WATER RECLAMATION FACILITY FACILITY PLAN

FINAL

June 2013

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CITY OF POST FALLS

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City of Post Falls WRF Facility Plan

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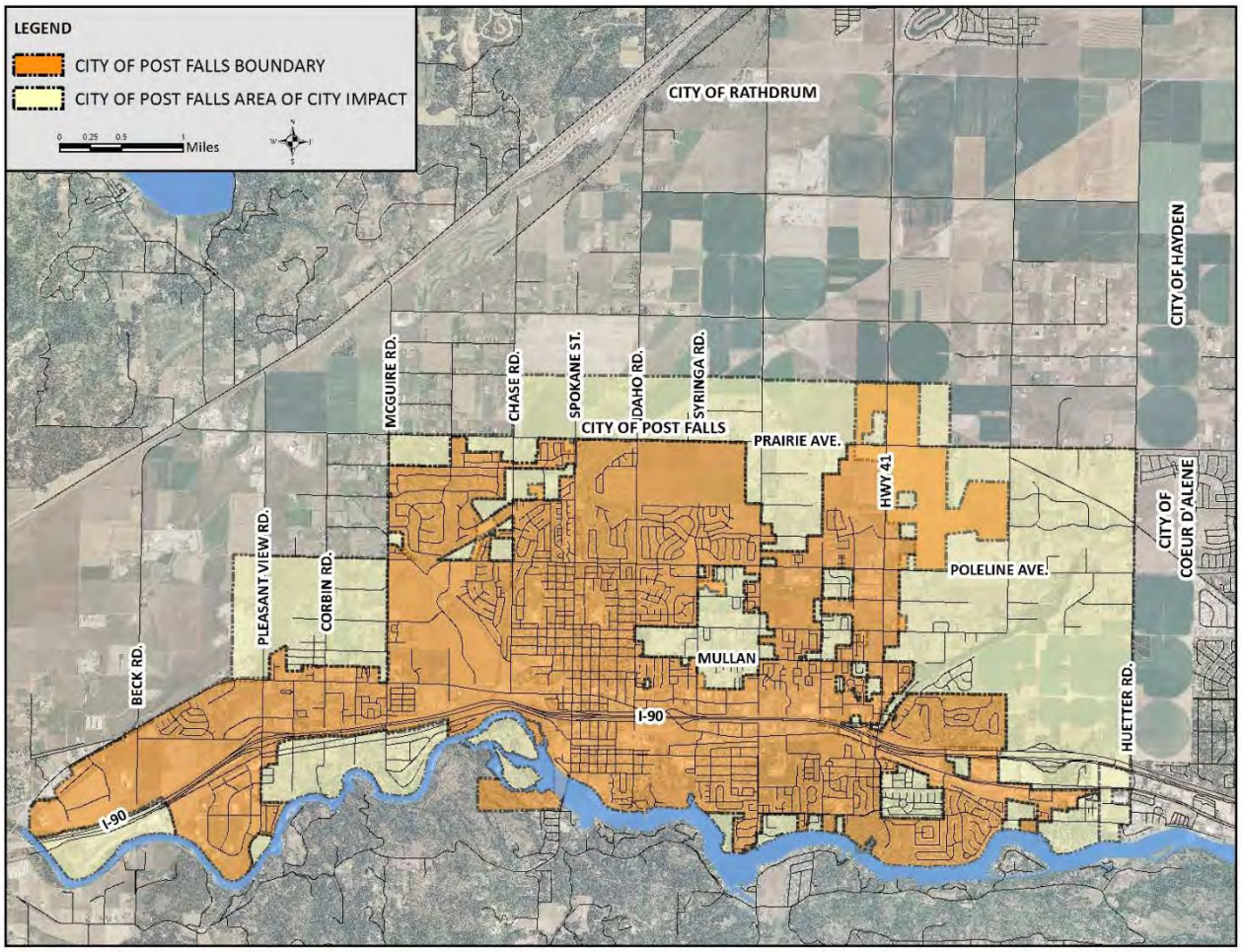
ES – Executive Summary

ES.1 Introduction and Objectives for the Plan

The City of Post Falls owns and operates a Water Reclamation Facility (WRF) to reclaim municipal wastewater generated within its boundaries. It also treats the wastewater pumped through their 8-mile-long force main by the City of Rathdrum, Idaho. **Figure ES-1** shows the City limits and general service territory.

Figure ES-1 – City of Post Falls



The purpose of this planning effort is to give the City the guidance necessary for providing future improvements at its WRF for the next 20 years–from 2012 to 2032. The effort also provides preliminary planning for expansion beyond the 20-year evaluation period. It is important to note that both Post Falls and Rathdrum have developed Collection System Master Plans separately from this Facility Plan. The Master Plans were consulted but are considered to be stand-alone documents.

The Facility Plan is organized into a series of Technical Memorandums (TMs) to more easily identify the origin and development of improvement alternatives. A summary of the TMs and their contents follows:

TM No. 1: Introduction and Overview: Includes a description of the basis and need for the planning document and the basic existing environmental conditions.

TM No. 2: Existing Conditions and Systems Review: Includes a description of the existing flows and loads experienced at the WRF, existing WRF unit process treatment capacities and identified deficiencies.

TM No. 3: Flow and Wasteload Projections: Includes a description of the projected flow and load increases anticipated at the WRF during the 20-year planning period.

TM No. 4: Regulatory and Permitting Review: Includes a review of past, current, and potential future regulatory considerations and restrictions in relation to federal and state water quality regulations associated with river discharge and recycled water rules.

TM No. 5: Unit Process and Improvement Options: Includes a review and recommendation of improvements and options necessary to meet anticipated treatment levels for each unit process within the WRF.

TM No. 6: Alternatives Review: Includes a review of each of the major treatment alternatives combining individual unit process improvement recommendations, alternative effluent disposal options including river discharge, and reclaimed effluent reuse; comparison of environmental impacts and costs; and selection of a preferred alternative.

TM No. 7: Financial Plan: Includes a capital improvement financial plan with anticipated phasing of projects, financial needs in relation to rates, fees and financing.

ES.2 Regulatory Overview

The primary impetus for this facility planning effort is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River. The NPDES Permits are being driven by a concern for diminished dissolved oxygen and fish tissue concentrations of toxic compounds.

The Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) was prepared by the Washington Department of Ecology (WDOE) and approved by the EPA in July 2010. The TMDL was developed to address water quality concerns in Lake Spokane (Long Lake), the upstream impoundment behind the Long Lake Dam. The TMDL restricts discharge of oxygen-demanding substances to among the lowest levels in the United States, including ammonia-nitrogen, total phosphorus, and 5-day carbonaceous biochemical oxygen demand ($CBOD_5$). Since Idaho permits issued by EPA cannot cause the violation of a downstream water quality standard, EPA plans to issue revised NPDES Permits in 2012 consistent with those issued by WDOE in 2010 and 2011. The anticipated permit for the City of Post Falls will equate to concentration limits of 8.0 mg/L (parts per million) for ammonia, 0.076 mg/L phosphorus (76 parts per billion), and 8 mg/L $CBOD_5$ at 5.0 million gallons per day (mgd) of flow. Those concentration limits will decrease proportionally to increasing flows in the future. The permit will also likely include a Compliance Schedule of up to ten years to fully meet the new requirements.

In addition to the DO TMDL, WDOE is also requiring Washington dischargers to participate in a Regional Toxics Task Force (RTTF) with the express purpose of reducing polychlorinated biphenyls (PCBs) in the Spokane River. Fish tissue concentrations in the Spokane River and Lake Spokane led to action on toxics, including a proposed PCB TMDL in Washington in 2006; a TMDL for cadmium, lead, and zinc in 1998; as well as concerns over dioxin and a "PCB-like" flame retardant molecule called polybrominated diphenylether (PBDE). Under the proposed draft NPDES Permit for Post Falls, EPA does not require participation in the RTTF. However, the Idaho water quality standard for PCB was more stringent than the Washington standard until May 2012 when EPA rejected Idaho's daily fish consumption value. Fish consumption essentially sets limits for 187 Water Quality Standards and 88 toxic compounds in Idaho, including PCBs, dioxins, and heavy metals. EPA stated that Idaho's recommended national standard of 17.5 g/day of fish consumption may be inadequate based on fish consumption studies completed in Oregon (175 g/day) by the Spokane Tribe of Indians and underway in Washington. Idaho has responded to EPA over the ruling by beginning negotiated rulemaking in October 2012 and contracting with an independent third party technical team to conduct surveys and determine appropriate fish consumption rates by the end of 2014. Because of these issues, EPA intends to require Idaho dischargers to regularly sample influent and effluent for PCB and dioxin plus sample river water for PCBs to determine "if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians." The EPA is also strongly encouraging Idaho dischargers to formally commit to participation in the RTTF as an alternative to immediate development of a TMDL.

Heavy metals also tend to accumulate in fish tissues and create concern for human health. Idaho's "TMDL for Dissolved Cadmium, Lead, and Zinc in the Surface Waters of the Lake Coeur d'Alene Basin" was ruled void on procedural grounds by the Idaho Supreme Court in 2003 and has not been revisited. Since Idaho has the Spokane River listed as a high priority water body, IDEQ originally contended that existing permit holders are limited to the mass loadings currently allowed in approved permits until a TMDL is approved. Detailed discussions with IDEQ led to a reconsideration of this interpretation and an expected concentration-based standard in accordance with existing water quality standards. IDEQ's response is included in **Appendix 4-C**. Therefore, river discharge limitations for metals will be influenced by both the proposed TMDL and the fish consumption standards being considered in 2012 and beyond. It is crucial for the City to stay involved in the development of these studies and resulting regulations in order to update this Facility Plan and provide for the required levels of treatment.

ES.3 Existing Facilities Review and Flow and Load Projections

The Post Falls WRF is a secondary extended aeration activated sludge wastewater treatment plant. Wastewater is screened and de-gritted during preliminary treatment. Flow is then split between two portions of the plant–one half is currently capable of biological phosphorus removal and the second half (2011 Upgrades) is designed for biological nutrient removal. Secondary treatment is performed through oxidations ditches and circular clarifiers. Flows from each half of the plant are then re-combined and disinfected with intense ultraviolet light. Treated flow currently discharges to the Spokane River downstream of the Post Falls Dam. Biosolids wasted from the secondary processes are dewatered utilizing belt filter presses and are trucked off site for land application and/or composting by a licensed third party contractor. **Figure ES-2** shows the treatment processes in schematic form and **Figure ES-3** shows an aerial photograph of the existing facility.

Figure ES-2 – Post Falls WRF Process Schematic

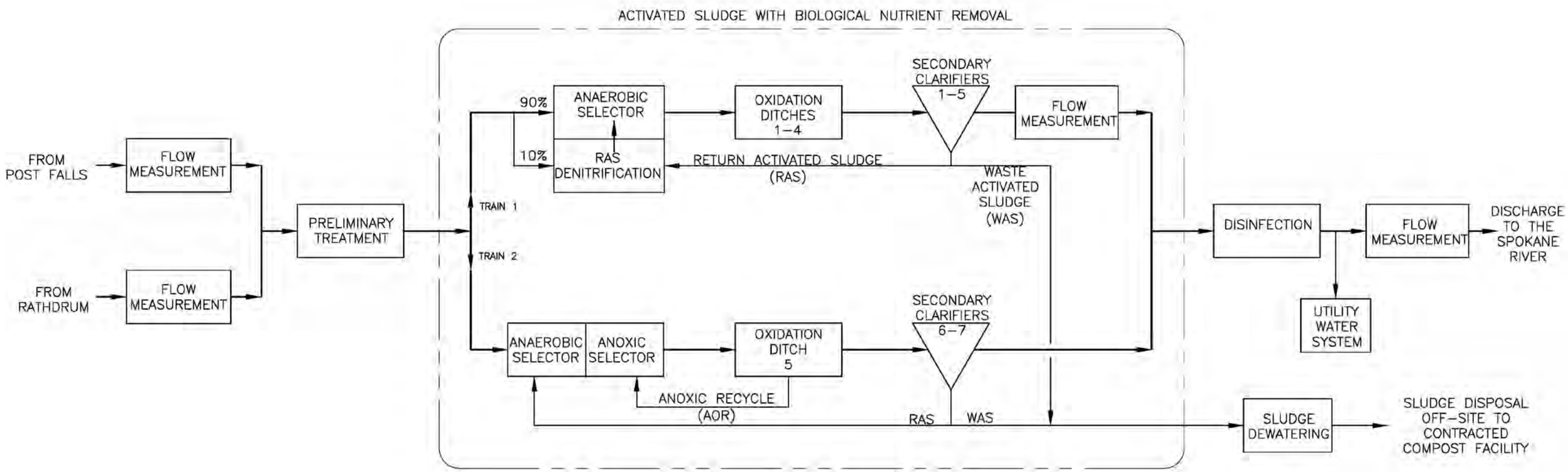
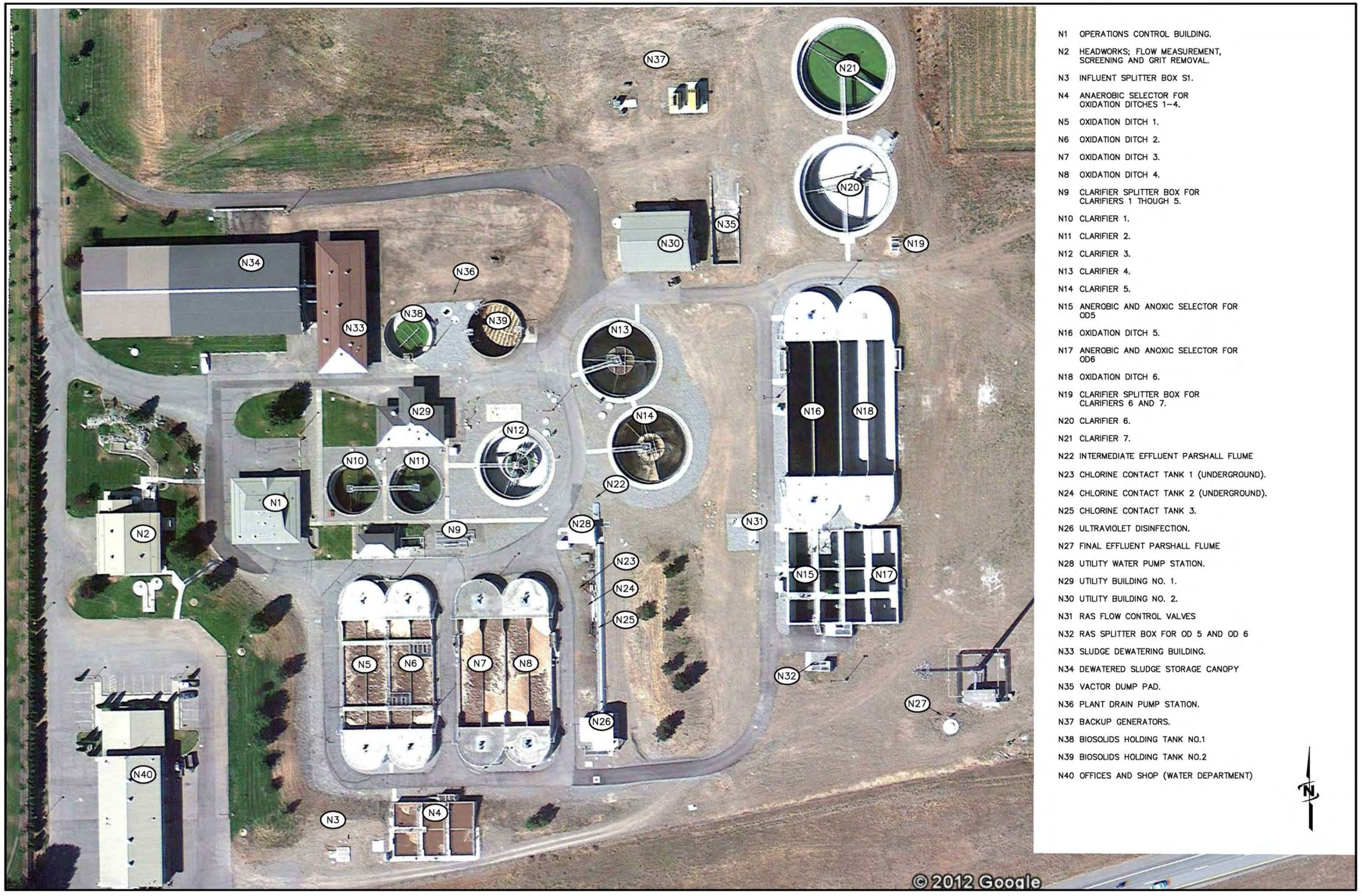


Figure ES-3 – Existing Post Falls WRF Aerial Photo and Site Layout



Flows and influent waste loads were reviewed in conjunction with historic population growth rates to determine past and likely projected future growth. Based on this review, 3.5 percent annual growth was selected as a reasonable projection between the commonly-referenced values ranging from 1.5 percent to 9.5 percent per year. Utilizing the 3.5 percent annual growth rate, projected average daily flow and loads through the 20-year planning period appear in **Table ES-1**. To provide a conservative estimate, peaking factors relative to average daily flows were assumed to remain consistent and re-applied to the projected average conditions.

Table ES-1 – Projected Influent Flows

	"2007-2011" Historical Flow (mgd)	2011 Peaking Factor [a]	2031 Projected Flows (mgd)
Peak Hour Flow (Max Instantaneous)	5.54	2.30	12.0
Observed Maximum Day	4.05	1.68	8.7
Statistical Maximum Day	3.04	1.26	6.5
Statistical Maximum Week	2.76	1.15	6.0
Statistical Maximum Month	2.61	1.08	5.6
Average Daily Flow	2.41 (2.62) [b]	---	5.2
Statistical Minimum Month	2.23	0.92	4.8
Actual Minimum Day	1.84	0.76	3.9

[a] *Relative to Average Daily Flow 2007-2011.*

[b] *Current 2011 average to be used as baseline for projections.*

Influent wasteloads were also projected through the 20-year planning period and are shown in **Table ES-2**.

Table ES-2 – Projected 2031 Waste Loads

	Projected BOD Load (lbs/day)	Projected TSS Load (lbs/day)	Projected NH3-N Load (lbs/day)	Projected TP Load (lbs/day)	Projected AOR Load (lbs/day)
Actual Maximum Day	16,360	26,062	1,931	449	27,172
Statistical Maximum Day	15,726	19,707	1,900	398	26,847
Statistical Maximum Week	13,844	13,944	1,770	359	26,360
Statistical Maximum Month	12,574	12,080	1,650	331	25,536
Average Daily Load	10,973	10,202	1,436	297	22,578
Statistical Minimum Month	9,577	8,706	1,277	256	20,199
Actual Minimum Day	6,341	6,363	1,074	212	16,203

ES.4 Alternatives Evaluation

In order to meet the permitting and treatment objectives identified in the plan as well as provide for continued growth to its member entities, the City of Post Falls is considering four general improvement alternatives. They are:

- Alternative 1: No action alternative
- Alternative 2: Additional treatment with seasonal river discharge (expand to partial reuse system to 3.2 mgd on existing land; no new land)
- Alternative 3: Additional treatment for seasonal river discharge combined with expanded full seasonal reuse (expansion of reuse land to 5.2 mgd)
- Alternative 4: Modifications to existing treatment system for full seasonal reuse (growing season) and non-growing season winter storage (emergency river discharge)

Each of these alternatives (as well as the potential environmental impacts, advantages, disadvantages, and 20-year life cycle costs) is discussed in more detail in Technical Memorandum 6. Necessary improvements to the WWTP facility are similar for Alternatives 2 and 3. Potential site layout for the WWTP improvements (as well as potential reuse expansion alternatives) is considered for the 20-year planning period. The goal of this plan is to receive public comment on these potential alternatives so the City can appropriately select the preferred alternative.

ES.4.1 Alternative 1: No Action Alternative

For this alternative, the City would not implement any improvements to the wastewater treatment facilities. This option is not recommended due to the following:

- The City of Post Falls will likely be unable to meet upcoming effluent discharge standards. The non-compliance situation will likely continue in the future unless improvements are implemented. This will likely result in fines and/or other penalties imposed by regulatory agencies.
- Effluent quality from the facility will most likely continue to worsen in the future as the treatment facilities become overloaded.
- Future residential and commercial growth may be restricted through a building moratorium unless the improvements are implemented. This may result in a loss of business and reduced property values and revenues.

ES.4.2 Alternative 2: Additional treatment for seasonal river discharge combined with seasonal reuse (during growing season to 3.2 mgd)

Under this option, the City would upgrade the existing WRF system targeting year-round discharge to the Spokane River. For this alternative, the existing treatment system would expand their secondary BNR facilities, combined with some form of effluent filtration. The following are recommended improvements under this alternative:

- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving adding mechanical equipment to OD 6, additional Secondary Clarifier No. 8.
- Effluent Filtration: Provide coagulation/settling and filtration to meet increased river discharge effluent requirements.
- Disinfection System: Increase reliability of existing UV disinfection system.
- Outfall: Increase capacity of river outfall pipeline.
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Reuse Site: The system will need improved with pipelines and irrigation equipment on existing Post Falls land plus purchase of Rathdrum's existing land (or equivalent).
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist a new building, with multiple irrigation pumps with a combined capacity of 5000 gpm (average daily flow of 3.2 mgd); piping, fittings, controls, and flow meters for distribution to the reuse site irrigation system during the growing season.
- Miscellaneous Improvements: Additional improvements required for this alternative include:
    - Site fencing around the storage lagoon and land application site to keep wildlife, debris and unauthorized personnel from entering the site.
    - Extension of power to the new storage lagoon site for irrigation pump station.
    - Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
    - Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
    - Wheel line, drip, or center pivot irrigation system for the new land application site.
    - A gravel access road to the new storage lagoon and/or land application site.
- Toxic Substances:
    - It is crucial for the Idaho dischargers including the City of Post Falls to stay actively involved in working with IDEQ to address the issue of lead, cadmium, and zinc concentrations in the Spokane River. This Facility Plan currently anticipates that the water quality standards for the Spokane River can be addressed through coordination and negotiation with IDEQ (likely will include a TMDL process). The objective of that effort is to document how the City of Post Falls discharge materially improves metals water quality due to the inherent hardness characteristics and thereby avoid an expensive quaternary (fourth level) process that would provide no demonstrateable benefit.

- As discussed in TM #4, concentrations of polychlorinated biphenyls (PCBs), dioxins, and polybrominated diphenyl ethers (PBDE) are also being considered for TMDLs by the State of Washington and/or the Spokane Tribe of Indians. Pilot studies at the City of Spokane and a literature review indicate that these compounds are reduced by 95 percent or higher across full tertiary treatment facilities similar to those proposed by this Facility Plan. It is unclear if and/or what other measures may be required to achieve Idaho or downstream water quality standards.
- These questions regarding metals and trace refractory organics should be addressed as part of any proposed pilot testing by the City of Post Falls and on-going coordination with IDEQ, EPA, and the State of Washington.

ES.4.3 Alternative 3: Additional treatment for seasonal river discharge combined with full seasonal reuse (during growing season to 5.2 mgd)

For this alternative, the existing treatment system would be utilized for treatment of the wastewater combined with the same in-plant improvements identified for Alternative 2. In addition to these improvements, the system would expand the seasonal reuse activities described in Alternative 2 in order to match the average daily flow conditions for the 20-year period.

During the non-growing season, treated effluent will continue to be discharged to the Spokane River. During the growing season, treated effluent would then be pumped to new storage lagoons where it would be held until it could be applied through a slow-rate land application site for irrigation of a crop. The following are recommended improvements under this alternative:

- Preliminary Treatment: Same as Alternative 2.
- Biological Treatment: Same as Alternative 2.
- Effluent Filtration: Same as Alternative 2.
- Disinfection System: Same as Alternative 2 with expansion for increased disinfection requirements for reuse.
- Outfall: Same as Alternative 2.
- Laboratory/SCADA: Same as Alternative 2.
- Solids Handling: Same as Alternative 2.
- Storage Lagoon: 7-day storage would be added as a buffer to process upset and for equalization of flows for irrigation. The Spokane River would be retained for non-growing season or non-compliance reuse disposal of reclaimed water.
- Reuse Site: The system will need to be improved with pipelines and irrigation equipment. Additional land will be required to provide the necessary irrigated acreage. An additional 582 acres will be required for 5.2 mgd ADF.
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist of a new building, with multiple irrigation pumps with a combined capacity of 5,500 gpm (peak day equalized flow of 7.7 mgd); piping, fittings, controls, and flow meters for distribution to the reuse site irrigation system.

- Miscellaneous Improvements: Additional improvements required for this alternative include:
  - Site fencing around the storage lagoon and land application site to keep wildlife, debris, and unauthorized personnel from entering the site.
  - Extension of power to the new storage lagoon site for irrigation pump station.
  - Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
  - Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
  - Wheel line, drip, or center pivot irrigation system for the new land application site.
  - A gravel access road to the new storage lagoon and/or land application site.
- Toxic Substances: Same as Alternative 2

ES.4.4 Alternative 4: Modifications to existing treatment system for full seasonal reuse (growing season) and non-growing season winter storage (emergency river discharge)

For this alternative, the existing treatment system would be utilized for treatment of the wastewater combined with the same in-plant improvements identified for Alternative 2. In addition to these improvements, the reuse activities would be expanded as necessary for year round reuse and winter storage. The existing river discharge would be retained as an alternative disposal point for recycled water that does not fully meet the Class A specifications.

The following are recommended improvements under this alternative:

- Preliminary Treatment: Same as Alternative 2.
- Biological Treatment: Same as Alternative 2.
- Effluent Filtration: Same as Alternative 2, with reduced chemical usage and reduced capital investment (increased hydraulic loading rates on filters).
- Disinfection System: Same as Alternative 2, with expansion for increased disinfection requirements for reuse.
- Outfall: Expanded and retained for emergency discharge.
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems.
- Toxic Substances: No river discharge requires no new improvements to meet recycled water requirements.
- Storage Lagoon: 7-day storage would be added as a buffer to process upset, and for equalization of flows for irrigation. The Spokane River would be retained for non-growing season or non-compliance reuse disposal of reclaimed water.

- Reuse Site: The system will need improved with pipelines and irrigation equipment. Additional land will be required to provide the necessary irrigated acreage. An additional 2298 acres will be required for 5.2 mgd ADF.
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist a new building, with multiple irrigation pumps with a combined capacity of 11000 gpm (average daily flow of 5.2 mgd); piping, fittings, controls, and flow meters for distribution to the reuse site irrigation system during the growing season.
- Miscellaneous Improvements: Additional improvements required for this alternative include:
    - Site fencing around the storage lagoon and land application site to keep wildlife, debris, and unauthorized personnel from entering the site.
    - Extension of power to the new storage lagoon site for irrigation pump station.
    - Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
    - Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
    - Wheel line, drip, or center pivot irrigation system for the new land application site.
    - A gravel access road to the new storage lagoon and/or land application site.

A summary of the likely costs and projects associated with each alternative is presented in **Table ES-3**.

Table ES-3 – Opinion of Probable Costs

Item for Capital Costs	*Description of Project*	*Targeted Year to begin Project*	Improvement Alternative 2: Additional Treatment with Year Round River Discharge (Expand to partial reuse system, no new land)	Alt 2 (20-year O&M)	Improvement Alternative 3: Additional Treatment combined with 5.2 MGD Seasonal Reuse (expansion of reuse)	Alt 3 (20-year O&M)	Improvement Alternative 4: Additional Treatment combined with 5.2 MGD Year Round Reuse	Alt 4 (20-year O&M)
Tertiary Treatment Pilot Study	$2M Project in current FY 2013 City Budget	2013						
Class C Reuse (Demonstration Project)	Reuse on WRF and adjacent land	2013	$167,600	$140,000	$ 167,600	$ 140,000	$ 167,600	$ 140,000
Outfall Improvements - Phase I	South of I-90 to River	2013	$1,620,000	0	$ 1,620,000	$ -	$ 1,620,000	$ -
Laboratory and Control Building Improvements	Lab, Admin and control improvements	2014	$662,500	0	$ 662,500	$ -	$ 662,500	$ -
Preliminary Treatment - Equalization Tank	New EQ	2015	$7,528,168	$880,000	$ 7,528,168	$ 880,000	$ 7,528,168	$ 880,000
Preliminary Treatment - Headworks	Relocate Headworks	2015	$2,645,032		$ 2,645,032	$ -	$ 2,645,032	$ -
Tertiary Treatment [1]	Tertiary (assumes MF)	2015	$19,230,000	$11,080,000	$ 19,230,000	$ 5,540,000	$ 19,230,000	$ 2,770,000
Disinfection - Improvements to Existing UV	Mitigate deficiencies and reliability	2017	$550,500	0	$ 550,500	$ -	$ 550,500	$ -
Biosolids Treatment Improvements (Digestion) [1]	Digestion Improvements	2017	$9,971,800	($4,100,000)	$ 9,971,800	$ (4,100,000)	$ 9,971,800	$ (4,100,000)
Utility Water Pump Station		2017	$743,400	0	$ 743,400	$ -	$ 743,400	$ -
Secondary Treatment Improvements	Expand BNR Eqpt into Ditch 6 and Clarifier 8	2019	$3,730,000	$1,100,000	$ 3,730,000	$ 1,100,000	$ 3,730,000	$ 1,100,000
Disinfection Improvements - Class A UV	Necessary for Class A Reuse	2022	$1,943,000	$800,000	$ 1,943,000	$ 800,000	$ 1,943,000	$ 800,000
Phase 1 -Class A Seasonal Reuse, 3.2 MGD Capacity, 618 Acre Existing Site, retain river outfall for non-growing season. Purchase 314 acres from City of Rathdrum.	Necessary for Class A Reuse	2022	$17,800,000	$982,000	$ 17,800,000	$ 982,000	$ 17,800,000	$ 982,000
Expanded Reuse to 5.2 MGD (Seasonal Reuse)	Seasonal Reuse with no winter storage. Non-growing season discharge to River.	2022		"	$ 10,090,000	$ 565,000	$ 10,090,000	$ 565,000
Maintenance Shop		2023	$757,400	0	$ 757,400	$ -	$ 757,400	$ -
Outfall Improvements - Phase II (Pipeline for I-90 Crossing)	South of I-90 to WRF	2025	$280,000	0	$ 280,000	$ -	$ 280,000	$ -
Full Reuse to 5.2 MGD (Year Round)	Full Reuse, no river discharge (assumes river discharge only for non-Class A water compliance)	2027					$ 82,010,000	$ 1,237,000
TOTAL			**$ 67,600,000**	**$ 10,900,000**	**$ 77,700,000**	**$ 5,900,000**	**$ 159,700,000**	**$ 4,400,000**
Total Capital + O&M				$ 78,500,000		$ 83,600,000		$ 164,100,000

ES.5 Selected Alternative

ES.5.1 Alternative Comparison of Environmental Considerations

A summary of the potential environmental concerns related to the project alternatives are as follows in **Table ES-4**.

Table ES-4 – Screening **Level Environmental Concerns**

Environmental Criteria	No Improvements (Alternative 1)	(Alternative 2) Additional treatment with year round river discharge (continuation of current practices) and seasonal reuse on existing land	(Alternative 3) Additional treatment for seasonal river discharge combined with 100% seasonal reuse (during growing season)	(Alternative 4) Modifications to existing treatment system for full seasonal reuse (growing season) and non-growing season winter storage (emergency river discharge)
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)	Yes – excavation for treatment facilities, expanded reuse and pipeline (Short-Term and Minor Long-Term Impact)	Yes – excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes - No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes - potential risk as system grows and inability to meet river discharge requirements year-round (Potential Long-Term Impact)	Yes – lower potential risk as system grows and inability to meet discharge requirements year-round (Potential Long-Term Impact	Yes - potential risk as system grows and inability to meet reuse requirements year-round (Potential Long-Term Impact)
Land Use	No Impact	No Impact	Yes - expanded reuse will potentially re-purpose land identified for Reuse expansion (Potential Long-Term Impact)	Yes - expanded reuse will potentially re-purpose land currently utilized for other purposes (Potential Long-Term Impact)
Floodplain Development	No Impact	No Impact	No Impact	No Impact
Wetlands and Water Quality	Yes - significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes - moderate risk as system grows to consistently treat wastewater to meet river water quality requirements (Long-Term Impact)	Yes – POSITIVE, reduced risk as system grows to consistently treat wastewater to meet river water quality requirements (Long-Term Impact)	Yes – POSITIVE, significantly reduced risk to meet river water quality requirements (Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)
Flora and Fauna	No Impact	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)

Environmental Criteria	No Improvements (Alternative 1)	(Alternative 2) Additional treatment with year round river discharge (continuation of current practices) and seasonal reuse on existing land	(Alternative 3) Additional treatment for seasonal river discharge combined with 100% seasonal reuse (during growing season)	(Alternative 4) Modifications to existing treatment system for full seasonal reuse (growing season) and non-growing season winter storage (emergency river discharge)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact (no change to land classification)	Yes – POSITIVE expanded reuse may increase agricultural lands (Potential Long-Term Impact)	Yes- POSITIVE expanded reuse may increase agricultural lands (Potential Long-Term Impact)
Air Quality	No Impact	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	Yes – increased energy consumption with facility upgrades (Long-Term Impact)	Yes – increased energy consumption with facility upgrades (Long-Term Impact)	Yes – increased energy consumption with facility upgrades (Long-Term Impact)
Public Health	Yes - water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, eliminate requirements to meet discharge requirements to river (Long-Term Impact)
Alternative Preliminary Cost Opinion (Total 2012 Present Worth Capital + O&M)	---	$78,500,000	$83,600,000	$164,100,000

ES.5.2 Potential Build-Out Site Plan

Alternative No. 3 was selected as the preferred alternative as recommended by J-U-B, City staff, and the City Council. The final selected alternative was determined by the City Council after receiving input from the public and regulatory agencies for all alternatives. The recommendation was developed from regulatory considerations reviewed in TM No. 4 and the development of treatment alternatives presented in TM No. 5. A wide range of alternatives was considered during the development of this plan for meeting the City's wastewater treatment and disposal requirements. The recommended alternative provides a flexible, long-term management approach for the City while identifying a phased implementation program to meet capacity and treatment requirements for the next 20 years.

Figure ES-4 provides a general layout for Alternative No. 3 (WRF capacity to 5.2 MGD) facilities at the City's WRF site and adjacent City-owned vacant parcels. It also shows how these facilities may be expanded over time to serve the projected build-out of the WRF (17.8 MGD).

ES.6 Financial Plan

Prior to selection of the alternative by the Council, and as a means to more fully understand the potential impact to their constituents, the City authorized J-U-B's subconsultant (FCS Group) to complete a basic preliminary draft analysis on the recommended Alternative No. 3. The intent of the analysis is to put the financial elements of alternative selection into perspective so that better review decisions could be made but without the expense of completing a full financial plan for every alternative. Alternative No. 2 has a similar treatment approach with less expensive reuse expenditures; therefore, its economic impact would be less than Alternative No. 3. Alternative No. 4 requires similar treatment improvements but relies exclusively on permanently removing discharge from the Spokane River and relying solely on reuse property for wastewater disposal. The cost for additional land to provide storage and disposal is high, making this alternative the highest cost option over time compared to Alternative No. 3. Ultimately, upon consideration of factors, including environmental concerns, public comments, and costs, Alternative No. 3 was selected by the Council.

Critical important financial analysis parameters and assumptions utilized are listed in TM No. 7.

This financial approach tends to utilize relatively conservative assumptions for future projections in order to provide reliable system funding. This draft approach currently projects the annual average rate increase of 9.46 percent for the average City customer to fully fund Alternative No. 3, including construction, operations, maintenance, and full-funded depreciation reserves. **Table ES-5** shows how these rate increases would apply during projected years when bonding would be required.

Figure ES-4 – Build-Out Aerial Photo of Site Layout

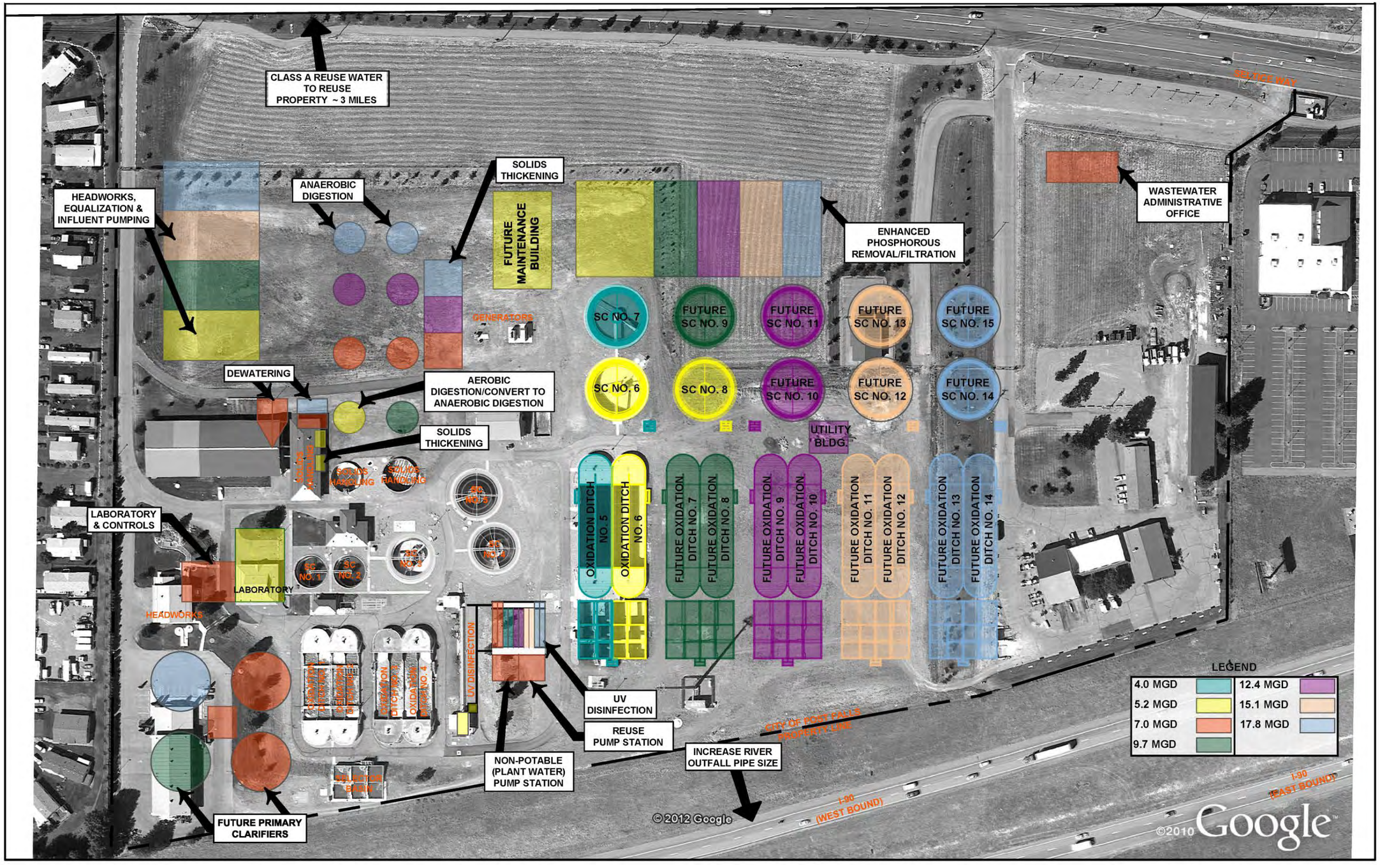


Table ES-5 – Preliminary Rate Analysis Summary (Alternative No. 3)

	2013	2018 [a]	2023 [b]
Cumulative Increase from 2012 (%)	2.50%	72.40%	131.42%
Total Monthly Rate (Avg User)	$49.63	$49.63 [a]	$68.35 [b]

[a] *NPDES Permit compliance schedule driven project borrowing completed in 2017.*

[b] *Growth/capacity driven project borrowing completed in 2021.*

While the projected annual rate increases for the entire planning period average 5.45 percent, **Table ES-5** shows that the first five years require the majority of the funding increases. The preliminary financial model indicates 14.5 percent rate increases in FY 2014 and 2015; 10 and 9 percent in FY 2016 and 2017 respectively with 7 percent increases through 2022. The overall average over the first ten years of the plan is 8.49 percent (year over year) increase to meet regulatory and replacement requirements.

New capacity will be funded by users requiring that capacity through capitalization fees. The financial model indicates that the City could decrease capitalization fees from the current $4659 per SU to no more than $4,563 per SU to have new users fully participate in funding their share of Alternative No. 3 capacity. If the City decides to substantially change capitalization fees, those changes should be reflected in the financial model and may tend to impact rates needed for interim funding. Capitalization fees for the treatment portion were calculated for the City of Rathdrum. The financial model indicates this fee could be increased from $3,036 to $4,021 per SU.

Additionally, the financial model anticipates a WWTP expansion between 2029 and 2033 with major collection system expansion project in 2033, as these planned facilities reach 85 percent of their available capacity. As such, funds are being allocated in the financial model but these projects aren't shown specifically as line-items in the capital improvement program.

It is important to note that the financial model is a representation of anticipated revenue and need for capital, operations, maintenance, and replacement funding. As such, the model should be updated regularly and periodically when factors such as significant capital project costs, financing terms, etc. become available.

J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Introduction and Overview

Final

June 2013

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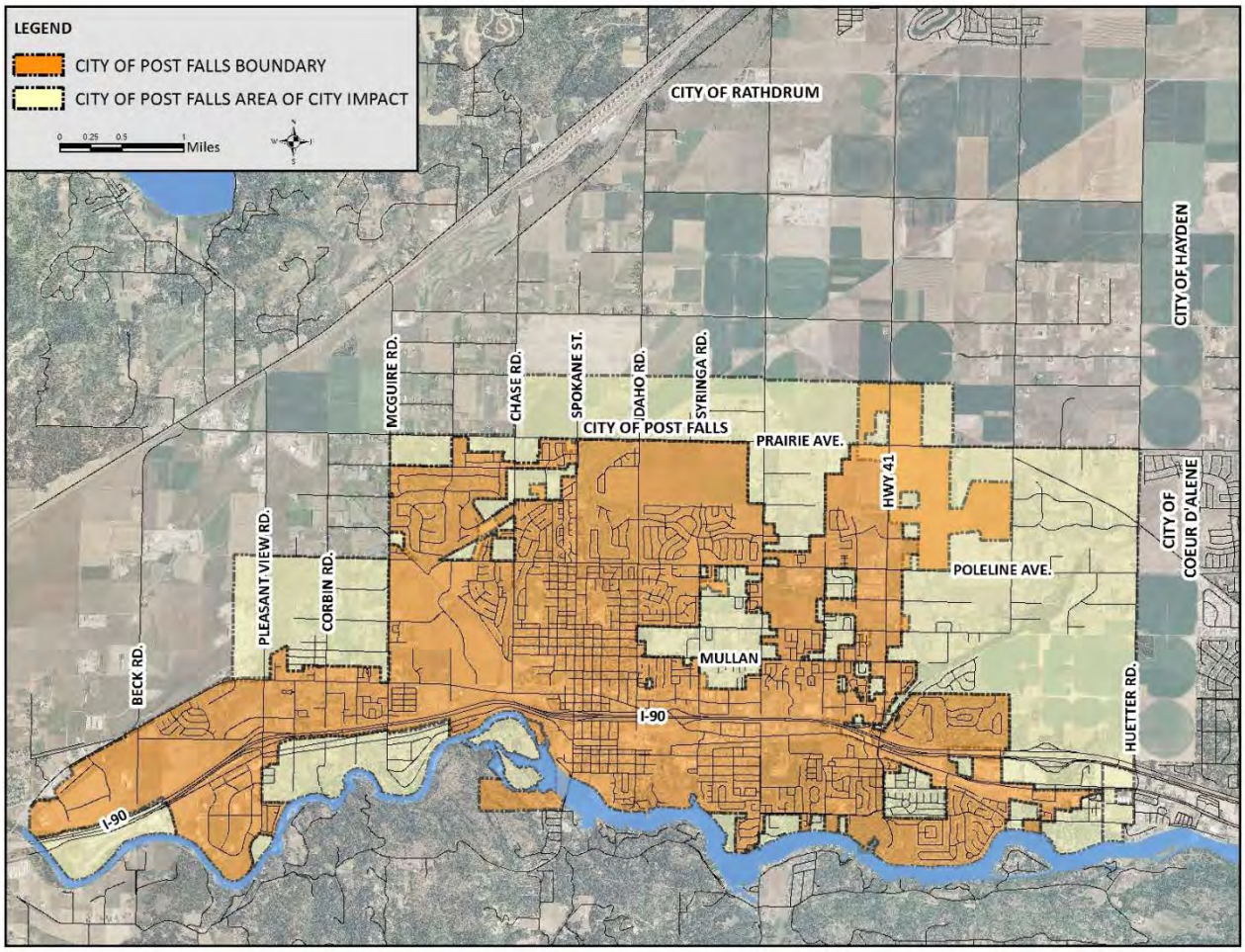
TM 1 – Introduction and Overview

1.1 Background

The City of Post Falls (City) is located in the northern panhandle of Idaho, generally north of the Spokane River on the Rathdrum Prairie. The City's existing Water Reclamation Facility (WRF) is located along Seltice Way north of Interstate 90 between Chase Road and McGuire Road. The WRF discharges reclaimed effluent to the Spokane River downstream of the Post Falls Dam. The City and city limits are shown on **Figure 1-1**. The City WRF also receives and treats wastewater from the City of Rathdrum. Wastewater is collected, and pumped to the Post Falls WRF in systems owned and operated by the City of Rathdrum. Wastewater is also collected and pumped within the City of Post Falls by the City's own systems. Facility planning for the Rathdrum and Post Falls collection systems is done under separate documents and are not included as part of this Plan.

Figure 1-1 – City of Post Falls



1.2 Historical Facility Planning

Previous facility planning efforts for the Post Falls WRF were completed in 2000 by Kimball Engineering. Kimball and J-U-B ENGINEERS, Inc. (J-U-B) merged in 2003. Rapid growth concerns in the Post Falls and Rathdrum areas in 2005 to 2006 prompted a master planning update. This document titled, "Wastewater Treatment Plant Master Plan, February 2006 through July 2008" by J-U-B identified the necessary improvements to 4.0 mgd plant capacity. Those improvements were subsequently constructed from 2008 to 2011 expanding the plant biological capacity from 3.1 to 4.0 mgd and converting the new half of the facility to full biological nutrient reduction (BNR) matched with the existing half of the plant utilizing enhanced biological phosphorus removal.

1.3 Planning Objectives

The purpose of this planning effort is to give the City guidance for future improvements for its WRF for the next 20 years (from 2012 to 2032), and preliminary planning for expansion beyond the 20-year evaluation period. The Plan is organized into a series of Technical Memorandums (TMs) to help the City identify immediate needs as well as long-term upgrades. The TMs also allow for development of costs, implementation strategies, and financial planning to budget and pay for necessary upgrades. It is crucial that this Facility Plan be reviewed at least every five years for possible modifications to address changing regulatory, economic, and technological conditions that cannot be fully anticipated in advance.

The primary impetus for this facility planning effort is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River. The NPDES Permits are being driven by a concern for diminished dissolved oxygen and fish tissue concentrations of toxic compounds.

The Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) was prepared by the Washington Department of Ecology (WDOE) and approved by the EPA in July 2010. The TMDL was developed to address water quality concerns in Lake Spokane (Long Lake), the upstream impoundment behind the Long Lake Dam. The TMDL restricts discharge of oxygen-demanding substances to among the lowest levels in the United States, including ammonia-nitrogen, total phosphorus, and five-day carbonaceous biochemical oxygen demand ($CBOD_5$). Since Idaho permits issued by EPA cannot cause the violation of a downstream water quality standard, EPA plans to issue revised NPDES Permits in 2012 consistent with those issued by WDOE in 2010 and 2011. The anticipated permit for the City of Post Falls will equate to concentration limits of 8.0 mg/L (parts per million) for ammonia, 0.0765 mg/L phosphorus (76 parts per billion), and 8 mg/L $CBOD_5$ at 5.0 million gallons per day (mgd) of flow. Those concentration limits will decrease proportionally to increasing flows in the future. The permit will also likely include a Compliance Schedule of up to 10 years to fully meet the new requirements.

In addition to the DO TMDL, WDOE is also requiring Washington dischargers to participate in a Regional Toxics Task Force (RTTF) with the express purpose of reducing polychlorinated biphenyl's (PCBs) in the Spokane River. Fish tissue concentrations in the Spokane River and Lake Spokane led to action on toxics, including a proposed PCB TMDL in Washington in 2006, a TMDL for cadmium, lead and zinc in 1998, as well as concerns over dioxin and a "PCB-like" flame retardant molecule called polybrominated diphenylether (PBDE). Under the proposed draft NPDES Permit for Post Falls, EPA does not require participation in the RTTF. However, the Idaho Water Quality Standard for PCB was more stringent than the Washington standard until May 2012 when EPA rejected Idaho's daily fish consumption value. Fish consumption essentially sets limits for 187 Water Quality Standards and 88 toxic compounds in Idaho,

including PCBs, dioxins, and heavy metals. EPA stated that Idaho's recommended national standard of 17.5 g/day of fish consumption may be inadequate based on fish consumption studies completed in Oregon (175 g/day), by the Spokane Tribe of Indians, and underway in Washington. Idaho has 90 days to respond to EPA over the ruling. Because of these issues, EPA intends to require Idaho dischargers to regularly sample influent and effluent for PCB and dioxin plus sample river water for PCBs to determine "if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians." The EPA is also strongly encouraging Idaho dischargers to formally commit to participation in the RTTF as an alternative to an immediate TMDL.

Heavy metals also tend to accumulate in fish tissues and create concern for human health. Idaho's "TMDL for Dissolved Cadmium, Lead, and Zinc in the Surface Waters of the Lake Coeur d'Alene Basin" was ruled void on procedural grounds by the Idaho Supreme Court in 2003 and has not been revisited. Since Idaho has the Spokane River listed as a high priority water body, IDEQ contends that existing permit holders are limited to the mass loadings currently allowed in approved permits until a TMDL is approved. Therefore, river discharge limitations for metals will be influenced by both the proposed TMDL and the fish consumption standards being considered in 2012 and beyond. It is crucial for the City to stay involved in the development of these studies and resulting regulations in order to update this Facility Plan and provide for the required levels of treatment.

In order to meet the permitting and treatment objectives as well as provide for continued growth to its member entities, the City of Post Falls is considering four general improvement alternatives. They are:

- Alternative 1: No action alternative
- Alternative 2: Additional treatment with year-round river discharge (expand to partial reuse system to 3.2 mgd; no new land)
- Alternative 3: Additional treatment for seasonal river discharge combined with full seasonal reuse to 5.2 mgd (expansion of reuse land)
- Alternative 4: Additional treatment as necessary, no river discharge; and year-round reuse activities (full reuse) with non-growing season winter storage

Each of these alternatives (as well as the potential environmental impacts, advantages, disadvantages, and 20-year life cycle costs) is discussed in more detail in Technical Memorandum 6. Necessary improvements to the WWTP facility are similar for Alternatives 2 and 3. Potential site layout for the WWTP improvements (as well as potential reuse expansion alternatives) is considered for the 20-year planning period. The goal of this plan is to receive public comment on these potential alternatives so the City can appropriately select the preferred alternative.

1.4 Temperature, Precipitation and Prevailing Winds

Climatic data for the area is recorded by the Coeur d'Alene Idaho Airport Weather Station in Hayden, Idaho. A summary of this data is provided in **Table 1-1**. Prevailing winds are predominantly from the west. The climate is generally temperate with approximately 25 inches of annual precipitation.

Table 1-1 – Historical Climatic Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	35	41	48	58	68	75	85	85	74	60	44	37	59.1
Average Min. Temperature (F)	22	24	29	34	41.7	48	53	52	45	37	30	25	36.8
Average Total Precipitation (in.)	3.4	2.5	2.3	1.7	2.01	1.8	0.7	0.9	1.3	2	3.1	3.6	25.26
Average Total Snowfall (in.)	16	8.9	3.6	0.5	0	0	0	0	0	0.2	4.3	13	46
Average Snow Depth (in.)	5	3	1	0	0	0	0	0	0	0	0	2	1

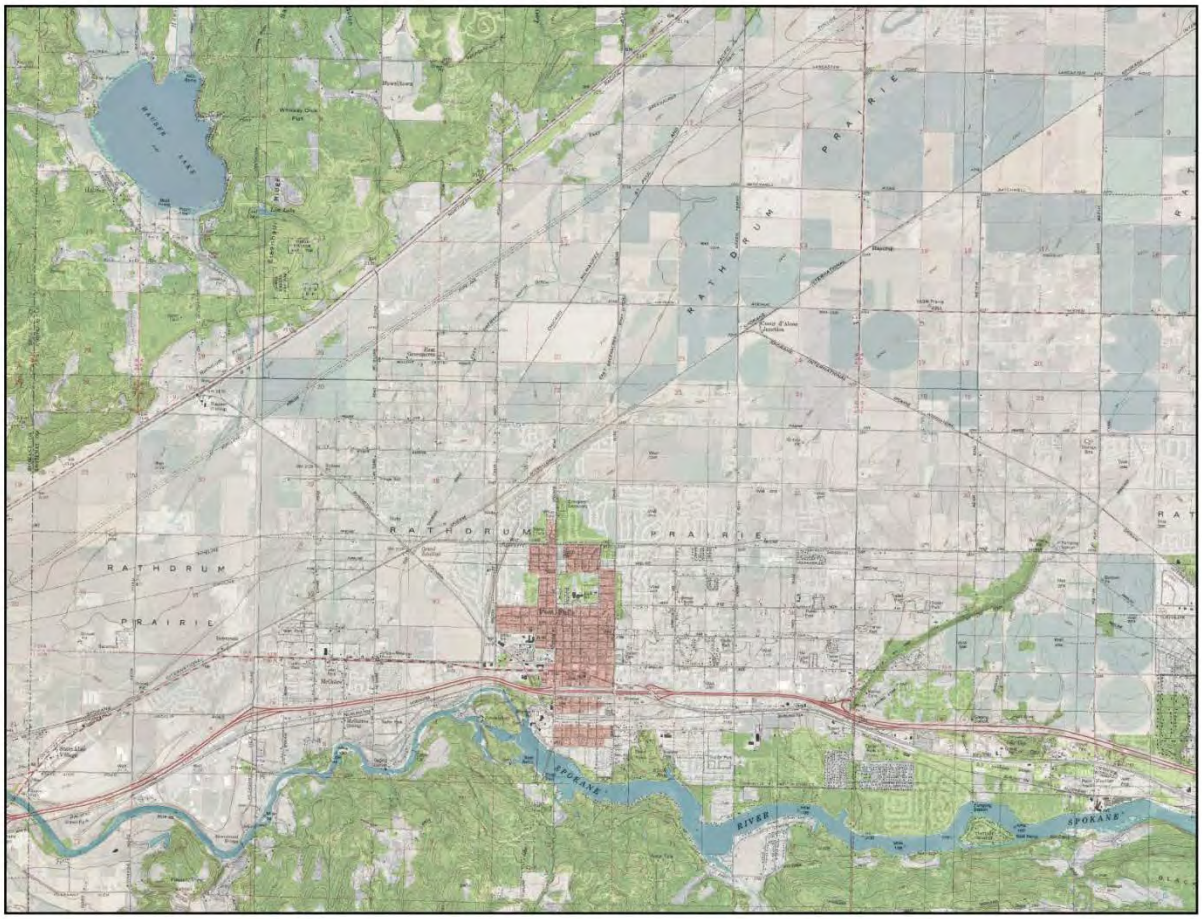
Source: Western Regional Climate Center, wrcc@dri.edu

Period of Record : September 1, 1895 to December 31, 2005

1.5 Physical Aspects: Topography, Soils and Geology

The topography of the City of Post Falls area is depicted on the U.S. Geologic Survey (USGS) topographic map shown in **Figure 1-2.** As shown on the map, the planning area generally consists of relatively flat land with a gradual slope to the south towards the Spokane River. The ground surface elevation is approximately 2,200 feet above sea level. The Post Falls area is bordered on the south by the Spokane River, on the east by the City of Coeur d'Alene, on the north by rural Rathdrum Prairie in Kootenai County agricultural land, and on the west by the Idaho Washington State Line.

Figure 1-2 – City of Post Falls Topography Map



The Post Falls area is at the south edge of the Rathdrum Prairie. This is a glacial-outwash plain where soils were deposited by water from the Spokane floods 12,000 to 22,000 years ago. The floodwaters were released when an ice dam burst on Glacial Lake Missoula in Montana. In the Post Falls area, up to 500 feet of sand, gravel, and silt were deposited in a relatively short period. Generally, the Prairie has level or gently sloping terraces with moderately steep slopes on the terrace breaks and along the Spokane River. Significant geologic features include the Spokane River and the Rathdrum Prairie Aquifer (Post Falls Comprehensive Plan).

A Natural Resource Conservation Service (NRCS) Web Soil Survey Map of the Post Falls area appears in **Figure 1-3.** The Post Falls regional area is generally underlain by Avonville-Garrison-McGuire soil types. These soils are well drained; their composition is mainly very coarse sand and gravel, and all materials are porous and permeable. These soil types are primarily suitable for irrigated cropland and rangeland. **Table 1-2** summarizes various characteristics of the predominant soil types in the area.

Figure 1-3 – NRCS Web Soil Survey Map

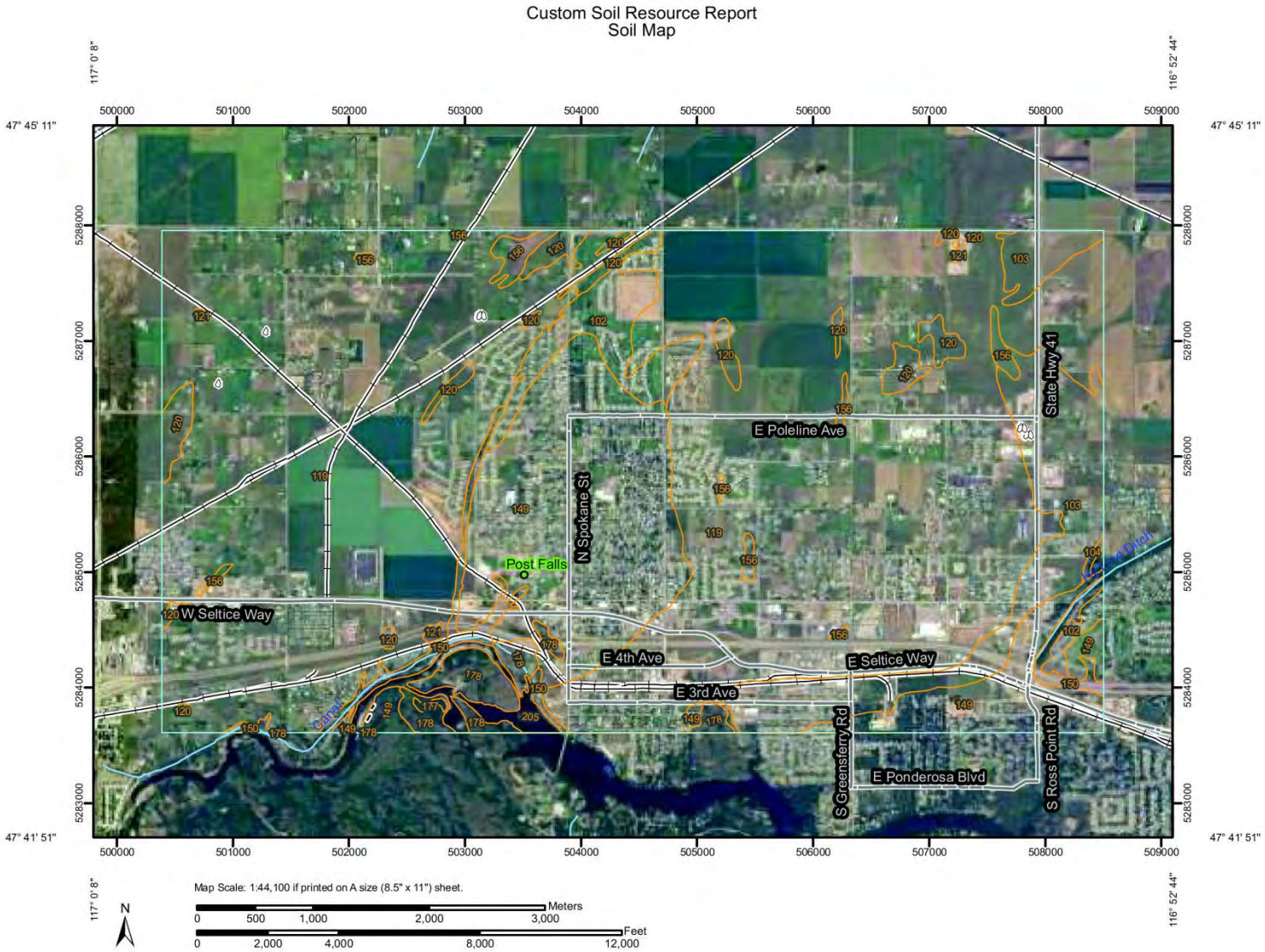


Table 1-2 – Soil Characteristics

Soil Map Unit	Description	Slope	Percent of Area	Drainage Class	Permeability	Available Water Capacity	Frequency of Ponding/Flooding
102	Avonville gravelly coarse sandy loam	0 to 20	2.7%	Well Drained	Moderate High to High	Low	None/None
103	Avonville fine gravelly silt loam	0 to 7 percent	7.0%	Well Drained	Moderate High to High	Low	None/None
104	Avonville fine gravelly silt loam	7 to 20 percent	0.1%	Well Drained	Moderate High to High	Low	None/None
119	Garrison gravelly silt loam	0 to 7 percent slopes	67.7%	Somewhat Excessively Drained	Moderate High to High	Low	None/None
120	Garrison very stony silt loam	0 to 7 percent slopes	2.2%	Somewhat Excessively Drained	Moderate High to High	Low	None/None
121	Pits, gravel	NA	0.1%	NA	NA	NA	None/None
149	McGuire-Marble association	0 to 7 percent slopes	14.9%	Somewhat Excessively Drained	High	Low	None/None
150	McGuire-Marble association	20 to 45 percent slopes	1.6%	Somewhat Excessively Drained	High	Low	None/None
156	Narcisse silt loam	0 to 5 percent slopes	0.8%	Moderately Well Drained	Moderate High to High	High	Occasional/None
177	Skalan gravelly loam	5 to 25 percent slopes	0.1%	Well Drained	Moderate High to High	Low	None/None
178	Skalan-Rock outcrop complex	5 to 30 percent slopes	1.8%	Well Drained	Moderate High to High	Low	None/None
205	Water	NA	0.9%	NA	NA	NA	NA

Source: Natural Resource Conservation Service – Web Soil Survey

1.6 Surface Water and Groundwater Hydrology

The area has an abundance of high-quality water. Surface water includes the Spokane River, with its shoreline bordering the southern edge of the City.

Below ground is the Rathdrum Prairie Aquifer, known to be one of the most vulnerable and prolific aquifers in the country. Soils in the City are generally dominated by alluvial sands and gravels, and are hydraulically connected to the Rathdrum Prairie Sensitive Resource Aquifer (RPA). Groundwater generally ranges from 150 to 300 feet below the ground surface. The RPA is the only Sensitive Resource Aquifer in Idaho. It is an aquifer high on the public's awareness for protection, with the following regulation history:

- 1977 Panhandle Health District (PHD) and Kootenai County create “5-acre rule” to limit onsite septic tank and drainfield wastewater treatment to one residential unit per five acres
- 1978 U.S. Environmental Protection Agency (EPA) Sole Source designation
- 1980 Idaho Department of Environmental Quality (IDEQ) designation as “Special Resources Water”
- 1995 IDEQ Supplement to Land Application Guidelines over Special Resource Aquifer
- 1997 IDEQ designates as “Sensitive Resource Aquifer”
- 2002 Idaho Department of Water Resources (IDWR) creates the Rathdrum Prairie Groundwater Management Area leading to adjudication
- 2003-2007 Bi-State Hydrologic Study, with the U.S. Geological Survey (USGS) and the State of Washington, focuses on water quantity
- 2006 voters approve Aquifer Protection District

1.7 Fauna, Flora and Natural Communities

Vegetation is an integral part of larger environmental systems. Predominate native tree species in the Post Falls area include Ponderosa Pine, Douglas Fir, Grand Fir, and Lodge Pole Pine. Understory plants that are native to the area include Snowberry, Sedge, Oregon Grape, and Idaho Fescue. The loss of indigenous plants can alter the character of the City and impact residents and wildlife. The City has an urban forestry program and supports the planting of trees throughout the community.

There are a variety of plants and animals in the Post Falls urban area that contribute to the quality of life within the community. All species require a specific set of conditions with respect to food, water, and vegetative cover or other natural features necessary for protection, feeding, and reproduction.

Important animal habitat areas include the riparian vegetation adjacent to the Spokane River and grasses on the Rathdrum Prairie, which support white tail deer, songbirds, and small mammals (Post Falls Comprehensive Plan).

1.8 Housing, Industrial and Commercial Development

The City of Post Falls encourages a balance of residential, commercial, and industrial lands that will serve to provide a well-balanced tax base. The City cooperates with the local business community to help retain, promote, and expand existing business and industry and to attract new business and clean industry that enhances, sustains, and diversifies the economic base.

Post Falls is strategically located along Interstate-90 with easy access to metropolitan Spokane and Coeur d’Alene. For this and many other reasons, Post Falls has become a vibrant, growing community.

Lumber and agriculture were the mainstays of the economy for most of the 20th Century, and a number of the residents commuted to the thriving mining district. The last 20 years of the century saw the decline of the lumber industry, the decline of mining, and major changes to agricultural production.

During this time, tourism grew into a major force and the City attracted new industries and commercial development. Rapid residential development also occurred.

Since 2000, the City has seen a great deal of new healthcare-related development. This includes a specialty and rehab hospital, a new Kootenai Medical Cancer Center, numerous medical offices, and a new Life Care Center. This can be viewed as a significant positive trend in the community.

Local "human capital" is growing and improving through enhanced educational services offered to the local labor force and through strengthening collaboration among business groups. The North Idaho College Workforce Training Center and the University of Idaho Research Park have located in Post Falls and continue to impact the education of the workforce.

Its "natural capital", the area's numerous lakes, rivers, mountains, and open spaces also add to the overall quality of life and economic attractiveness of Post Falls. The natural resources of the area and region continue to attract new residents and tourists (Post Falls Comprehensive Plan).

1.9 Cultural and Historic Resources

Cultural and historic resources contribute to the overall wellbeing of a community and provide for an economic base by attracting quality businesses, residents, and tourists. Today, the Post Falls community is actively engaged in expanding its cultural and historic resources through the combined efforts of citizens and citizen groups. The Post Falls Historical Commission plays an active role in preserving the heritage of the community.

In 1871, German immigrant, Frederick Post settled in the area. Purchasing 298 acres from Chief Seltice of the Coeur d'Alene tribe, he immediately set to work. Mr. Post dammed the Spokane River and erected the first sawmill in this portion of the country. He developed an important power supply from the Upper Falls of the Spokane River. Appropriately, the small town that emerged to support the milling and lumber industries was known as Post Falls.

Remaining structures of early Post Falls include a few commercial buildings and monuments generally found in the older portion of the community near the Spokane River. There are some residences located throughout older neighborhoods, public buildings scattered throughout the community, and several churches in the older sections of town. Interstate-90 construction bisected the community, removing many earlier settlement structures. It is fortunate that several large engineering structures, such as bridges and canals, endure as reminders of the town's vital association with the Spokane River and the railroads.

The First Methodist Episcopal Church, with Gothic Revival architecture, was built in 1890 at the corner of Sixth Avenue and Post Street in Post Falls, Idaho. The Presbyterian Church, with Vernacular style architecture, was built in 1899 at the corner of Second Avenue and Henry Street. After World War I, Post Falls had more churches than the town could support. The Reverend Nathan Fiske, of the Presbyterian Church, encouraged the citizens to combine the two churches into one.

Drawn by horses, the church buildings were moved and joined at their present location in 1921 at the corner of Fourth Avenue and William Street. The new congregation became the Community Presbyterian Church. Through the years, the Community Presbyterian Church served people from

around the area. The church brought together a rich tapestry of people and became the gathering place in the community. The Old Church has been restored by Post Falls Community Partners and is currently a Regional Community Cultural Center.

There are sites that have such a significant impact on the City that they warrant special attention. Special areas of the City include the City Center, the Spokane River Corridor, Falls Park and Treaty Rock, Q'emlin Park, Corbin Park, Black Bay, and Ford Rock. Other special areas include the City's entryway corridors and the Centennial trail. Historically, the City Center was the commercial and transportation center of Post Falls. Over time, its function has changed, yet the historic significance and sense of place is important to the citizens. Spokane Street traverses the area and provides direct access to I-90. Recent improvements to the district include Falls Park, Centennial Trail, and street trees and new sidewalks on the lower part of Spokane Street.

The City Center has great potential for a community focal point. Significant developable land provides a prime opportunity for an innovative private and/or public partnership. Another resource is the future development of the Spokane riverfront. Through creative street and architectural designs, landscaping, etc., the opportunity exists to tie together recreation (e.g., the Spokane River, Falls Park, and Treaty Rock), rehabilitated historic buildings, cultural uses, and a mix of commercial and housing uses. The district would attract tourists and serve as a focal point for City life (Post Falls Comprehensive Plan).

1.10 Floodplains and Wetlands

Flood-prone areas in Post Falls are found primarily along the Spokane River and are noted on Federal Emergency Management Agency (FEMA) maps located at the City's Community Development Department. There is very little property within the City that could be subject to flooding, and most of these areas have been developed or are in park areas (Post Falls Comprehensive Plan).

1.11 Wild and Scenic Rivers

The Spokane River begins on the northern end of Lake Coeur d'Alene and eventually drains into the Upper Columbia River. From Lake Coeur d'Alene, the river traverses west until reaching the Post Falls dam and natural 40-foot waterfall. Continuing west across the Idaho-Washington state line, it eventually passes over four more dams in the City of Spokane. It is finally impounded by the Long Lake and Little Falls dams, forming Long Lake, a 15-mile-long reservoir. The river flows 112 miles from Post Falls Dam in Idaho to Lake Roosevelt (the Upper Columbia River) in Washington.

The River is a valuable resource for the City of Post Falls, being a key natural feature in the City that provides recreation, power, and scenic waterfalls the City is named after.

References

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National Resource Conservation Service (NRCS) Web Soil Survey (WSS); Custom Soil Resource Report for Kootenai County Area, Idaho, Post Falls Area; September 2011.

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J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Existing Conditions and Systems Review

Final

June 2013

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TM 2 – Existing Conditions and Systems Review

2.1 Collection System Description

The City of Post Falls Wastewater Collection System routes sanitary wastewater from the service areas, including the City of Rathdrum, to the Water Reclamation Facility (WRF) via a combination of gravity sewers, pump stations, and force mains.

The City of Post Falls pumps wastewater to their WRF through a system of approximately 30 lift stations and force mains. The treatment plant also receives wastewater from the City of Rathdrum's 8-mile parallel force main. Wastewater from Rathdrum is blended with City of Post Falls and treated at the WRF. A copy of the agreement between the City of Post Falls and the City of Rathdrum for wastewater treatment and discharge is included in **Appendix 2-B**.

2.2 Collection System Capacity Evaluation

The City of Post Falls has completed their update to their 2000 Collection Master Plan under separate cover from this 2011 WRF Facility Plan. An important part of the City's master planning effort was to gain an understanding of its collection system. A hydraulic model of the sewer system was developed to evaluate the capacity of the existing sewer collection system and establish a tool for planning future expansions. Hydra sewer modeling software (developed by Pizer, Inc.) was used to create the model.

The Collection System Master Plan was developed following the completion of the Rathdrum Prairie Sewer Master Plan that encompassed build-out evaluations for the cities of Post Falls, Rathdrum, and Hayden Areas of City Impact. Together, these Collection System Master Plans will guide the planning, infill, and expansion of the Post Falls Collection System to route wastewater to the Post Falls WRF.

2.3 Recent WRF Upgrades

The Post Falls WRF is located on the south side of Seltice Way between McGuire Road and Chase Road. The treatment plant was originally constructed in 1984 and has undergone periodic upgrades since then. Following the 2000 WRF Master Plan (Kimball, 2000), several improvement projects have been implemented at the WRF to address maintenance and capacity issues. A synopsis of the WRF improvements include:

- 1984 Treatment Plant Construction
- 1987 Phase 1 Stage 2 – 1.0 MGD Treatment Plant Expansion
- 1988 Sludge Dewatering Facilities
- 1990 Phase 2 Stage 1 – 1.5 MGD Treatment Plant Expansion
- 1995 Phase 2 Stage 2A – New Headworks
- 1996 Phase 2 Stage 2B – Treatment Plant Expansion (including biological phosphorus removal)
- 2001 UV Disinfection and Standby Power
- 2001 Vactor Truck Dump Station
- 2002 Headworks Bypass Piping and Channel Protection Coating

- 2002 Sludge Holding Tank No. 2 Aeration
- 2003 Oxidation Ditch No. 2 Aeration Equipment
- 2006 Oxidation Ditches No. 1 & No. 3 and Clarifier Upgrades
- 2011 Upgrades:
    - Biological Nutrient Removal (BNR) Facilities
    - Secondary Treatment Expansion
    - Headworks Screening and Odor Control
    - Belt Filter Press Expansion
    - Electrical and Standby Power Improvements

2.4 Historical Wastewater Flows and Loads

Influent wastewater flow and loading trends at the Post Falls WRF have been increasing since 2000, with significant changes occurring in recent years. **Figure 2-1** through **Figure 2-11** present effluent total plant flows and influent wasteload parameters, including concentration and mass loading BOD, TSS, ammonia, and phosphorus.

2.4.1 Flows

Multiple flow meters have been used historically (influent, effluent, partial effluent). Plant staff have reviewed the historical records and determined the most accurate plant flow data available based on when each flow meter was installed and whether the meter was capturing the entire plant flow. A combination of effluent flow data (2001 through 2008) with the influent meter data (2009 to current) was determined to be used during the evaluation. Additionally, the data was evaluated and found that the WRF provides little attenuation of peaks; and for daily flow data, total effluent flow is equal to total influent flow. For the purposes of this study, a composite data set "Total Plant Flow" data has been used for evaluation of the WRF. Rathdrum influent flows have also been evaluated to determine current contribution.

Combined total WRF flow was reviewed to determine existing daily peak flow rate, current average daily flow, and observed flow trends. As can be seen on **Figure 2-1,** the plant flow appears to be experiencing seasonal cyclic fluctuation in flow, presumably due to inflow and infiltration (I/I). A ratio of peak wet weather flow to average flow was generated for each year and shows that there is no discernible trend in the magnitude of the seasonal fluctuation, but the peaking factor generally ranges from 1.17 to 1.62 with an average of 1.38 since 2006.

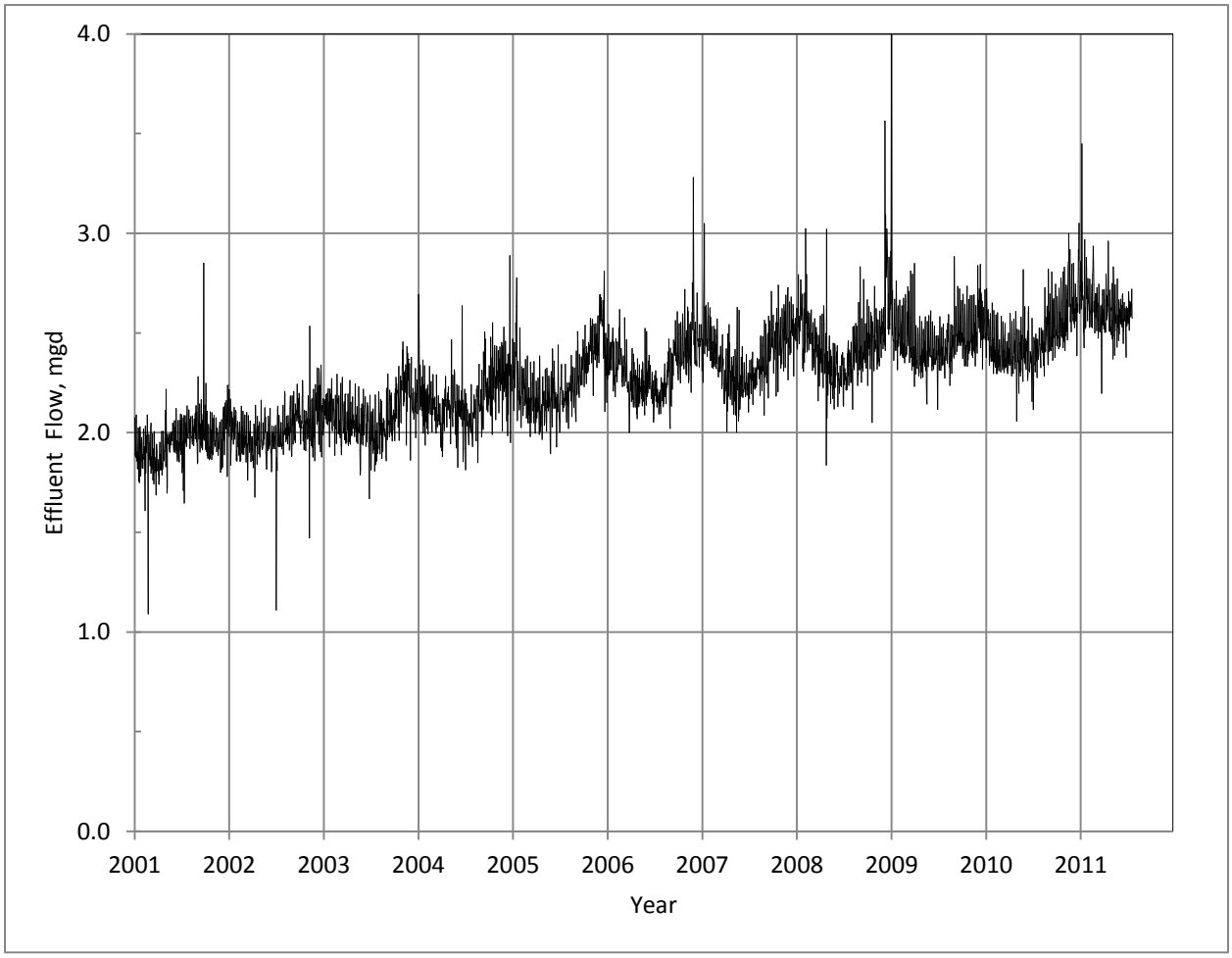
Example seasonal fluctuations in flow and general flow summaries since 2006 are shown in **Table 2-1.**

Table 2-1 – Effluent Flow Summary by Year

Item	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 (Jan. to Aug.
Dry Weather Flow (mgd)	1.09	1.11	1.67	1.81	1.89	2.00	2.00	1.84	2.12	2.06	2.20
Average Daily Flow – Annual (mgd)	1.95	2.01	2.09	2.16	2.26	2.32	2.38	2.44	2.48	2.48	2.62
Max – Month (mgd)	2.05	2.14	2.28	2.30	2.55	2.52	2.55	2.70	2.63	2.70	2.72
Peak Daily Flow (mgd)	2.85	2.53	2.46	2.89	2.81	3.28	3.05	3.56	4.02	3.00	3.45
Peak Day to Average Day Ratio (peaking factor)	1.46	1.25	1.17	1.34	1.24	1.41	1.28	1.46	1.62	1.21	1.32

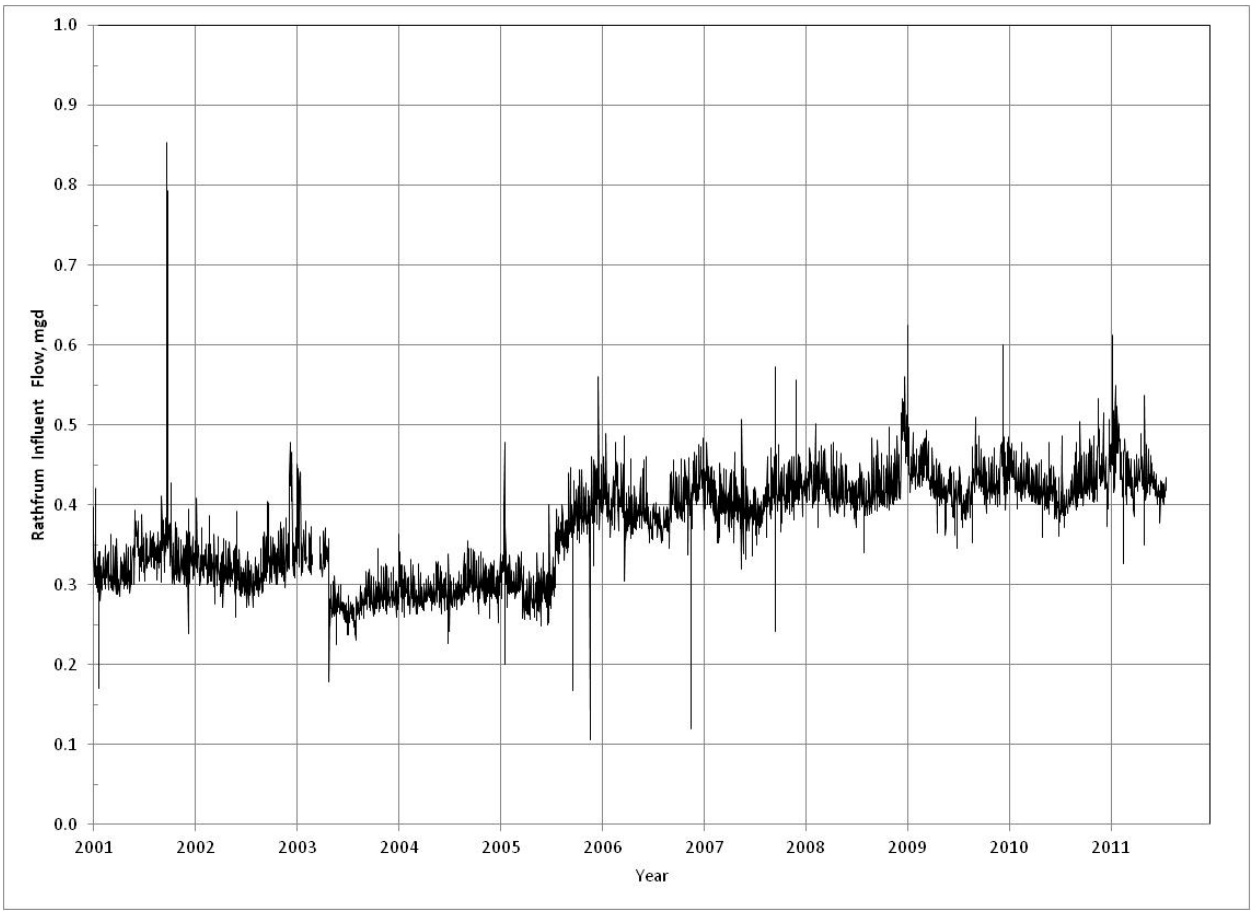
As can be seen on **Figure 2-1**, plant average daily flow has increased over the past 10 years from approximately 1.95 mgd to approximately 2.62 mgd, with a more aggressive flow increase from 2001 to 2007.

Figure 2-1 – WRF Effluent Flow



Additionally, flow from Rathdrum is monitored to determine trending and contribution to the overall WRF plant flow. Influent flows from 2001 to 2011 as measured at the WRF plant influent are shown on **Figure 2-2**.

Figure 2-2 – Rathdrum Influent Flow



To obtain current WRF total flow and peaking characteristics for the last five years, data from 2007 to 2011 were reviewed and analyzed. Peak hour data was developed from plant SCADA records. A summary of the analysis is shown in **Table 2-2**.

Table 2-2 – 2007-2011 Influent Flow Summary

Flow	Historical Value 2007-2011 (mgd)	Peaking Factor Relative to the Average (2007-2011) (mgd)
Peak Hour	5.54	2.3
Actual Maximum Day	4.05	1.68
Statistical Maximum Day	3.04	1.26
Statistical Maximum Week	2.76	1.15
Statistical Maximum Month	2.61	1.08
Average Day	2.41	1.00
Average Day 2011	2.62	---
Statistical Minimum Month	2.23	0.92
Actual Minimum Day	1.84	0.76

2.4.2 Influent Biochemical Oxygen Demand (BOD)

The influent BOD has increased steadily in both concentration strength and total load of the waste stream. These trends are presented in **Figure 2-3** and **Figure 2-4**, respectively. As can be seen in **Figure 2-4**, BOD concentration has been increasing steadily since 2001, with average BOD concentration increasing from 214 mg/L in 2001 to 275 mg/L in 2010. The City has attributed this increase in concentration to increased use of low-flow lavatory fixtures and the addition of garbage disposals in most new residential construction and increased water conservation efforts throughout the collection system. As the data is still trending upward, it is not readily apparent whether the trend will continue or if it has stabilized. The City should continue to monitor these trends.

Figure 2-3 – Influent BOD (mg/L)

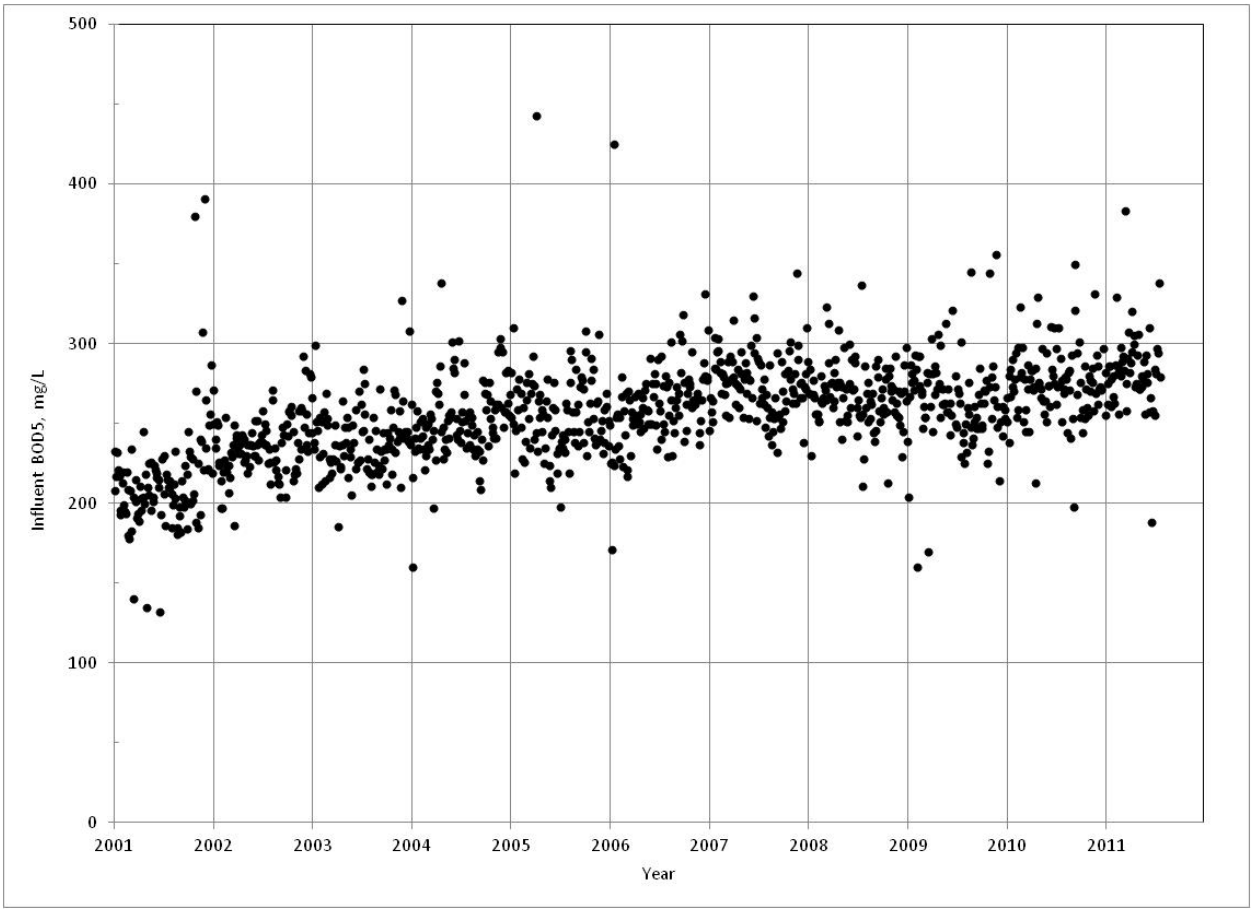
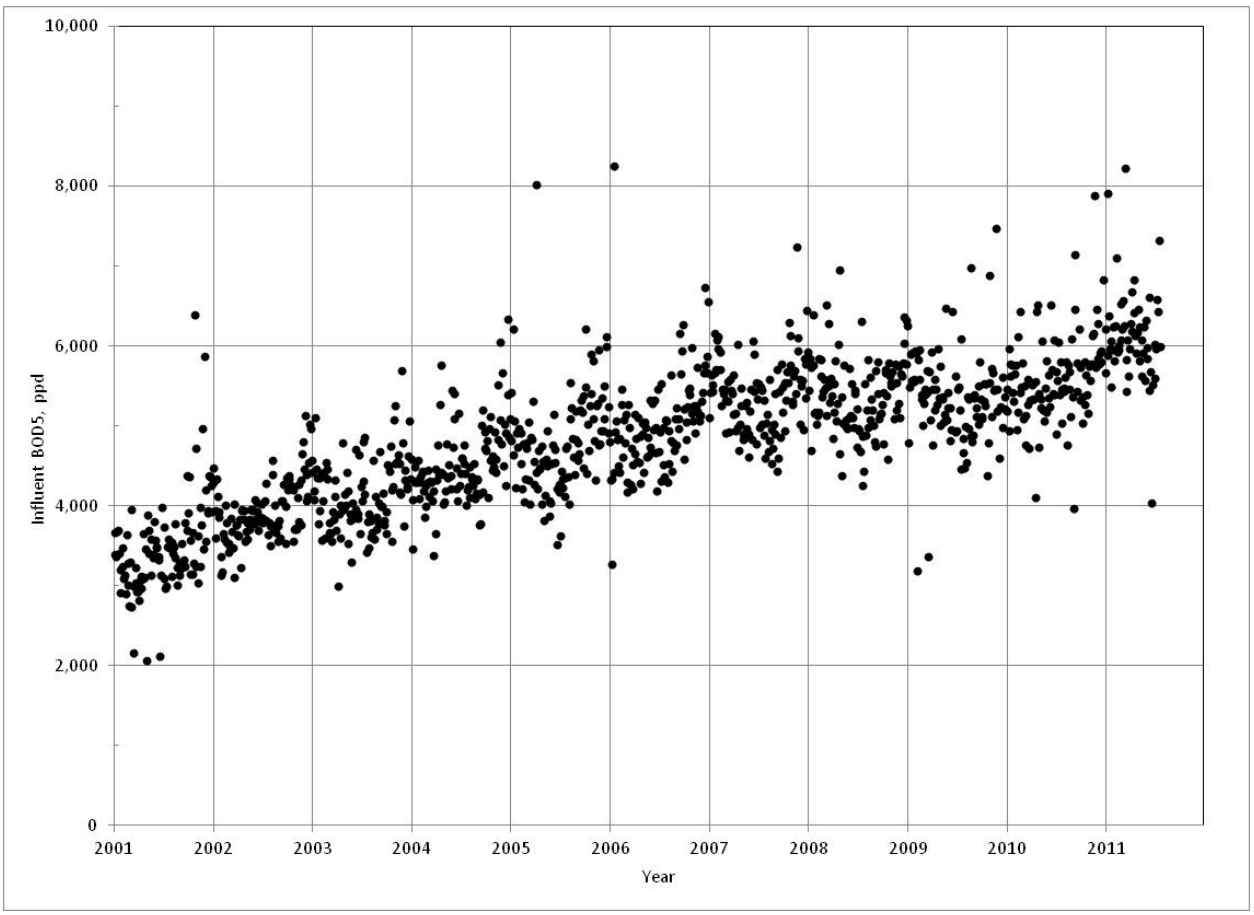


Figure 2-4 – Influent BOD (ppd)



A summary of the 2007 to 2011 influent BOD load data is presented in **Table 2-3**.

Table 2-3 – 2007-2011 Influent BOD Loading Summary

Flow	Historical Value 2007-2011 (ppd)	Peaking Factor Relative to the Average
Actual Maximum Day	8,222	1.49
Statistical Maximum Day	7,903	1.43
Statistical Maximum Week	6,957	1.26
Statistical Maximum Month	6,319	1.15
Average Day	5,515	1.00
Statistical Minimum Month	4,813	0.87
Actual Minimum Day	3,187	0.58

2.4.3 Influent Total Suspended Solids (TSS)

Similar to BOD loading, total suspended solids concentrations for the facility have been trending upward since 2001. These trends are presented in **Figure 2-5** and **Figure 2-6**, respectively. As can be seen in **Figure 2-5**, TSS concentration has been increasing slowly since 2001, with average TSS concentration increasing from 227 mg/L in 2001 to 256 mg/L in 2010.

Figure 2-5 – Influent TSS (mg/L)

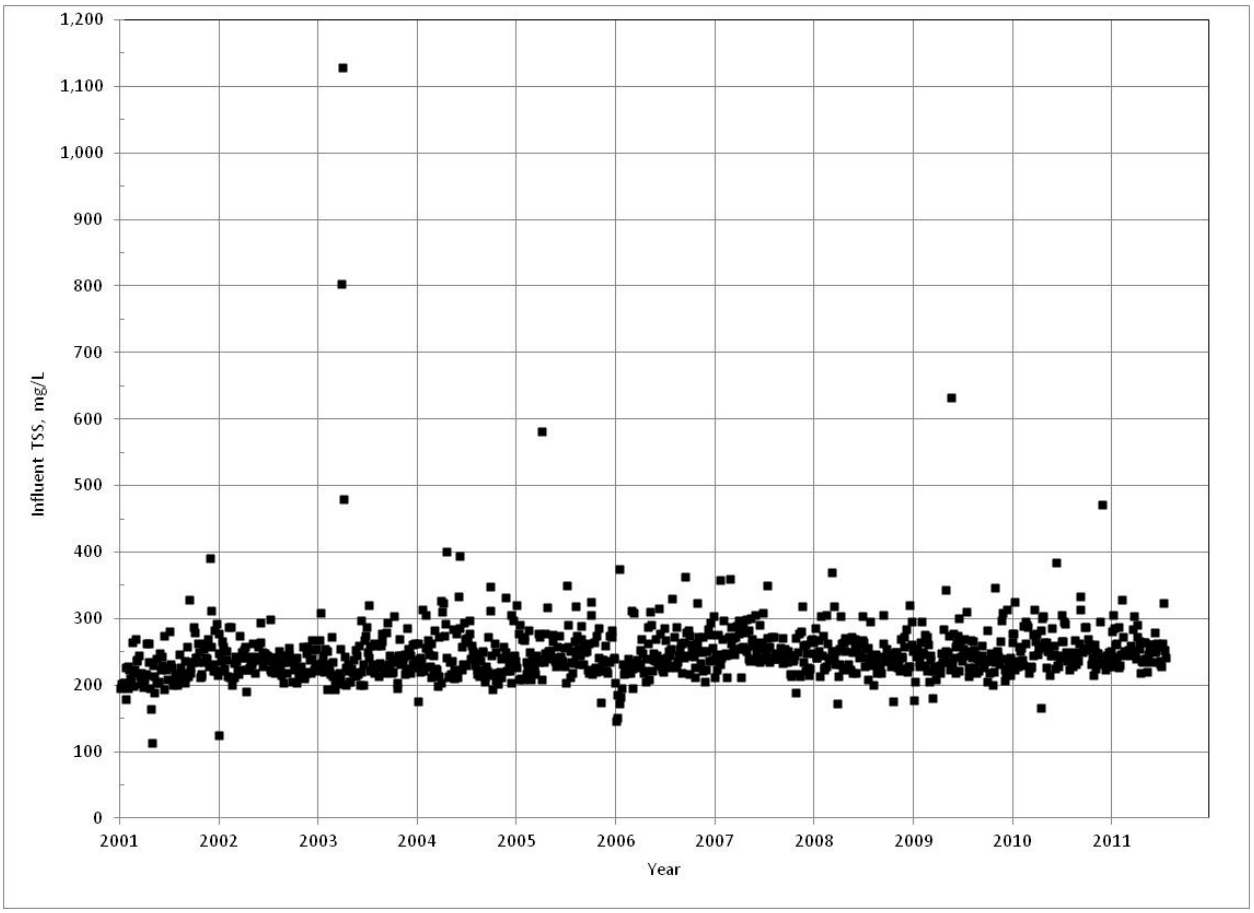
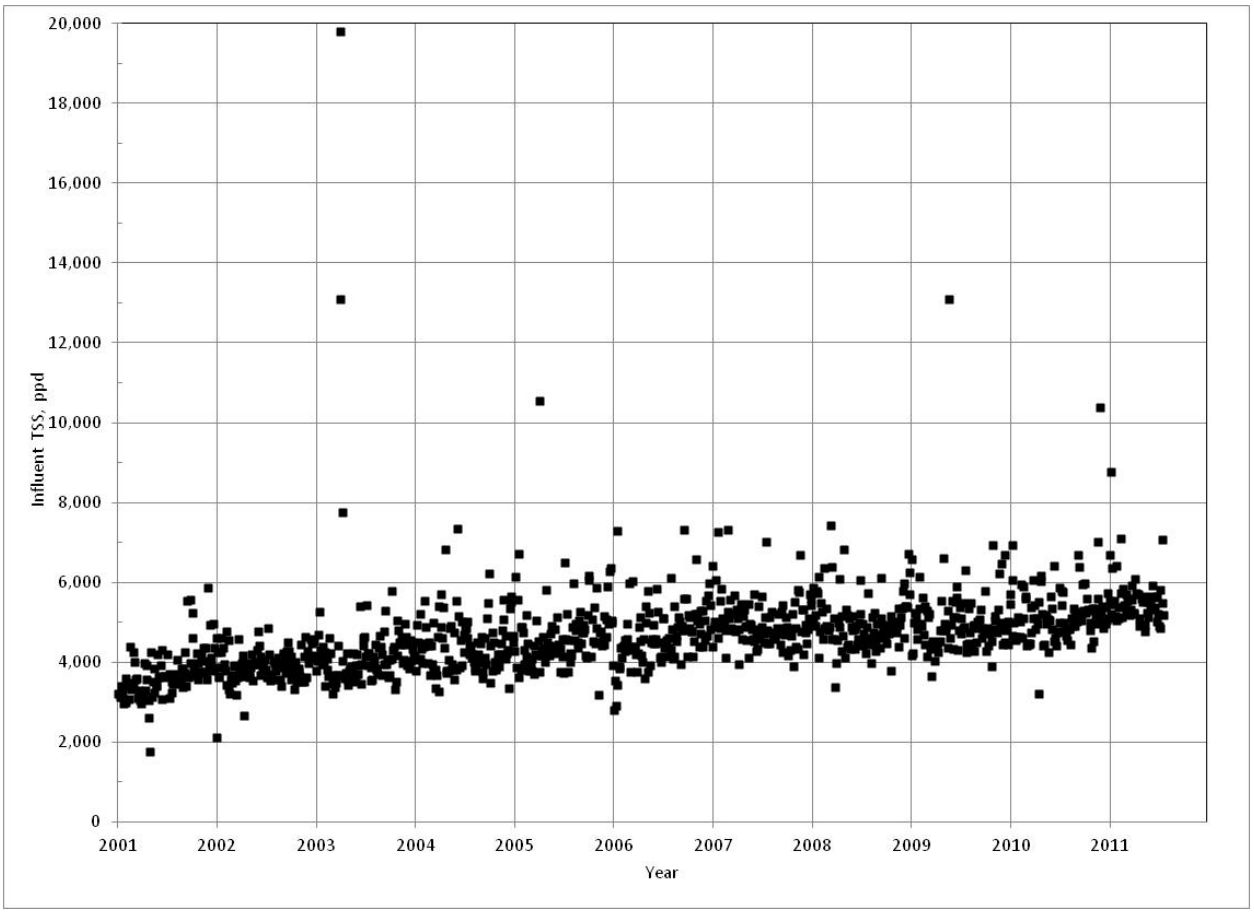


Figure 2-6 – Influent TSS (ppd)



A summary of the influent TSS load data from 2007 to 2011 is presented in **Table 2-4**.

Table 2-4 – 2007-2011 Influent TSS Loading Summary

Flow	Historical Value 2007-2011 (ppd)	Peaking Factor Relative to the Average
Actual Maximum Day	13,098	2.55
Statistical Maximum Day	9,904	1.93
Statistical Maximum Week	7,008	1.37
Statistical Maximum Month	6,071	1.18
Average Day	5,127	1.00
Statistical Minimum Month	4,375	0.85
Actual Minimum Day	3,198	0.62

2.4.4 Influent Ammonia Nitrogen

Similar to BOD and TSS loading, ammonia for the facility has been trending upward slightly since 2001. These trends are presented in **Figure 2-7** and **Figure 2-8**, respectively. As can be seen in **Figure 2-7**, ammonia concentration has been increasing slowly since 2001, with average concentration increasing from 29.6 mg/L in 2001 to37.4 mg/L in 2010. These concentrations are well within literature values for typical wastewater strength.

Figure 2-7 – Influent Ammonia Nitrogen (mg/L)

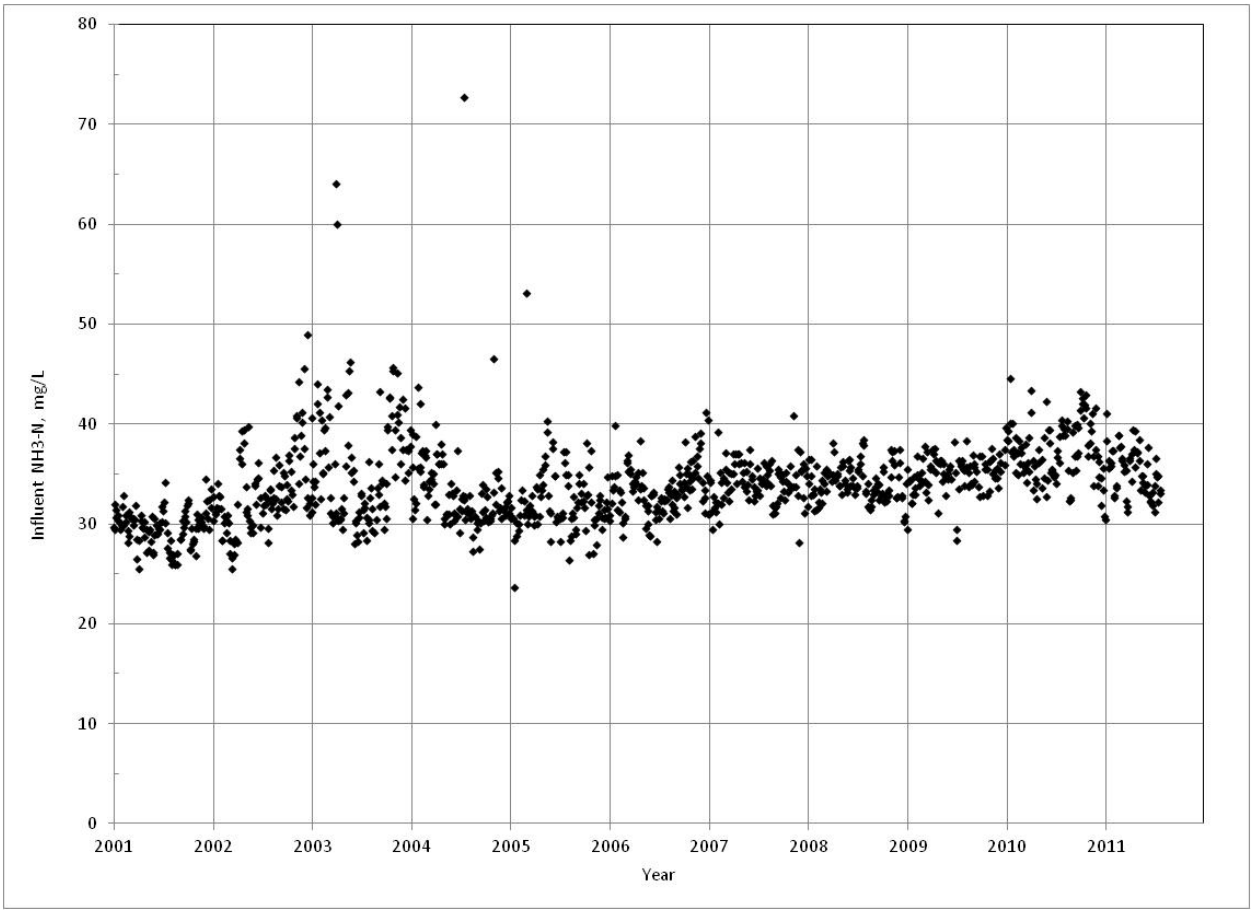
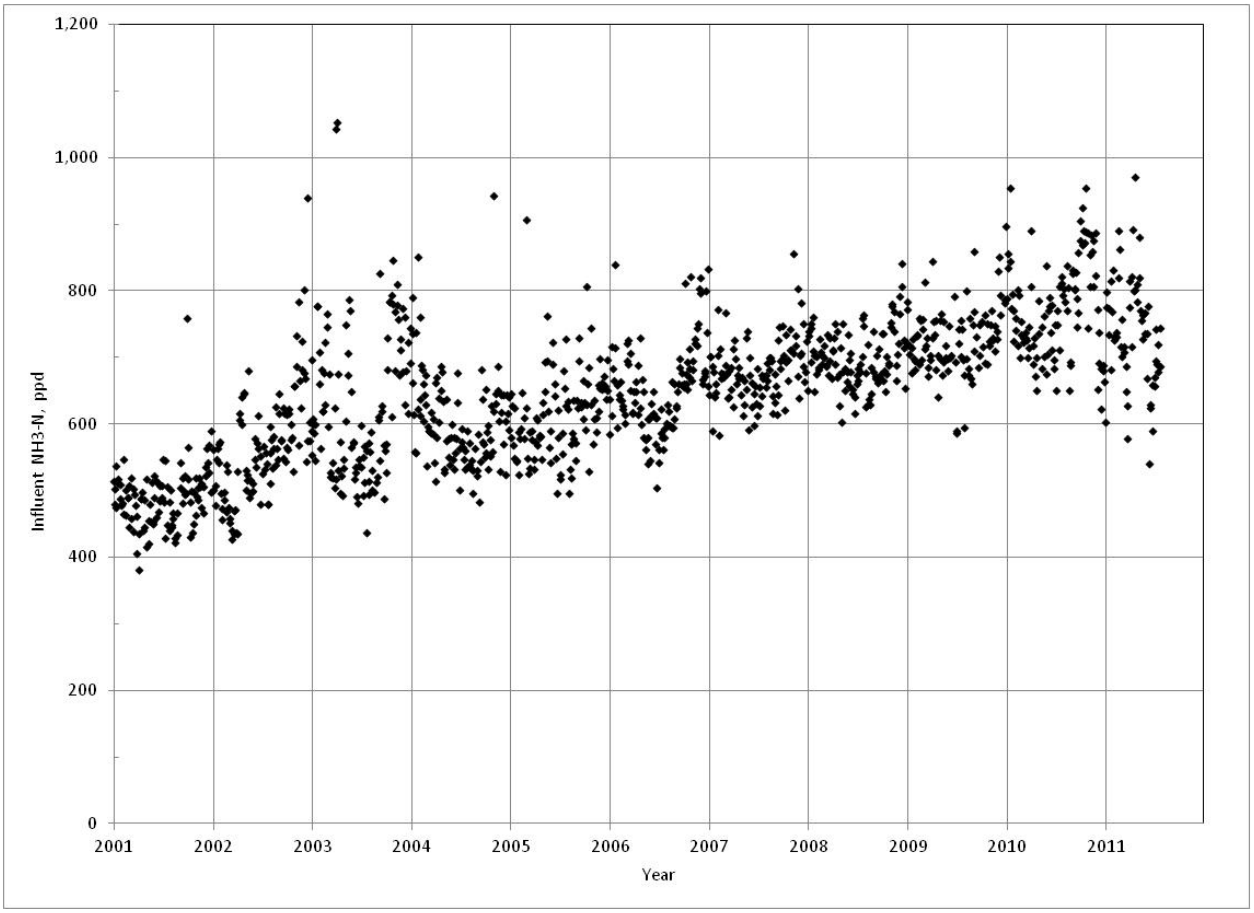


Figure 2-8 – Influent Ammonia Nitrogen (ppd)



A summary of the influent ammonia load data from 2007 to 2011 is presented in **Table 2-5**.

Table 2-5 – Influent Ammonia Loading Summary

Flow	Historical Value 2007-2011 (ppd)	Peaking Factor Relative to the Average
Actual Maximum Day	971	1.34
Statistical Maximum Day	955	1.32
Statistical Maximum Week	890	1.23
Statistical Maximum Month	829	1.15
Average Day	722	1.00
Statistical Minimum Month	642	0.89
Actual Minimum Day	540	0.75

2.4.5 Influent Phosphorus

Influent phosphorus concentrations have remained relatively stable since 2001. A general trend is observable that shows average concentration dropping since 2008 and observed "spiking" in 2003. This may be attributable to many products (detergents) that have changed to low or no-phosphate alternatives or because of the City's industrial discharge monitoring program. These concentrations are well within literature values for typical wastewater strength. Overall mass load has been increasing generally in proportion to flow.

Figure 2-9 – Influent Phosphorus (mg/L)

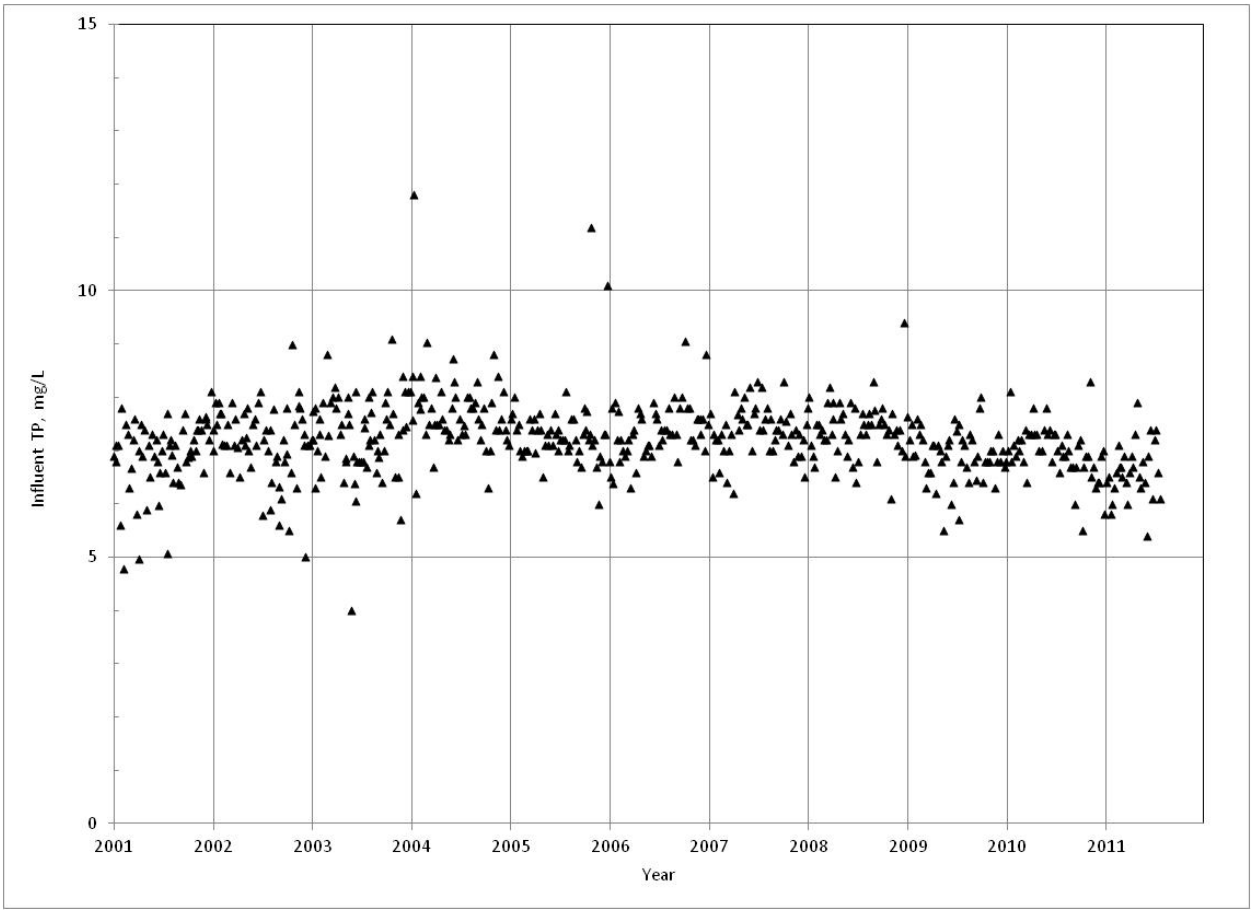
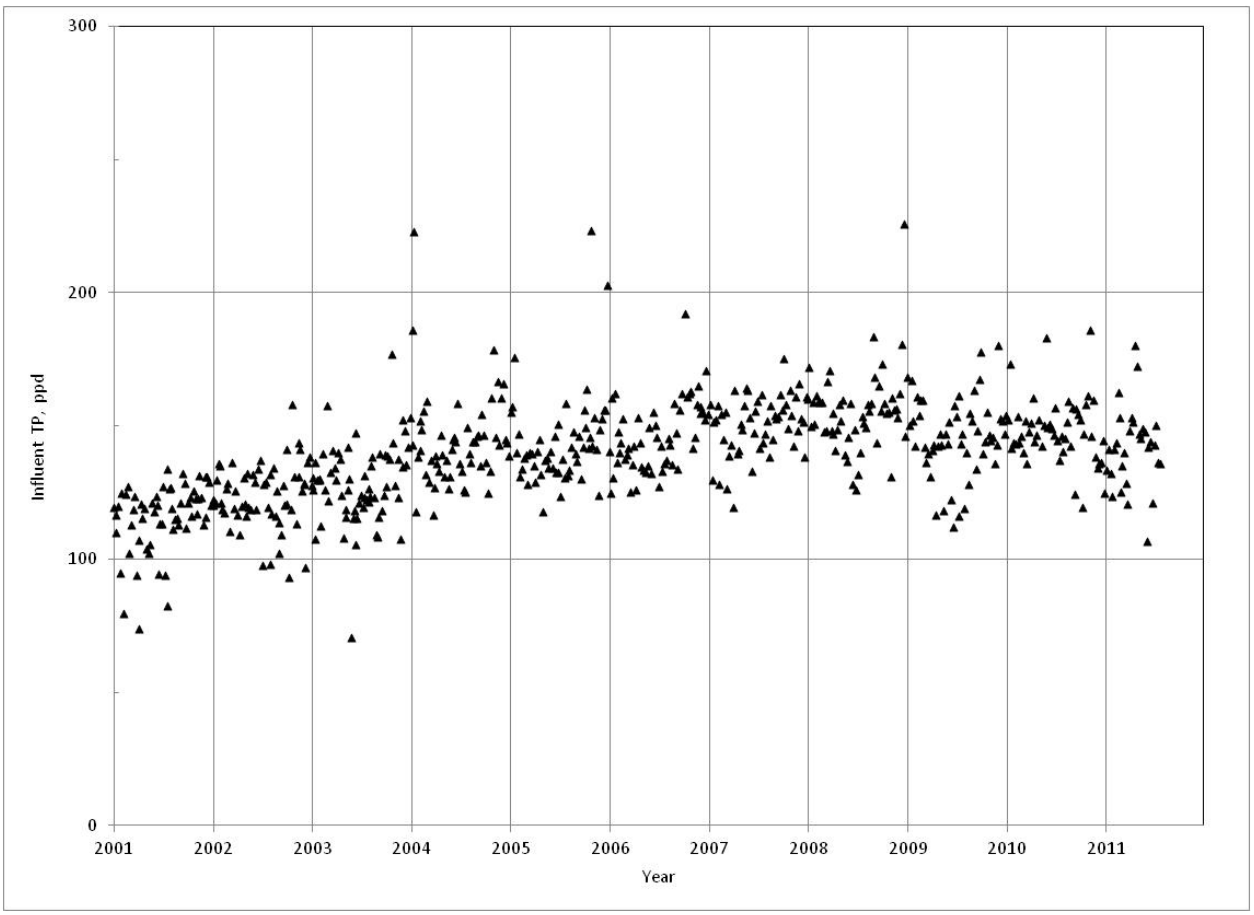


Figure 2-10 – Influent Phosphorus (ppd)



A summary of the daily influent total phosphorus load data from 2007 to 2011 is presented in **Table 2-6**.

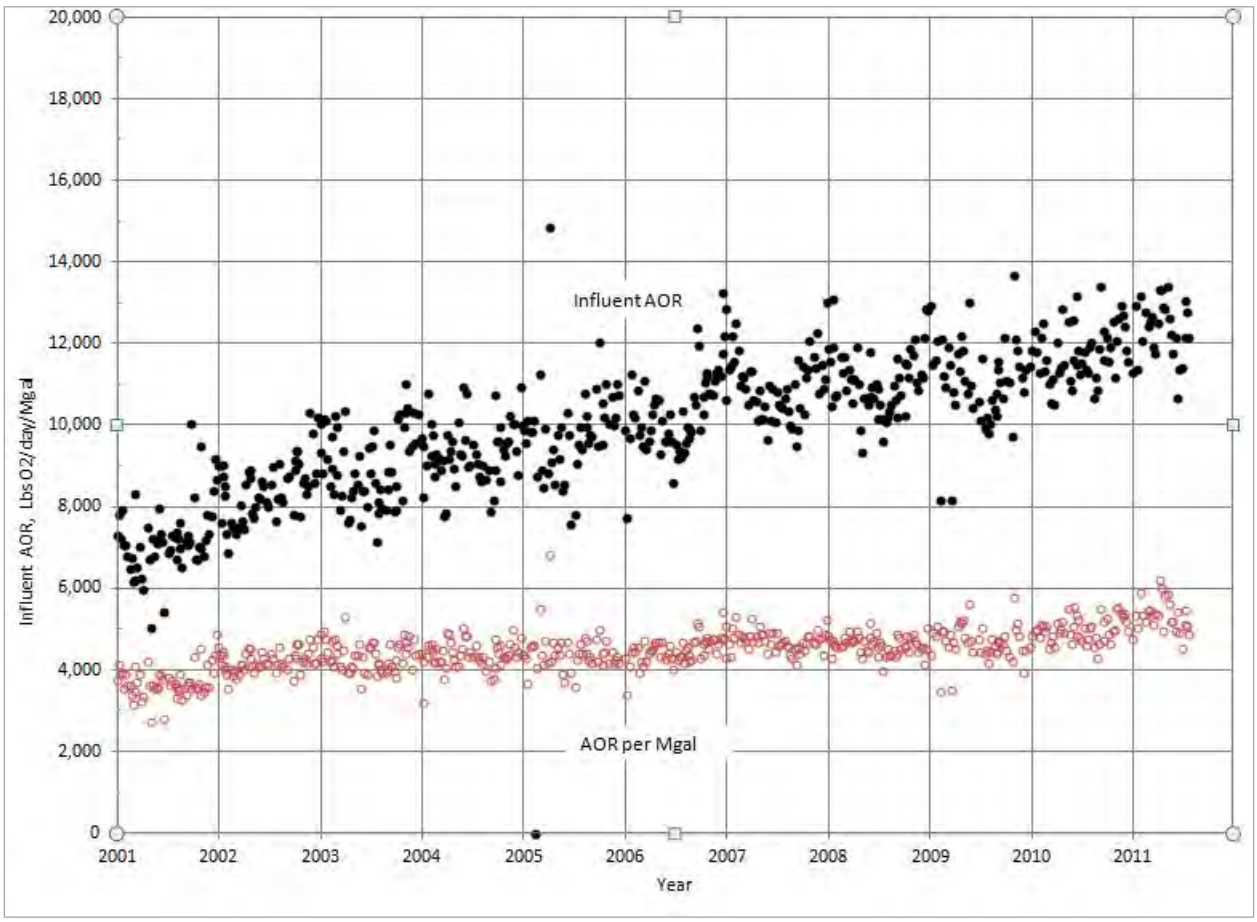
Table 2-6 – Influent Total Phosphorus Loading Summary

Flow	Historical Value 2007-2011	Peaking Factor Relative to the Average
Actual Maximum Day	226	1.51
Statistical Maximum Day	200	1.34
Statistical Maximum Week	180	1.21
Statistical Maximum Month	166	1.12
Average Day	149	1.00
Statistical Minimum Month	129	0.86
Actual Minimum Day	107	0.72

2.4.6 Actual Oxygen Required (AOR)

AOR is a calculated variable that defines and drives the sizing of the biological treatment process. AOR is the calculated oxygen demand imposed by BOD and NH_3-N. In general, the oxygen required is 1.5 times the BOD load plus 4.6 times the NH_3-N load. **Figure 2-11** shows both AOR and AOR/Mgal. Due to increasing trends in BOD and ammonia strength, the AOR/Mgal has shown a slight increase over the past ten years.

Figure 2-11 – AOR (lb/day and lb/Mgal-day)



A summary of AOR from 2007 to 2011 has been developed to determine existing conditions and is shown in **Table 2-7**.

Table 2-7 – 2007-2011 AOR Summary

Flow	Historical Value 2007-2011	Peaking Factor Relative to the Average
Actual Maximum Day	13,656	1.20
Statistical Maximum Day	13,493	1.19
Statistical Maximum Week	13,248	1.17
Statistical Maximum Month	12,833	1.13
Average Day	11,347	1.00
Statistical Minimum Month	10,151	0.89
Actual Minimum Day	8,143	0.72

2.5 Seasonal Flow Evaluation

As will be discussed in subsequent sections of this evaluation, new effluent discharge standards will require the plant to meet more strict effluent limitations during the majority of the year (February 1 to October 31). As this period will likely require additional unit processes to be sized based on plant flows and loads, it was determined that reviewing the flows and loads in two "seasons" would be appropriate.

The two seasons for evaluation include November 1 to January 31 when secondary treatment standards will likely be required and From February 1 through October 31 when more stringent phosphorus, CBOD, and nutrient standards will be applicable.

A summary of seasonal flow evaluation for 2001 to 2011 is shown in **Table 2-8**.

Table 2-8 – Seasonal Flow Summary

	February 1 to October 31			November 1 to January 31		
Year	Average Day (mgd)	Max Month (mgd)	Peak Day (mgd)	Average Day (mgd)	Max Month (mgd)	Peak Day (mgd)
2001	1.95	2.05	2.85	1.92	1.98	2.09
2002	1.99	2.10	2.26	2.01	2.07	2.24
2003	2.05	2.16	2.33	2.10	2.14	2.53
2004	2.13	2.25	2.64	2.22	2.28	2.69
2005	2.21	2.39	2.57	2.30	2.36	2.89
2006	2.28	2.41	2.72	2.44	2.54	2.81
2007	2.34	2.47	2.74	2.49	2.52	3.28
2008	2.39	2.55	3.02	2.52	2.57	2.79
2009	2.45	2.53	2.88	2.60	2.81	4.02
2010	2.44	2.56	2.82	2.53	2.60	2.84
2011	2.60	2.68	2.96	2.68	2.73	3.45
Maximum	2.60	2.68	3.02	2.68	2.81	4.02

In reviewing the two seasonal summaries, it can be seen that in general the "winter" season from November 1 to January 31 generally exhibits higher influent flows than the "summer" season from February 1 through October 31. The most significant difference is between the "winter" peak day flow of 4.02 mgd versus the "summer" peak day flow of 3.02 mgd. Differences between average day and max-month flows are much less significant.

2.6 Seasonal Load Evaluation

Similar to flow conditions, loading parameters were evaluated for both of the "seasons". Data from January 1, 2007 through July 31, 2011 was used for the evaluation to determine current seasonal variation of loading conditions. A summary of the seasonal loads is shown in **Table 2-9**.

Table 2-9 – Seasonal Load Summary (January 1, 2007 to July 31, 2011)

	February 1 to October 31			November 1 to January 31		
Year	Average Day	Max Month	Peak Day	Average Day	Max Month	Peak Day
BOD (ppd)	5,494	6,417	8222	5,727	6,349	7,910
TSS (ppd)	5,087	6,037	13,098	5,343	6,036	10,386
Ammonia (ppd)	717	881	971	736	843	955
TP (ppd)	148	165	184	152	177	226
Influent Temperature (C)	16.9	22.8	23.5	14.0	17.6	18.9

2.7 WRF Overview

The Post Falls WRF is a secondary extended aeration activated sludge wastewater treatment plant. Wastewater is screened and de-gritted during preliminary treatment. Flow is then split between two portions of the plant–one half currently is capable of biological phosphorus removal and the second half (2011 Upgrades) is designed for biological nutrient removal. Secondary treatment is performed through oxidations ditches and circular clarifiers. Flows from each half of the plant are then re-combined and are disinfected via ultraviolet disinfection. Treated flow is currently discharged to the Spokane River downstream of the Post Falls Dam. Biosolids wasted from the secondary processes are dewatered utilizing belt filter presses and are trucked off site for land application and/or composting. A diagram of the existing facility is shown in **Figure 2-12**, with a detailed process schematic in **Appendix 2-A**.

2.8 Existing Unit Process Capacity and Performance

2.8.1 Introduction

Each of the existing unit processes at the WRF has been evaluated to determine its current treatment capacity, performance, and identified deficiencies and capacity limitations. Data gathered from the past ten years have been utilized to evaluate the performance of these processes, with focus on recent years' performance based on current operations. The detailed description of each unit process and its evaluation is included in subsequent sections. An aerial photo showing the existing location of the major unit processes and facilities on the WRF site is included in **Figure 2-13**.

Figure 2-12 – Post Falls WRF Process Schematic

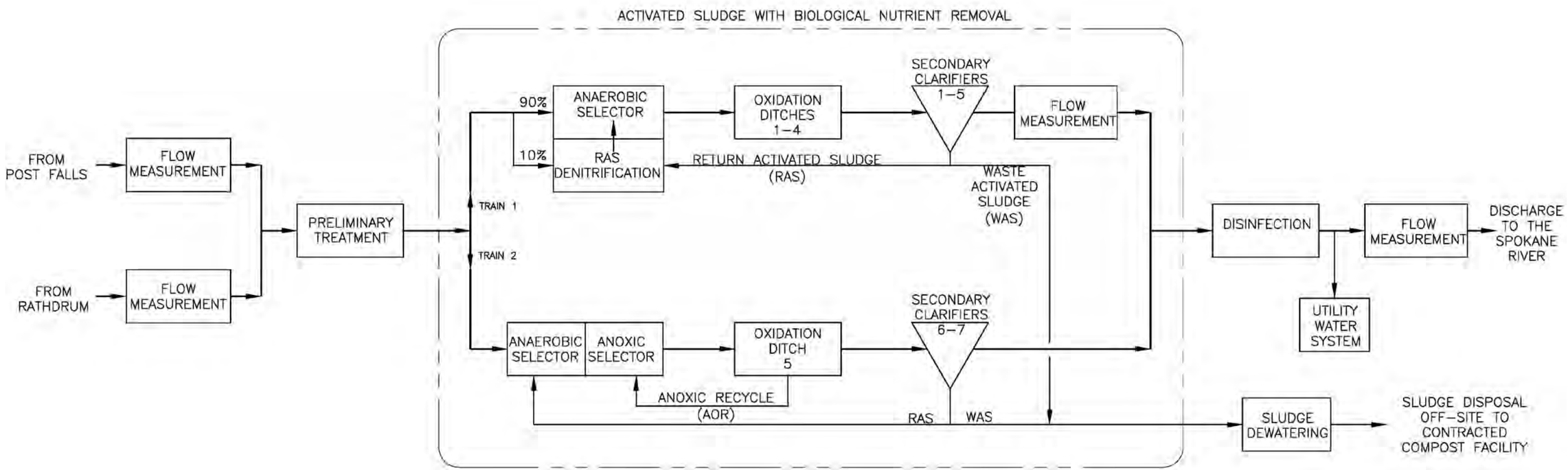
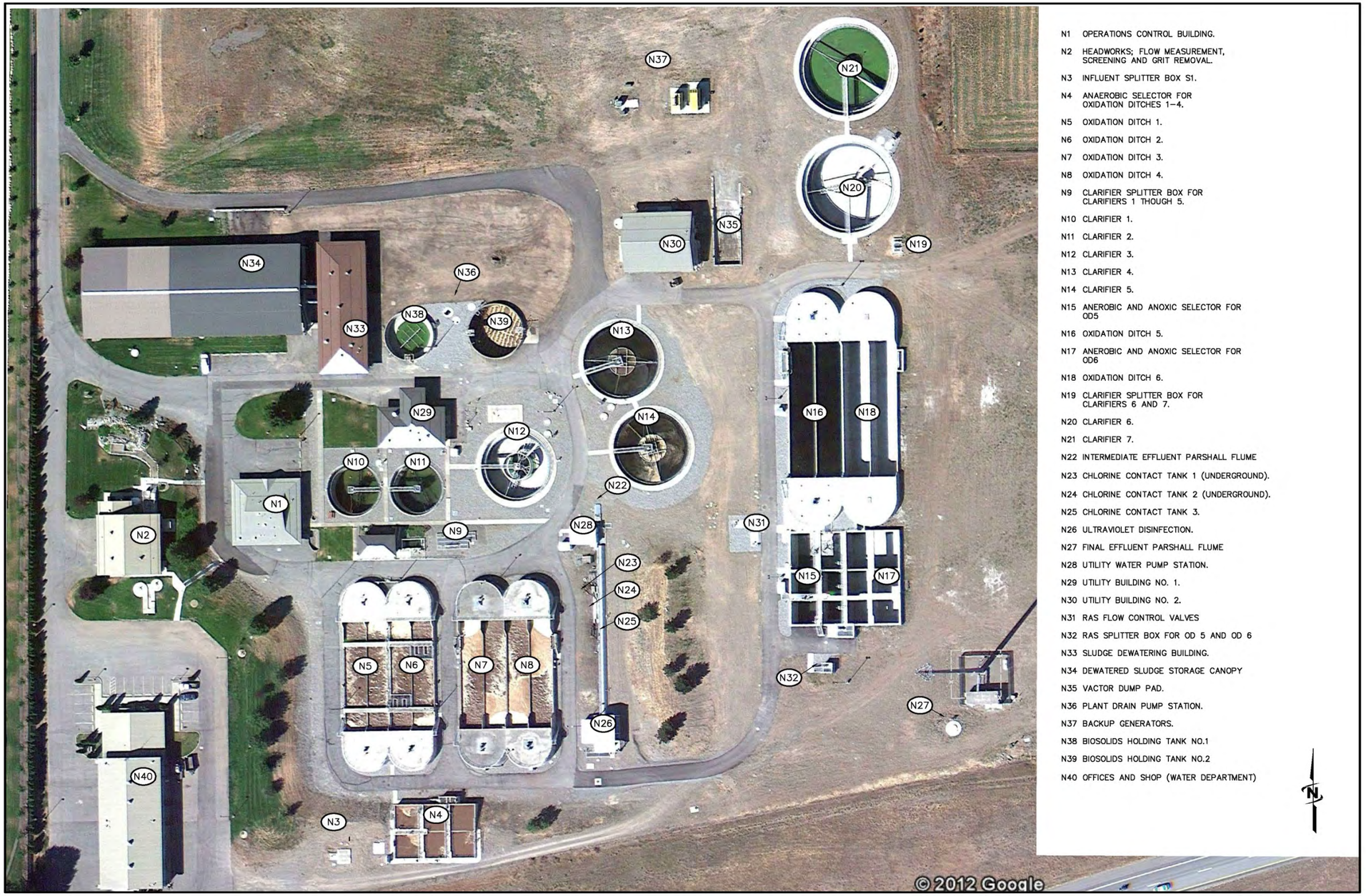


Figure 2-13 – Post Falls WRF Aerial Photo and Site Layout



2.8.2 Preliminary Treatment (Headworks)

The current headworks facility was expanded as part of the 2011 improvement project. Wastewater from the City of Post Falls and the City of Rathdrum is pumped to the headworks. Flows from each City are measured separately with 24-inch and 6-inch Parshall flumes, respectively, and then combined for sampling, screening, and de-gritting.

The screening system consists of parallel screens with a common bypass channel. The eastern channel utilizes a Lakeside internally fed, in-channel drum screen. The west channel contains a Huber, in-channel step-screen. The capacity of the screening system is shown in **Table 2-10**. The screening system utilized a common washer-compactor unit. The Rotamat unit has an internal screenings washer system but does not produce a high quality solid. To mitigate this, as part of the 2011 upgrades, a common washer compactor unit was installed and processes waste from both the Huber step screen and the Rotamat unit. This washer compactor unit is a single unit and has no redundancy. The screening channels are shown in **Figure 2-14.**

Figure 2-14 – Screening System

The grit removal system also utilizes a common grit washer/classifier. This unit has no redundancy if it were to be taken off line. Grit is removed through two parallel vortex grit chambers. A summary of the grit system treatment capacity is shown in **Table 2-10**.

Following grit removal, flow then passes out of the grit channels and into Distribution Box S-1. The pipelines from the grit channels to Distribution Box S-1 include an older 24-inch ductile iron (cement mortar lined) gravity line and parallel 30-inch C905 PVC gravity line (installed in 2011). The 24-inch line flows partially full for much of the reach and is likely experiencing deterioration from hydrogen sulfide attack. This piping has a peak hydraulic capacity of 7.89 mgd with the 30-inch line out of service and 13.8 mgd with both lines active.

Distribution Box S-1 splits flow between the existing BPR process (Oxidation Ditches 1-4) and the new BNR Ditch 5 (and future Ditch 6). Distribution Box S-1 and anaerobic selector tanks are shown in **Figure 2-15**.

Figure 2-15 – Distribution Box S-1 and Anaerobic Selector Tanks (looking east)

The performance capacity of each of the preliminary treatment unit processes is shown in **Table 2-10**.

Table 2-10 – Preliminary Treatment Processes Performance Capacity

Item	Equipment Manufacturer	Hydraulic Capacity	Support System Capacity and Comments
Influent Flow Measurement – Post Falls	Parshall Flume (24")	Capacity: 12.31 mgd @ 1.75' depth	Installed 1995, expected 20-year life
Influent Flow Measurement – Rathdrum	Parshall Flume (6")	Capacity: 3.2 mgd @ 1.75' depth	Installed 1995, expected 20-year life
Screening Channel 1 (Internally Fed Basket Screen)	Lakeside Corp. Rotamat – 55", ¼" bar spacing	3.1 mgd ADF 7.1 mgd, maximum maximum upstream WL = 29.5" maximum head loss = 12.2"	Installed 1995, expected20-year life
Screening Channel 2 (Step Screen)	Huber, ¼" bar spacing	12.0 mgd, maximum Maximum upstream WL = 33"	Installed 2011
Grit Chamber 1	Induced vortex, 7.0 Pista by Smith and Loveless	7.0 MGD	Installed 1995, expected 20-year life, Includes grit washer/classifier
Grit Chamber 2	Induced vortex, 12.0 Pista by Smith and Loveless	12.0 MGD	Installed 2011, expected 20-year life, Connects to washer/classifier installed in 2008

Deficiencies and limitations identified include the following:

- The limiting hydraulic component in the headworks and influent piping system is the existing No. 1 basket screen at 3.1 mgd ADF, slightly lower than the current biological capacity of 4.0 mgd.
- The grit classifier has no redundant unit.
- The screenings washer/compactor has no redundant unit.
- 24-inch piping from the grit channels to Splitter Box S-1 has likely had excessive H_2S attack and should be evaluated through CCTV inspection to determine if it is in need of replacement or rehabilitation.

2.8.3 Flow Equalization

The WRF currently has no flow equalization facilities to attenuate incoming peak flows or loads; however, the City tries to control peak flows to the plant by operating influent lift stations with variable speed pumps.

2.8.4 Primary Treatment

The WRF currently has no primary treatment facilities.

2.8.5 Secondary Biological Treatment with Biological Nutrient Removal

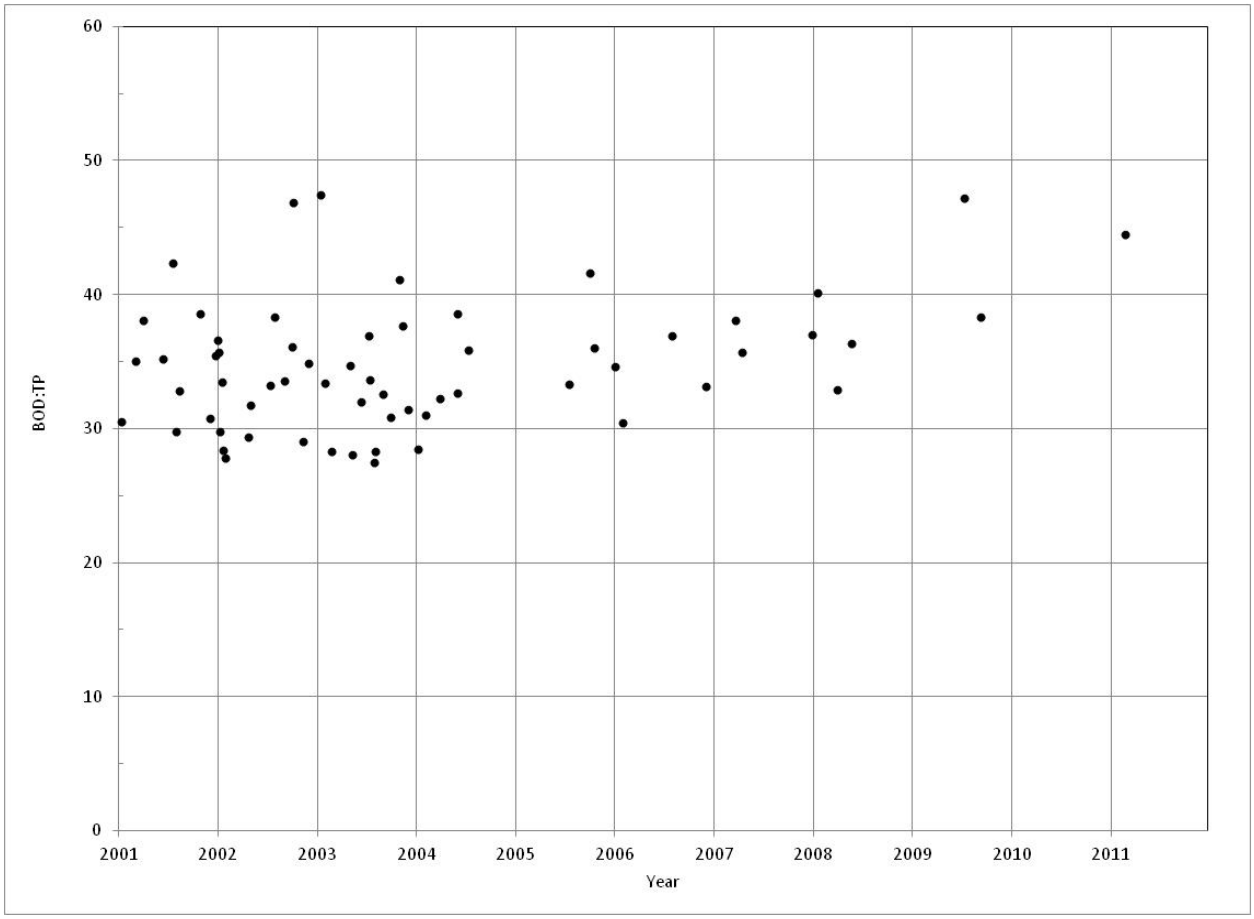
The facility has two secondary biological treatment trains. Train 1 consists of Oxidation Ditches No. 1-No. 4 and Clarifiers No. 1-No. 5. Train 2 consists of Oxidation Ditch No. 5 and Clarifiers No. 6 and No. 7. The trains can be operated independently, or the RAS from each train can be blended. The biological solids grown in the aeration basins are separated from the effluent by the secondary clarifiers and returned by the return activated sludge (RAS) pumps back to the anaerobic selector to be re-used in the treatment process. Excess biological solids are wasted from the system by the waste activated sludge (WAS) pumps. Both treatment trains are designed to remove BOD, TSS, ammonia, and phosphorus from the wastewater. Train 2 is also designed to remove nitrogen.

Anaerobic Selector No. 1 (for Oxidation Ditches 1-4): The anaerobic selector is used in the biological phosphorus removal process. It creates ideal growing conditions for the bacteria, which perform phosphorus removal. The structure contains six cells. The first two cells are used to denitrify the RAS. The remaining four cells are used to anaerobically condition the RAS. The cells can be used in various combinations to vary the hydraulic residence time in ½-hour increments from ½ to 2 hours (at 3.1 mgd). A summary of the physical characteristics of the selector tanks is shown in **Table 2-11**.

Several factors may influence the performance of the BPR process. A commonly used parameter to predict performance is the BOD:TP ratio. If BOD:TP is >20~30, BPR, in general, is feasible.

In **Figure 2-16**, the BOD:TP ratio is plotted from 2001 to 2011. The ratio was calculated using paired sets of data (i.e., the BOD and TP values came from the same 24-hour composite sample). Another method would be to use the peak day BOD and peak day TP, but these peak loads do not necessarily occur at the same time and could result in an overly optimistic prediction. In the plot, it can be seen that the BOD:TP ratio is typically greater than 30:1, with 2005 to current date being consistently greater than 30:1.

Figure 2-16 – BOD_5:TP



Anaerobic and Anoxic Selector No. 5 (for Oxidation Ditches 5 and 6): BNR requires sequential anaerobic (no oxygen), anoxic (no dissolved oxygen), and aerobic (with dissolved oxygen) conditions. Return activated sludge (RAS) settled out of the clarifiers is returned to the anaerobic tanks and mixed with the influent wastewater. MLSS from the oxidation ditch is recycled to the anoxic selector where it provides nitrate as an oxygen source for denitrifying bacteria. As the nitrate is reduced, nitrogen is off-gassed to the atmosphere and the activated sludge continues to oxidize the incoming wastewater as a food source. Denitrification allows the treatment process to beneficially recover 2.9 milligrams (mg) of oxygen and 3.6 mg of alkalinity (as calcium carbonate) per milligram of nitrate-nitrogen removed (Jeyanayagam, 2005). This represents a recovery of up to 63 percent of the oxygen and 50 percent of the alkalinity consumed by the ammonia oxidation process. A BNR treatment process can therefore reduce energy input for aeration as well as chemical input to maintain alkalinity and pH within acceptable discharge limits. The BNR facilities were designed to reduce total nitrogen to 10.0 mg/L and total phosphorus (TP) to 1.5 mg/L on a monthly average basis. A summary of the physical characteristics of the anoxic and anaerobic selector tanks is shown in **Table 2-11**.

Table 2-11 – Anoxic and Anaerobic Selector Cell Summary

Parameter	Selector No. 1 (Serving ODs #1-#4)	Selector No. 5 (Serving OD #5)
RAS Denitrification Tanks:		
Number	2	None
Volume (each)	64,600 gal	None
Detention Time at 60% RAS [a]	1.7 Hrs [a]	None
Mixing	Mechanical	None
Anaerobic Selector Tanks Denitrification Tanks:		
Number	4	2
Volume (each)	64,600	58,570
Total Nominal Detention Time	2.0 Hrs [a]	2.0 Hrs [b]
Mixing	Mechanical	Mechanical
Anoxic Selector Tanks:		
Number	None	2
AO Recycle Rate	None	100% to 400%
Volume	None	353,900
Nominal Detention Time	None	6.0 Hrs [b]
Mixing	None	Mechanical

[a] *Based on ADF = 2.6 mgd*

[b] *Based on ADF = 1.4 mgd*

Aeration Basins (Oxidation Ditches 1-4): BOD, ammonia, and phosphorus are removed from the wastewater in the aeration basins. The aeration basins are of the oxidation ditch design. Their physical and design parameters are listed in **Table 2-12** and **Table 2-13**. Oxidation Ditches No. 1 through No. 4 are shown on **Figure 2-17**, and Oxidation Ditches No. 5 and No 6 are shown on **Figure 2-18**.

Aeration Basins (Oxidation Ditches No. 5 and No. 6): Concrete tankage and piping for Oxidation Ditches No. 5 and No. 6 were constructed in the 2011 upgrades. Equipment for Ditch No. 5 was installed, with Ditch No. 6 being available for future expansion.

Figure 2-17 – Oxidation Ditches 1 through 4 (looking northeast)

Figure 2-18 – Oxidation Ditches 5 and 6

Table 2-12 – Oxidation Ditch Physical Parameters

Parameter	OD #1	OD #2	OD #3	OD #4	OD #5	OD #6
Year Constructed	1984	1987	1990	1996	2011	2011
Volume, Mg	0.50	0.50	0.56	0.56	1.15	1.15
Water Depth, ft	10	10	11	11	15.5	15.5
Type of Aerator (Year Installed)	Vertical Turbine (2006)	Vertical Turbine (2003)	Vertical Turbine (2006)	Vertical Turbine (1996)	Vertical Turbine (2011)	Vertical Turbine [b]
Number of Aerators	2	2	2	2	2	2 [b]
Hp per Aerator	60	60	60	60	125	125 [b]
SOTE, lbs O_2/hp-hr	3.5	3.5	3.5	3.5	3.5	3.5 [b]
Capacity, lbs O_2/day [a]	10,080	10,080	10,080	10,080	21,000	21,000 [b]

[a] *Both aerators in operation.*

[b] *Aeration equipment is not yet installed.*

Table 2-13 – Oxidation Ditch Design Criteria

Parameter	Value	Recommended Value	Units
Number of Units	5	---	
Total Volume	3.27	---	Mg
Hydraulic Residence time	19.6	8-36	Hours
Solids Residence Time	14.8	10-30	Days
F/M	0.08	0.05-0.30	lbs BOD_5/ lbs MLVSS-day
Volumetric Loading	19.8	5-30	lbs BOD_5/1000 ft^3-day
MLSS	4,000	3,000-6,000	mg/l
Qr/Q	0.6-1.25	0.75-1.50	--

Table 2-14 – Aeration Equipment Capacity at Field Conditions

	Aeration Equipment Capacity at Field Conditions (lbs O2/day)
Oxidation Ditch No. 1	5,340
Oxidation Ditch No. 2	5,340
Oxidation Ditch No. 3	5,340
Oxidation Ditch No. 4	5,340
Oxidation Ditch No. 5	11,100
All oxidation ditches with largest aerator out of service	26,830

AOR =

$$\frac{SCR\ [(\beta)(ACF)\ (Cw) - C_L]\ (2)\ 1.024^{T-20}}{C_{S20}}$$

AOR = lb O_2/hp • h transferred under field conditions

SOR = lb O_2/hp • h transferred in water at 20° C and zero dissolved oxygen

β = Salinity-surface tension correction factor

ACF = Altitude Correction Factor

C_W = Oxygen saturation concentration for tap water at given temperature and altitude

C_{S20} Oxygen saturation concentration in tap water 20° C, mg/L

C_L = Operating oxygen concentration, mg/L

T = Temperature, ° C

α = Oxygen-transfer correction factor for waste

Assumptions:

β = 0.95, α =0.8

C_{S20} = 9.08 mg/L

T = 22° C

C_W = 8.73

Elev = 2,000-2,500 ft

ALF = 0.915

C_L = 2.0 mg/l

Secondary Clarifiers: The secondary clarifiers separate the activated sludge from the treated effluent. A portion of the sludge is wasted from the system by the WAS pumping system, and the remainder is returned to the treatment process using the RAS pumping system. Physical parameters and typical design criteria for the clarifiers are shown in **Table 2-16** and **Table 2-17**. Details for the RAS and WAS pumping equipment are summarized in **Table 2-18** and **Table 2-19**. Table 2-20 shows hydraulic capacity of the secondary treatment system piping.

The original No. 1 and No. 2 clarifiers are small in comparison to newer clarifiers (No. 3-No. 5) and do not have the design advantages of the newer clarifiers such as flocculating feed wells, full radius skimmers,

increased depth, etc. Normal operation is to utilize Clarifiers No. 3, No. 4, and No. 5 and retain Clarifiers No. 1 and No. 2 as redundant units in case of emergency.

Secondary Clarifiers No. 1 through No. 5 are shown in **Figure 2-19**.

Figure 2-19 – Secondary Clarifiers No. 1 through No. 5
(looking southwest)

Secondary Clarifiers No. 6 and No. 7 are shown in **Figure 2-20**.

Figure 2-20 – Secondary Clarifiers No. 6 & No. 7 and Splitter Box S3
(looking north)

Scum skimmings from the clarifiers are directed to one of four pump stations as shown in **Table 2-15**.

Table 2-15 – Scum Pump Stations

	Clarifiers Served	Comments
Scum Pump Station No. 1	#1 & #2	Operators indicate pumps and controls are at end of useful life
Scum Pump Station No. 2	#3	Operators indicate pumps and controls are at end of useful life
Scum Pump Station No. 3	#4 & #5	---
Scum Pump Station No. 4	#6 & #7	Constructed 2011

Table 2-16 – Clarifier Physical Parameters

Parameter	SC #1 & #2	SC #3	SC #4 & #5	SC #6 & #7
Year Installed	1983	1990	1996	2011
Diameter, ft	45	60	65	80
Surface Area, sq ft (each)	1590	2827	3318	5026
Weir Length, ft	141	188	204	251
Side Wall Depth, ft	12	12	14	14
Type of Scraper	Staggered flygts	Staggered flygts	Spiral	Spiral
Type of Sludge Withdraw	Hopper	Suction tubes or hopper	Sludge ring	Sludge ring
Type of Scum Skimming	3 ft box	Full radius	Full radius	Full radius

Table 2-17 – Typical Clarifier Design Parameters

Parameter	Recommended Value [a]	Units
Surface Overflow Rate at PHF [b]	1,000	gpd/ft^2
Solids Loading Rate at PHF+1Qr [b]	35	lbs/day-ft^2
Weir Loading Rate at PHF [b]	30,000	gpd/ft

[a] *With largest unit out of service*

[b] *PHF = Peak Hour Flow*

Table 2-18 – Summary of Return Activated Sludge (RAS) Pumps

Pump No.	Type	Capacity gpm/TDH	HP	Location
1	Non-clog centrifugal	550 gpm @ 65 ft	20	Utility Bldg #1
2	Non-clog centrifugal	550 gpm @ 65 ft	20	Utility Bldg #1
3	Non-clog centrifugal	450 gpm @ 10 ft	7.5	Utility Bldg #1
4	Non-clog centrifugal	800 gpm @ 26 ft	15	Utility Bldg #1
5	Non-clog centrifugal	880 gpm @ 30 ft	20	Utility Bldg #2
6	Non-clog centrifugal	880 gpm @ 30 ft	20	Utility Bldg #2
7	Non-clog centrifugal	880 gpm @ 30 ft	20	Utility Bldg #2

Table 2-19 – Summary of Waste Activated Sludge Pumps

Type	Capacity gpm/TDH [a]	HP	Location	Comment
Piston Pump	50 gpm @ 28 ft	3	Utility Bldg #1	Serves Clarifiers #1-#3
Motorized valve off of the RAS line	---	N/A	Utility Bldg #2	Serves Clarifiers #4 & #5
Motorized valve off of the RAS line	---	N/A	Utility Bldg #2	Serves Clarifiers #6 & #7

[a] *TDH = Total Dynamic (friction) Head*

Table 2-20 – Secondary Treatment Piping Hydraulic Capacity

Size	Service	From	To	Capacity (mgd)
24 & 30 in parallel	PI	Headworks	S1	11.7
18	ML	AN1	OD1	5.2
18	ML	AN1	OD2	5.2
18	ML	AN1	OD3	5.2
18	ML	AN1	OD4	5.2
30	PI	S1	OD5 & 6	11.5
24	ML	OD5	S2	9.0
24	ML	S2	SC6	6.7
24	ML	S2	SC7	6.7
30	FE	Junct SC6 & 7	CCT	16.7

Deficiencies and limitations identified were as follows:

- Pumps and controls for Scum Pump Stations No. 1 and No. 2 are at the end of their useful life.
- Treatment train 1 has a capacity of 2.9 mgd. Train 2 has a capacity of 1.1 mgd.

2.8.6 Tertiary Treatment

The WRF currently has no tertiary treatment facilities.

2.8.7 Disinfection

The treated effluent is disinfected with ultraviolet (UV) light. The WRF is currently equipped with parallel channels of vertical, in-stream ultraviolet disinfection modules. Both channels are fed by a single UV controller. The UV modules are set inside a previously modified chlorine contact chamber and covered by a steel canopy. The UV channels and disinfection system are shown in **Figure 2-21** and the capacity of the system is shown in **Table 2-21**.

Figure 2-21 – UV Disinfection System (looking northwest)

The UV disinfection system has a backup chlorine gas feed system with sulfur dioxide dechlorination system. This system is at the end of its useful life, as replacement parts for the equipment are becoming increasingly difficult to obtain. The chlorine gas feed system is located in Utility Building 1 (UB-1). The current system has two rooms–one for gas storage and scales and the second for feed and regulator equipment. The chlorine gas feed system was originally designed around 1-ton cylinders and contains a 2-cylinder scale and overhead trolley hoist for off-loading cylinders. In the late 1990s, the system was abandoned and switched to 150# cylinders. Currently, a manually adjusted feed regulator is used when the system must be operated. The capacity of this system is shown in **Table 2-21**. All other existing equipment has been abandoned in-place. The chlorine system in UB-1 is shown in **Figure 2-22**.

Figure 2-22 – Chlorine Gas Feed Room Equipment (in UB-1)

The sulfur dioxide feed system is located in a small shelter near the utility water pump station. The SO_2 system, similar to the chlorine gas, is fed with a manual feed regulator. The capacity of the backup dechlorination system is shown in **Table 2-21**. The SO_2 system is shown in **Figure 2-23**.

Figure 2-23 – Sulfur Dioxide Dechlorination System
(looking east)

Utility Water Building on left side; Sulfur Dioxide Building on right side

The performance capacity of each of the disinfection treatment unit processes is shown in **Table 2-21**.

Table 2-21 – Disinfection Treatment Processes Performance Capacity

Item	Equipment Manufacturer and Equipment Size	Hydraulic Capacity	Performance Data
UV Channels	Infilco Degremont Inc. (IDI) 4 (two parallel trains of 2) In-Channel vertical tube.	Dosage at 13.8 mgd peak hour flow = 35.5 mWs/cm^2 • *6.0 mgd average-day flow assuming a peaking factor of 2.3* • *Assumes all modules operating* Dosage at 10.5 mgd peak hour flow = 35.0 mWs/cm^2 • *4.56 mgd average-day flow assuming a peaking factor of 2.3* • *Assumes one redundant module out of service*	• Influent TSS: <= 30 mg/l • Ultraviolet transmittance at 254 nm: >65% • Max 30 day geometric mean: 50 mpn/100 ml • Max avg weekly fecal coliform: 200 mpn/100 ml • Max daily fecal coliform count: 500 mpn/100 ml • No more than 10% of the samples shall exceed a fecal coliform count of 200 mpn/100 ml over a 30-day period.
Gas Chlorination System	Wallace and Tiernan	Historically fed at (2.3 mg/L dose) Peak Capacity 120 ppd = 6.3 mgd @ 2.3 mg/L dose • *Per 10 States Standards, nitrified effluent requires ability to dose at 6 mg/L. Peak capacity = 120 ppd = 2.4 mgd @ 6 mg/L*	• Assumes 6 cylinders on-hand, 3 installed for dosing with maximum of 40 ppd draw from one cylinder to prevent freezing.
Gas Sulfur Dioxide Dechlorination System	Wallace and Tiernan	Historically fed at (<0.8 mg/L dose) Peak Capacity 80 ppd = 8 mgd @ 1.2 mg/L dose (assuming 1.5 factor of safety over historical usage)	Assumes 4 cylinders on-hand, 2 installed for dosing with maximum of 40 ppd draw from one cylinder to prevent freezing.
Chlorine Contact Chambers (ALL)			When the UV channel is taken off line, flow is diverted and split between Chambers 1 and 2. Assuming a minimum detention time of 15 minutes, the peak hydraulic capacity of the system is 3.6 mgd.
Chamber 1	Type: Buried pipe	Volume: 18,800 gallons	
Chamber 2	Type: Buried pipe	Volume: 18,800 gallons	
Channel 3	Type: Open channel	Volume: 48,850 gallons	

Deficiencies and limitations identified include the following:

- The capacity of the UV channels is 10.5 mgd peak hour flow, firm capacity with one unit out of service; 4.56 mgd average daily flow assuming a 2.3 peaking factor.
- The plant has had approximately five maximum daily fecal coliform violations while using the UV system. At the times of the violations, the plant was not experiencing an upset, and the corresponding effluent total suspended solids were always low. The violations seem to be random, and the operators have not been able to correlate them to any cause. There could be

many potential causes, but it seems most likely they are caused by a particulate collected in the sample. If this is the cause, effluent filtration would be required to prevent it.

- The UV structure is an open-air canopy structure. Windblown debris and birds nesting in the area are also potential causes of fecal coliform violations. Modification to the structure to prevent birds and debris from contaminating the channel areas would potentially help to mitigate these coliform violations.
- The backup chlorine gas disinfection and sulfur dioxide dechlorination system is limited to approximately 2.4 and 8.0 mgd, respectively. The chlorination equipment is under capacity at peak flows. The system equipment is also aging and in need of replacement, or another backup system needs to be provided.

2.8.8 Outfall

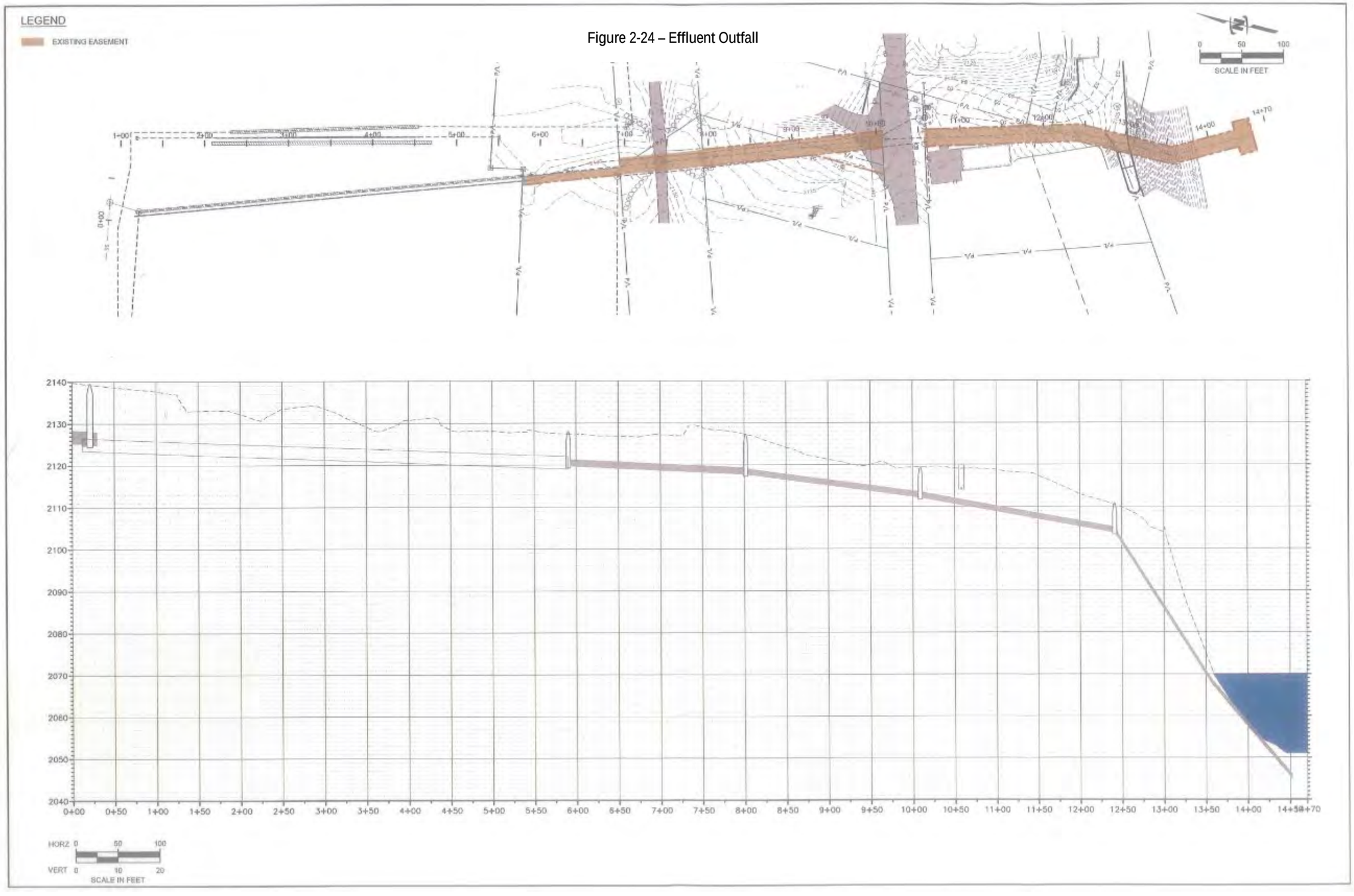
The existing outfall line leaves the Post Falls WRF, runs east along the south side of I-90, then travels beneath I-90 through an 18-inch line inside a 48-inch steel case. A second parallel 48-inch case was installed in 2008. The effluent then flows by gravity south where the pipe slope increases and the pipe transitions to a 15-inch-diameter gravity line. The line continues to flow to the south and transitions to a 12-inch-diameter pressure-rated line as the pipe drops into the river channel and out to the final outfall in the Spokane River. The profile was determined using As-built Drawings obtained from an Idaho Department of Environment Quality file dated December 1984. Based on the profile, it is highly probable that the flow conditions in the outfall vary between open channel and full pipe flow. The existing diffuser assembly is composed of a single 12-inch-diameter, 90-degree fitting directed downstream per the As-Built Drawings.

A supplemental survey was completed in the summer of 2011 as part of this study to establish property ownership extents for future modifications to the outfall. A diagram of the outfall pipeline and Spokane River outfall pipe is shown in **Figure 2-24.**

Deficiencies and limitations identified include the following:

- Under current conditions, the hydraulic capacity of the outfall system is limited to approximately 4.5 mgd at a velocity of 9 feet/sec at the discharge.

Figure 2-24 – Effluent Outfall



2.8.9 Reuse of Reclaimed Wastewater

The WRF currently uses reclaimed disinfected effluent for non-potable utility water within the treatment plant for scum and foam spray nozzles and wash-down yard hydrants and belt filter press wash-down. The City does not currently have any active reclaimed water reuse sites beyond the WRF property.

All utility water is coarse screened using a backwashing automatic filter to remove particulate matter. Utility water feed lines for the belt filter presses are further screened using basket strainers.

The utility water pumps are controlled through a PID loop to maintain a system pressure between 50 and 85 psi. Flow is split from the utility water system to monitor irrigation flows separate from in-plant flows. The Utility Water Building is shown in **Figure 2-23** and the pumping and screening equipment is shown in **Figure 2-25**.

Figure 2-25 – Utility Water Pump and Screening Equipment

The performance capacity of the non-potable utility water system is shown in **Table 2-22**.

Table 2-22 – Non-Potable Utility Water System Capacity

Item	Equipment Manufacturer	Hydraulic Capacity
Utility Water Pumps (1)	Peerless, 15 HP	150 gpm @ 85 psi
Utility Water Pump (2)	Peerless, 25 HP	300 gpm @ 85 psi
Screening	SP Kinney	500 micron

Deficiencies and limitations include the following:

- Currently, the utility water system has adequate capacity for current uses but does not have capacity to provide water for all planned irrigated areas within the WRF. Further, irrigation would need to be performed during off-work hours when the belt presses were not being operated at the plant.

2.8.10 Biosolids Handling

Excess activated sludge is wasted from the secondary clarifiers directly to the aerated sludge storage tanks to be held prior to dewatering. The sludge typically consists of 0.8 percent to 1.0 percent solids and 99.2 percent to 99.0 percent water. This solids content is typical for extended aeration treatment plants.

Because the treatment process uses biological phosphorus removal, it is necessary to keep the waste sludge aerobic and dewater it as soon as possible in order to minimize the release of phosphorus. It is typically held no more than 72 hours. Diffused aeration is used to keep it aerobic. Little or no digestion occurs in the storage tanks due the short holding time and sometimes low temperatures.

The aeration blowers for the sludge holding tanks are located in two different buildings. The blowers for Tank No. 1 are located on the ground floor of UB-1. The blowers for Tank No. 2 are located in the basement of UB-2. Under typical operation, one storage tank is used. A summary of the sludge storage tank and blowers is shown in **Table 2-23**. The storage tanks and dewatering building are shown in **Figure 2-26**.

Table 2-23 – Sludge Storage Tanks Physical Parameters

Parameter	Tank #1	Tank #2
Diameter, feet	45	50
Sidewater Depth, feet	7.5	17
Volume, gallons	120,000	279,000
Aerators	Coarse bubble diffused air	Medium bubble diffused air
Blowers	3	2
Type	Positive displacement	Positive displacement
Capacity, each	370 scfm	470 scfm
Size, each	15 hp	40 hp

Figure 2-26 – Sludge Storage Tanks and Dewatering Building

Belt Filter Press Feed: Sludge from the aerated storage tanks is pumped to two belt filter presses for dewatering. Sludge is fed to the belt presses using two dedicated pumping stations. Sludge is pumped from Tank No. 1 using centrifugal pumps in the basement of UB-1. Each pump contains an in-line grinder to macerate solids and protect the belt filter press. Sludge from Tank No. 2 is pumped to the belt filter presses using in-tank submersible non-clog centrifugal pumps.

A polymer is added to the sludge to aid in the removal of water. The polymer system consists of two positive displacement polymer feed pumps and two batch makeup tanks where the dry polymer is mixed with water to the desired concentration and then aged before being mixed with the sludge. The system also has a bulk-storage tank for alum feed.

The polymer feed system is located in the south end of the Belt Filter Press Building and is shown in **Figure 2-27**.

Figure 2-27 – Polymer Feed Equipment

Sludge Dewatering: The Post Falls WRF dewatering system has two belt filter presses, including an older Andritz 1.5 meter press and a 2.5 meter BDP press installed in the 2011 upgrades. At Post Falls, the belt filter presses typically produce a cake consisting of 12.5 percent to 15.0 percent solids and 87.5 percent to 85.0 percent water. Dewatered sludge is transported by a conveyor to a covered storage area. The capacity of each conveyor is seven tons/hour. The dewatered sludge is then stored temporarily until it is hauled away to be composted by a contractor.

Presently, the dewatering system operates the newer BDP belt press every other day for an 8-hour shift each day. The operators shift the system once per month and operate the 1.5 meter Andritz press to maintain the system viability. As this press has a reduced capacity compared to the BDP, it must be operated every day for 7 to 8 hours per day to keep up with solids production. A summary of the dewatering equipment is shown in **Table 2-24**.

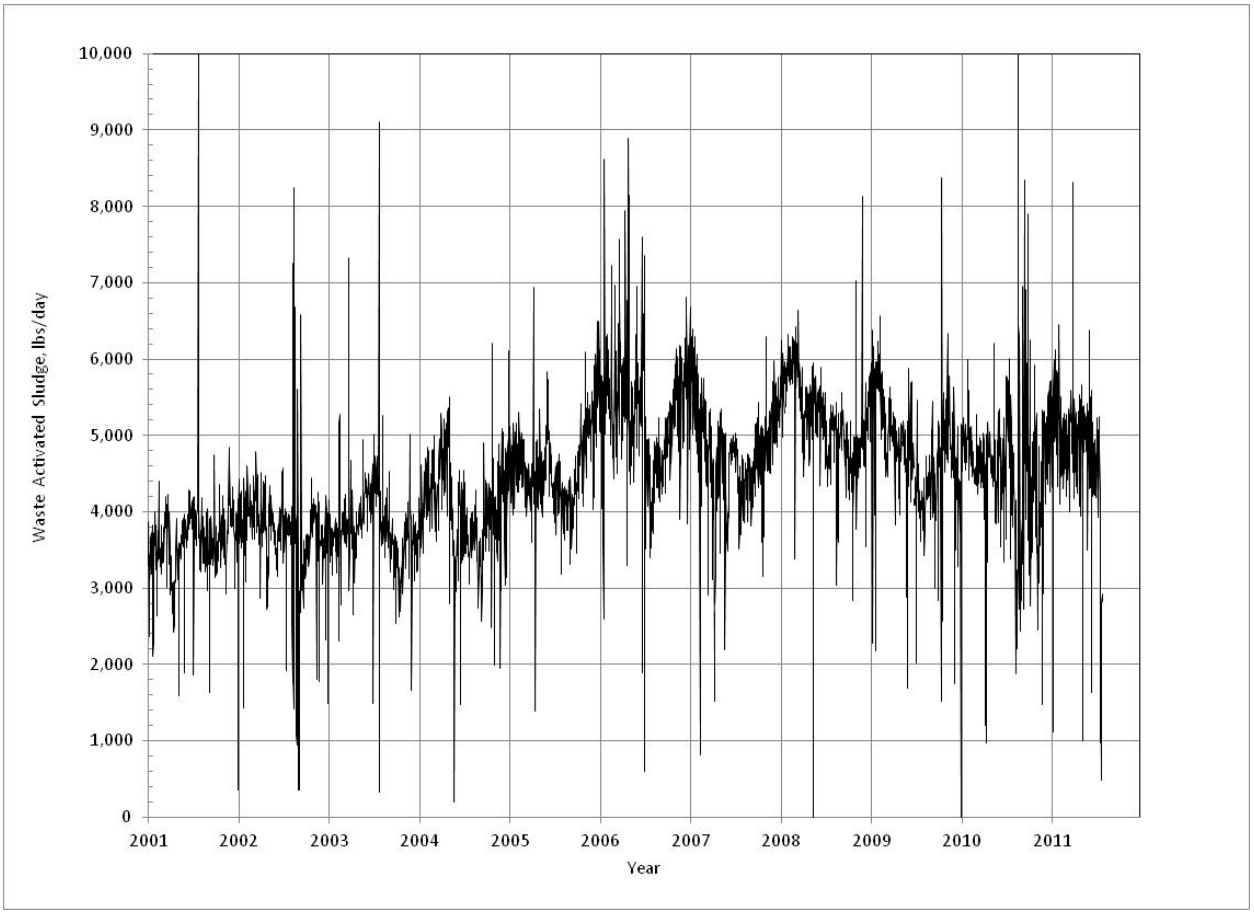
Table 2-24 – Dewatering Process Equipment Summary

Component	Number/Type/Size
Belt Filter Press Feed Pumps (Press No. 1)	
Number	2
Capacity	85 gpm/each
Type	Non-Clog Centrifugal
Sludge Grinders	
Number	2
Capacity	400 gpm/each
Belt Filter Press #1	
Make	Andritz
Size	1.5 meter
Hydraulic Throughput	100 gpm
Solids Loading	500 lbs/hr at 1% feed
Belt Filter Press Feed Pumps (Press No. 2)	
Number	2
Capacity	200 gpm/each (350 gpm both running)
Type	Submersible
Belt Filter Press #2	
Make	BDP
Size	2.5 meter
Hydraulic Throughput	250 gpm
Solids Loading	1,250 lbs/hr at 1% feed

Pressate water is drained back to a duplex sump pump station (located between the holding tanks on the north side). The pump station was installed in 2011 and has adequate capacity for current flows generated from the belt filter press (one press operating) but is operating at full capacity. Future expansion of the belt filter press system will require expansion of this pump station capacity. For 2007-2011, the treatment plant operated with an average sludge yield of 0.89 lbs total solids/lb BOD removed.

Historical data of sludge wasting is shown in **Figure 2-28**. The average sludge wasted was 4,788 lb/day (56,800 gpd) for 2001 to 2011. The statistical "peak day" was 8,014 lb/day (78,800 gal). If the BDP belt filter press was out of service, the Andritz belt filter press would have to be operated at least 10.5 hours per day, seven days per week to meet the dewatering need.

Figure 2-28 – Sludge Wasting (pounds per day)



Originally, the facility utilized liquid sludge hauling and disposal. The loading station and pumps are still in place.

Disposal and Costs: The City currently contracts with BARR TECH for solids disposal. Dewatered solids are loaded by a City-owned loader onto the contractor's trucks at the WRF and hauled to designated land application sites operated by the contractor. The contractor is responsible for biosolids hauling, composting, and disposal of wholesale compost. The City's contract with BARR TECH includes a cost of $65.00 per wet ton with a fuel surcharge adjustment. The biosolids storage and loading area is shown in **Figure 2-29**.

Figure 2-29 – Biosolids Storage and Loading Area

Post Falls has always used land application for biosolids disposal. Originally, the treatment plant land applied the biosolids themselves, but for one year they used a licensed contractor (Parker Ag Services, LLC) to land apply the dewatered biosolids with no further treatment. The City currently contracts with Barr-Tech. The City's previous contractor was EKO Compost. EKO Compost further treated the sludge by composting.

Sewage sludges applied to the land must meet the requirements of the Part 503 Biosolids Rule. Subpart B of the rule specifies pollutant requirements for biosolids applied to the land. Biosolids applied to the land must meet the ceiling concentrations for pollutants and also either pollutant concentration limits, cumulative pollutant loading rate limits, or annual pollutant loading rate limits for 10 heavy metals. Post Falls has not had difficulty meeting these limits. The sludge from Post Falls is compared to the ceiling concentration limits and the pollutant concentration limits in **Table 2-25**. The loading rate limits would be specific to the land application site.

Table 2-25 – Sludge Compared to Ceiling Concentration Limits and Pollutant Concentration Limits

	Post Falls Sludge Maximum Concentration (2005-2006)	Ceiling Concentration Mg/kg	Pollutant Concentration Limits
Arsenic	6.38	75	41
Cadmium	1.69	85	39
Chromium	31.2	3,000	1,200
Copper	229	4,300	1,500
Lead	11.6	840	300
Mercury	1.6	57	17
Nickel	33.1	420	420
Selenium	7.29	100	436
Zinc	548	7,500	2,800

Subpart D of the 503 rule specifies the requirements for pathogen reduction and vector attraction reduction. Biosolids applied to land must meet either Class A or Class B pathogen reduction requirements and one of 12 options to meet the vector attraction reduction requirements.

Post Falls meets the requirements of Class B pathogen reduction requirements using Alternative 1: Monitoring of indicator organisms to demonstrate compliance. Alternative 1 requires that the fecal coliform density in the sludge be less than 2 million MPNs or CFUs per gram of dry solids. Historically, the treatment plant has not had difficulty meeting these requirements. Recent sampling results are summarized below in **Table 2-26**.

Table 2-26 – Recent Sampling Results

Date	Fecal Coliform Density CFU/gr
04/07/2009	200,200

To demonstrate the vector attraction reduction requirements, the treatment plant has historically used Option 10: Incorporate biosolids into the soil within six hours of application. Other options that could be used to meet the vector attraction reduction requirements are:

- Option 3: Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit.
- Option 9: Inject biosolids beneath the soil surface.

Currently, all biosolids go to Barr Tech for composting in accordance with the City's WDOE biosolids permit.

Deficiencies and limitations identified include the following:

- The biosolids handling system is currently limited by the older Andritz press to 500 lbs/hr at 1 percent feed rate.
- The pressate pump station currently adequately handles pressate from the larger press, but should the system be expanded to operate more than one press consistently, this pump station would have inadequate capacity.
- Solids disposal is handled through a contractor. There is currently no redundant disposal mechanism in place. Future planning should provide for an alternative means of disposal and adequate sludge storage.
- Lack of odor control in the dewatered biosolids storage room.

2.8.11 Electrical and Controls

Definitions

AF ..... Circuit Breaker Ampere Frame Rating

AT ..... Circuit Breaker Ampere Trip Rating

KVA..... Kilowatt Ampere

KW..... Kilowatt

KWH ..... Kilowatt Hour

PLC..... Programmable Logic Controller

Plant Electrical Loads (peak and average demand)

The average plant load has been recently measured (February 2012) at approximately 550 amperes or 457 KVA. This load is with ditches 2 and 4 out of service and with ditches 1 and 3 aerators running at 43 hertz and ditch 5 aerators running at 46 hertz. The average plant load with ditches 1 through 4 in service near capacity and without ditch 5 in service is approximately 640 amperes or 532 kVA.

Existing Electrical Utility (Normal Power Source)

The existing water reclamation facility is fed by Avista Utilities under rate schedule 021, Large General Service. The utility distribution system is designed as a 3,000 ampere service with parallel 1000KVA utility transformers. The utility transformers are located north of Utility Building Number 2. Currently, only one 750kVA, 13.2KV-480/277Y service transformer is installed and the main circuit breaker long time trip setting is set at 1,200 amperes. These units are shown in **Figure 2-30**.

Figure 2-30 – Existing Utility Transformer and Stand-by Generators

Existing Generators (Stand-By Power Source)
There are two diesel driven stand-by generators (one 500 KW and one 800 KW) installed north of Utility Building 2 with provisions for adding a third 800KW unit. The 500KW unit feeds the standby side if the plants main switch gear via a 800 AT/1200 AF circuit breaker and the 800 KW unit feeds the stand-by side if the plants main switch gear via a 1200 AT/1600 AF circuit breaker. The installed generators operate in parallel and are interconnected with the plants electrical distribution system via a 3,000 ampere tie breaker. The automatic operation of the generators, paralleling system, and load transfer is controlled by a PLC based Caterpillar/Allen Bradley paralleling switchgear control system.

Existing System Electrical Capacity
The currently installed system is capable of supporting the plants electrical load requirements through 5MGD (~1300 KVA). The electrical distribution system is designed to accommodate the peak loads of the planned capacity phases of the water reclamation facility though 8 MGD (~2450KVA) with the addition of conductors installed in spare conduits as well as utility transformer upgrades.

Existing Distribution Switchgear
The Main Electrical Distribution Switchgear (GDP1) is located in Utility Building Number 2 as shown in **Figure 2-31**. This switchboard has a 3000 ampere bus and main draw-out utility service power circuit breaker with a 100 KA rated interrupting capacity. The normal power side of the switchgear then feeds a 3000 ampere distribution power panelboard (MDP1), which in turn feed all plants loads. The standby power side of GDP1 consists of three draw-out power circuit breakers, (one 1200 ampere, and two 1600 ampere). The two sides of GDP1 are interconnected with a 3000 ampere draw-out power circuit breaker.

Figure 2-31 – Existing Main Switchboard GPD1 and Panelboard MDP1

Panelboard MDP1 is provided with a transient voltage surge suppression (TVSS) unit to provide a first level of plant protection. Electronic power monitoring is provided in GDP1 and MCC-G to provide real time and historical power system information. An Active harmonic filter is connected to panelboard MDP1 to ensure compliance with IEEE-519-1992 harmonic content limits.

Panelboard MDP1 feeds the 800 ampere MCC-G in Utility Building Number 2 and the main switchboard MSS in Utility Building Number 1. The current system one-line diagram is portrayed in **Figure 2-32**.

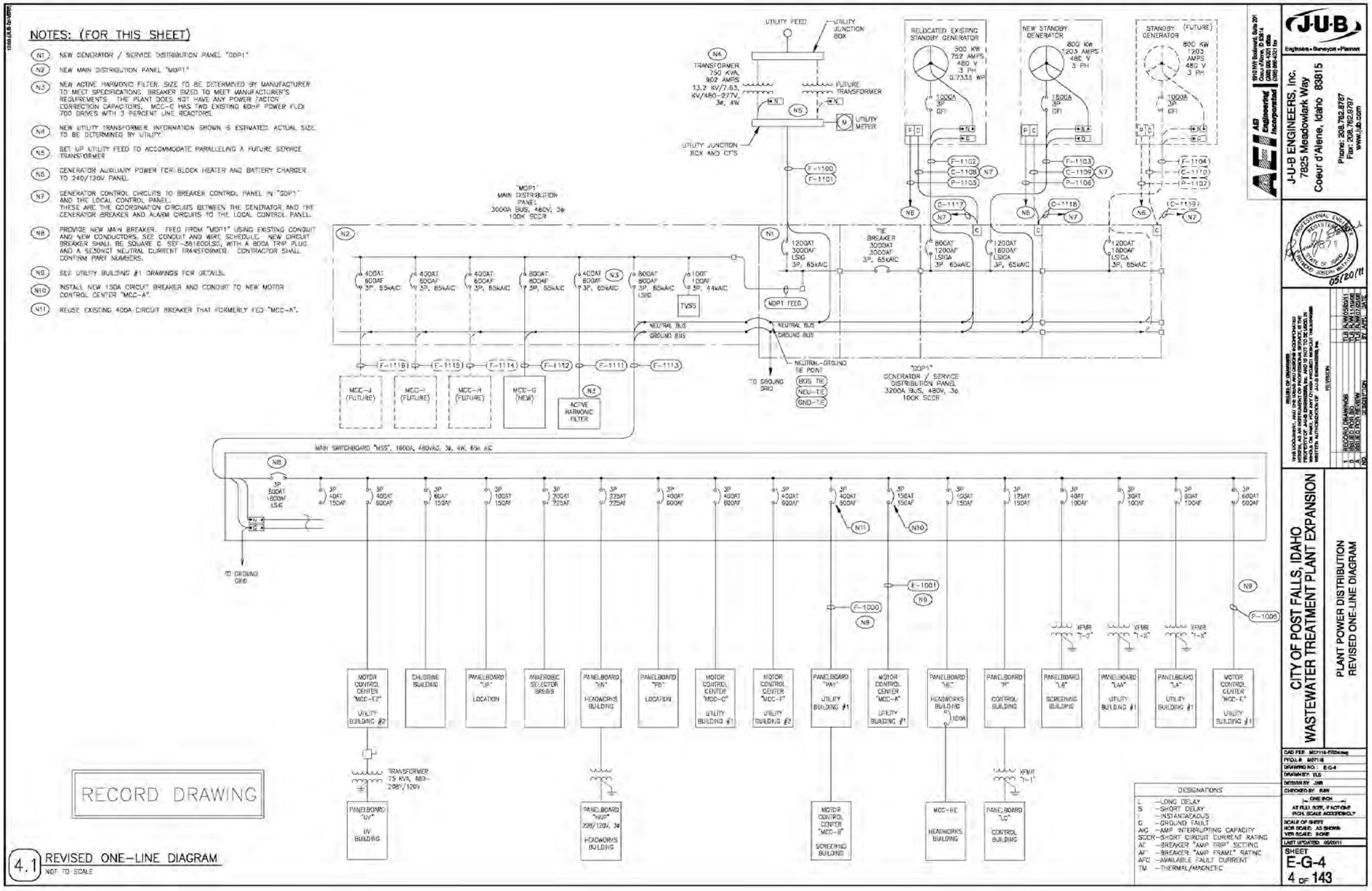
Power Distribution within the Plant

The existing power distribution system is divided into two physical areas with the current dividing line being the access road on the east side of ditch 4. All power and motor control west of the dividing line is fed from Utility Building Number 1 (MSS). All power and motor control east of the dividing line is fed from Utility Building Number 2 (MCC-G).

Ductbank System

The electrical power, controls, instrumentation, and communication conductors are distributed throughout the plant in a network of underground electrical ductbanks. The electrical ductbanks provide adequate separation of the different system signal circuits. Pulling vaults are placed at all intersections and where required for cable pulling. The ductbanks are encased in reinforced concrete and have a minimum of 24 inches burial.

Figure 2-32 – Electrical Distribution One-Line Diagram



Electrical Code Analysis
In general, there are no known electrical code issues involving equipment or installation methods.

National Fire Protection Association Recommendation Review
Presented below is a review of Ventilation and Electrical Area Classification requirements of the Post Falls Water Reclamation Facility, based on National Fire Protection Association Standards.

NFPA Publications Used For This Review
The following NFPA publications were used in the preparation of this facility plan update; NFPA 820, 70, 496, and 45. NFPA 820-2008 (Recommended Practice for Fire Protection in Wastewater Treatment and Collection Facilities) specifically addresses issues such as ventilation rates, area classification, and fire protection measures in wastewater treatment facilities. NFPA 70-2008 (National Electrical Code) specifically addresses issues such as ventilation rates, area classification, and fire protection measures in commercial vehicle maintenance facilities. **Table 2-27** summarizes the NFPA ventilation, area classification, and fire protection recommendations for the various buildings and process facilities within the Water Reclamation Facility. A list of abbreviations used in the table is shown below:

Abbreviations

CGD ..... Combustible Gas Detection System
FAS ..... Fire Alarm System
FDS ..... Fire Detection System
FE..... Portable Fire Extinguisher
H ..... Hydrant Protection
NA..... Not Applicable
NNV ..... Not Normally Ventilated
NR..... No Requirements

Table 2-27 – Area Classification **of the Post Falls WWTP per NFPA 820**-2008**, NFPA 70-200**8

Location	NFPA Category	NEC Electrical Classification	Ventilation Requirements: Extent of Classified Area	Ventilation Requirements: Air Changes Per Hour	Fire Protection Measures
➢ Secondary Clarifier Scum Pit Wet Well	Wastewater Pumping Station Wet Wells, Table 2-2, row 16	Class I, Div 1	Entire Room	NNV or <12	CGD
		Class I, Div 2		12	
		Unclassified		6	
➢ Various locations throughout the plant	Above Grade Wastewater Pumping Station Physically Separated from Wet Well, Table 2-2, row 18	Unclassified	Entire Room	NR	FE
➢ Raw Sewage Distribution Structure ➢ Primary Influent Flow Splitter Box	Diversion Structures, Table 2-2, row 29	Class I, Div 1	Enclosed Space	NNV	NR
		Class I, Div 2		12	
➢ Various locations throughout the plant	Below Grade Valve/Meter Vault Physically Separated from Wet Well, Table 2-2, row 31/36	Class I, Div 2	Enclosed Space	NNV	NR
		Unclassified		6	
		Class I, Div 2		12	
➢ Headworks	Coarse and Fine Screen Facilities / Flow Equalization Tanks / Grit Removal Tanks, Table 3-2, row 1/3/4/5	Class I, Div 1	Enclosed Space	NNV or <12	FE, H, CGD
		Class I, Div 2		12	
			Within a 10-ft Envelope around Equipment and Open Channel	Not Enclosed	
➢ Selector Tanks ➢ Anoxic Basins ➢ Anaerobic Basins	Pre-Aeration Tanks, Table 3-2, row 5	Class I, Div 1	Enclosed Space	NNV or <12	H, CGD
		Class I, Div 2		12	
			Within a 10-ft Envelope around Equipment and Open Channel	Not Enclosed	

Table 2-27 – Area Classification of the Post Falls WWTP per NFPA 820-2008, NFPA 70-2008 continued

Location	NFPA Category	NEC Electrical Classification	Ventilation Requirements: Extent of Classified Area	Ventilation Requirements: Air Changes Per Hour	Fire Protection Measures
➢ Aeration Basins	Aeration Basin, Pond, Lagoon, Oxidation Ditch, etc., Table 3-2, row 7 (not proceeded by primary sedimentation)	Class I, Div 1	Enclosed Space	NNV or <12	H, CGD
				12	
		Class I, Div 2	18" envelope about tank and extending 10 ft beyond tank walls	Not Enclosed	
➢ Secondary Clarifiers	Intermediate Secondary, or Tertiary Sedimentation Tanks, Table 3-2, row 14 (not proceeded by primary sedimentation)	Class I, Div 1	Enclosed Space	NNV or <12	H, CGD
		Class I, Div 2		12	
			18" envelope above tank and extending 10 ft beyond tank walls	Not Enclosed	
➢ Utility Building No. 1 Basement ➢ Utility Building No. 2 Basement	Intermediate or Final Pumping Stations, Table 3-2, row 19	Unclassified		NA	H
➢ UV Disinfection Area	Ultraviolet Disinfection Unit, Table 3-2, row 24	Unclassified		NA	H
➢ Secondary Effluent Splitter Box	Effluent Structures, Table 3-2, row 25	Unclassified		NA	H
➢ Shop, Utility Building No. 2	Commercial Garages, Repair, and Storage, NFPA 70-511	Class I, Div 1	Pit or Depression below Floor Level	NNV or <6	NR
		Class I, Div 2		6	
			18" above the Floor		
				NNV or <4	
		Unclassified		4	
➢ Scum Handling Areas	Scum Handling Building or Area, Table 4-2, row 3	Class I, Div 2	Enclosed Space	NNV or <12	CGD, H, FE
		Unclassified		12	
			NA	Not Enclosed	

Table 2-27 – Area Classification of the Post Falls WWTP per NFPA 820-2008, NFPA 70-2008 continued

Location	NFPA Category	NEC Electrical Classification	Ventilation Requirements: Extent of Classified Area	Ventilation Requirements: Air Changes Per Hour	Fire Protection Measures
➢ Scum Boxes	Scum Pits, Scum Pumping Areas, Wet Side, Table 4-2, row 4/5	Class I, Div 1	Enclosed Space	NNV or <12	CGD,H, FE
				12 Not Enclosed	
			Within 10 ft envelope around Equipment and Open Channel		
		Class I, Div 2			
➢ Scum Handling Areas	Scum Pumping Areas, Dry Side, Table 4-2, row 6	Class I, Div 2	Enclosed Space	NNV or <6	FE
				6	
		Unclassified	NA	Not Enclosed	
➢ Dewatering Building ➢ Solids Pumping	Sludge Pumping Stations, Dry Side, Table 4-2, row 9	Class I, Div 2	Dry Well	NNV or <6	FE, H
		Unclassified		6	
➢ Digested Sludge Tanks	Sludge Storage Wet Wells, Pits, and Holding Tanks, Table 4-2, row 10 Sludge Blending Tanks and Holding Wells, Table 4-2, row 11	Class I, Div 1	Enclosed Space	NNV or <12	FE, H, CGD
		Class I, Div 2		12	
			Envelope 18" above Water Surface and 10 ft Horizontally from Wetted Walls	Not Enclosed	NR
➢ Dewatering Building	Dewatering Building Containing Centrifuges, GBT, BFP, Table 4-2, row 12	Unclassified	NA	NA	FE, FDS, FAS
➢ Dewatering Building	Pumping of Drainage from Digested Sludge Dewatering Processes, Table 4-2, row 25	Unclassified	NA	NR	H

Control, Data Acquisition and Monitoring
The following paragraphs present a brief description of the existing System Control and Data Acquisition (SCADA) system at the City of Post Falls WRF.

The plant currently uses multiple Allen Bradley CompactLogix and MicroLogix PLCs connected via a plant-wide fiber optic network (Ethernet) to monitor and control the process equipment. The PLC's are located in the Administrations Building, Utility Building Number 1, Utility Building Number 2, the Dewatering Building, the Disinfection Area, the Utility Water Building, and the Headworks Building. Reference **Figure 2-33**.

The plant staff monitors and controls the treatment process via an Intouch Wonderware Operator Interface program loaded on a PC (SCADA Computer) in the Administration Building and on a Laptop located in Utility Building Number 2. The SCADA Computer enables the Operator to view the system by displaying process data collected by the PLCs on the graphical screens. This data is logged into the computer database and can be viewed with the trending tool. The SCADA Computer also enables the operator to change set points and manually control equipment. The PLC converts signals from switches, motor controls, instrumentation, and other field devices for transmitting to the SCADA Computer which displays the entire plant process, monitors for alarm conditions, calculates equipment run times and flow totals, and other logic functions.

The existing PLC I/O and terminal space includes provisions to accommodate the addition of the ditch 6 aerators and anoxic/anaerobic mixers along with all associated instrumentation.

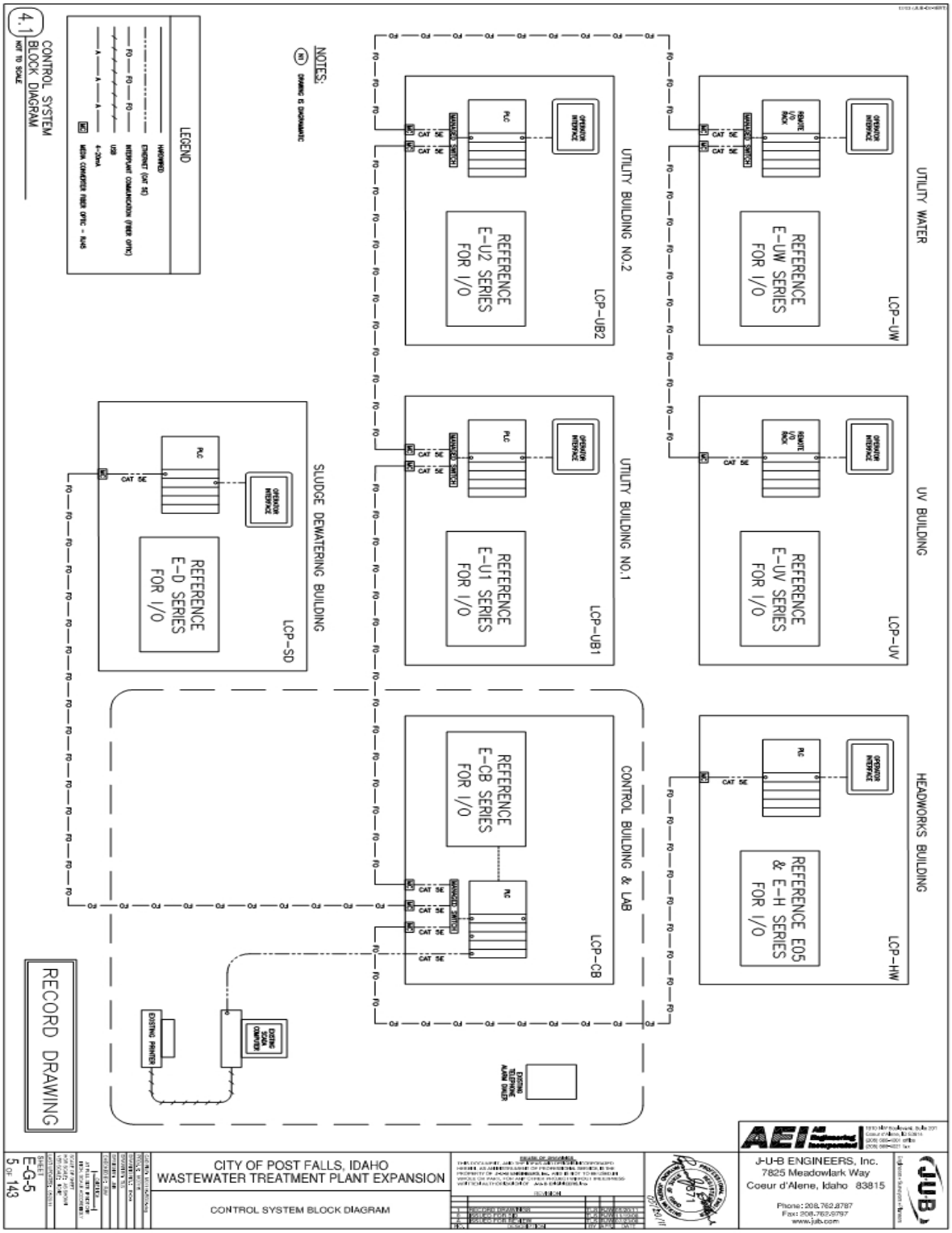
Operator Interface Terminals (OITs)
In addition to the PC based "Wonderware" control stations, each local control panel (PLC location) with the exception of Utility Building Number 2 has a door mounted touchscreen operator interface panel for local system status and alarm indication.

Local Controls Capabilities
All plant equipment has the ability to run in a manual mode in the event of a PLC control system failure. Local switches are normally located on the appropriate MCC starter buckets. In addition, some process equipment/motors have jog switches located at the motor location to allow for manual operation and maintenance.

Alarm Systems
The Fire Alarm Control Panel (FACP), located in the Dewatering Building, annunciates trouble and alarm signals and notifies the plant operator via local annunciation, the SCADA system, and the automatic dialer.

The SCADA system produces various alarms that are annunciated to the plant operators. When plant operators are not present the alarms are sent to remote locations through a hardwired automatic dialer (Sensaphone Express II) located in the Administration Building.

Figure 2-33 – Control System Block Diagram



2.8.12 Administration and Support Systems

Odor Control: Odor control is an ongoing concern for the WRF facilities. The entire influent wastewater to the WRF is pumped, and thus is often beginning to become anaerobic by the time it reaches the WRF. This anaerobic wastewater is the primary odor generator at the WRF. Upgrades in 2011 improved the odor control system by adding a Vapex odor control chemical at the headworks facility. Further, all influent channels adjacent to the headworks are covered, and foul air from these channels and the buildings is routed through a carbon air scrubber system. In 2012, operations staff installed a Vapex unit at Splitter Box S-1 prior to the EBPR facility. No other odor control mitigation facilities exist at the plant.

Control Building, Laboratory, and Staff Facilities. The current laboratory and office facility space is used for SCADA computer control stations, laboratory analyses, storage of plant records, and break room/meeting facilities for the operations staff. The size of the facilities is limited and is already strained by the current number of staff at the facility.

The laboratory is currently easily accessible by unauthorized staff, creating a potential for lab hygiene to be compromised. The laboratory facilities should be segregated from the day-to-day operations staff to minimize potential contamination of the lab facilities.

Normal break room and meeting facilities should be isolated from the control rooms and laboratory to improve security for plant operations as the number of staff increases.

Management and Staffing: The WRF is a division of the City and is led by the Director of the Department of Public Services. The Public Services Department is comprised of two divisions–the Public Works Division and the Community Development Division. The Public Works Division consists of streets, water, water reclamation, stormwater, fleet services, and facility maintenance. The Community Development Division consists of Building, Engineering, and Planning.

The Public Services Director and Environmental Manager work with WRF operations staff to oversee and manage the WRF facility operations, laboratory, collection system, and industrial pre-treatment programs.

The WRF is operated and maintained by a group of staff with varying tasks. Direction of day-to-day operations is by the Lead Operator (Class IV). The organizational scheme and duties are as follows for the WRF staff positions:

- Chief Operator (Class IV) – In responsible charge and supervises day-to-day plant operations and process control.
- Lead Operator (Class IV) – In responsible charge when the Chief Operator is not available; responsible for management of additional supporting Operators.
- Operators (five positions) – Report to the Chief Operator and Lead Operator for daily maintenance and operations tasks.
- Senior Lab Technician – Responsible for lab management and day-to-day sampling, analyses, and testing for reporting on Daily Monitoring Reports (DMRs).
- Lab Technician – Supports the Senior Lab Technician.

- Industrial Pre-treatment Coordinator – Works with the Lead Operator and Senior Lab Technician to maintain and coordinate the industrial pre-treatment program.

Normal working shift is 7:00 AM to 4:00 PM Monday through Friday and 6:00 AM to 2:00 PM on weekends. During off hours, a plant operator is "on call".

Financial: The Fiscal Year 2010/2011 (FY 2011) operating budget for the WRF is approximately $4.67 million. This includes WRF operation, collections staff, laboratory, solids disposal, and staffing costs. FY 2012 budget for operations has been budgeted to $4.88 million.

Appendices

Appendix 2-A – Detailed Process Schematic
Appendix 2-B – Wastewater Treatment and Discharge Agreement between the City of Rathdrum and the City of Post Falls

Appendix 2-A

Detailed Process Schematic

See enclosed DVD for appendix information

Appendix 2-B

Wastewater Treatment and Discharge Agreement between the City of Rathdrum and the City of Post Falls

See enclosed DVD for appendix information

J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Flow and Wasteload Projections

Final

June 2013

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TM 3 – Flow and Wasteload Projections

3.1 Introduction

Flow and load projections for the Water Reclamation Facility (WRF) are used to identify current and future capacity limitations in the existing plant, future unit process sizes, and total plant size and needs through the planning period. These projections are based on review of a varying number of sources:

- Historical data collected at the WRF (Technical Memorandum, TM, No. 2)
- City Engineering, Wastewater Collection System Master Plan Update (City of Post Falls, *completion pending*)
- City of Post Falls Water System Master Plan (J-U-B, 2011), including Kootenai Metropolitan Planning Organization (KMPO, 2009) projections
- Population projections within the current city limits and the Area of City Impact (ACI), including:
    - Stravens, 2007 and 2011
    - US Census
    - Rathdrum Prairie Wastewater Master Plan, 2010
- Flow and Loads Technical Memorandum (J-U-B, 2010) located in **Appendix 3-A**

This TM will review the current flows and loads entering the Post Falls WRF and will evaluate flows and peaking factors as well as projections of future flows and loads through the 2031 planning period.

3.2 Future Wastewater Flow Projections

3.2.1 Population Based Projections

A number of projections have been established over recent years to determine the potential rate at which population will grow on the Rathdrum Prairie, including the City of Post Falls, and Rathdrum.

The area served by the Post Falls WRF, City of Post Falls and current Area of City Impact (ACI), Rathdrum and current ACI, and potential expanded ACI for each of the entities was established as part of the 2010 Rathdrum Prairie Wastewater Master Plan. Further, the Rathdrum Prairie Master Plan established land and sewer service area planning for the study area, which includes areas beyond the City's current ACI.

Populations for the Rathdrum Prairie and surrounding cooperating areas in Kootenai County are expected to increase substantially in the future. While areas within the existing City ACI have been projected by each respective City, such projections within the study area are considerably more complex due to possible future land uses and their resulting densities.

In 2007, the City contracted with J.P. Stravens Planning (Stravens, 2007) to develop population growth projections for the City. This projection and the KMPO projections were used to develop wasteloads leaving the Post Falls WRF, which is summarized in a March 11, 2010 memo from Paul Klatt, J-U-B, to the

City of Post Falls (**Appendix 3-A**). The resultant wasteload allocation is included in the proposed Settlement Agreement and is anticipated to result in the final NPDES Permit conditions. The Spokane River Dissolved Oxygen TMDL is based on a 3.3 percent growth rate to 5.0 mgd in the next 20 years.

The City of Post Falls is concurrently in the process of completing their Collection System Master Plan and recently completed their Water System Master Plan (J-U-B, 2011). As part of these studies, the City evaluated potential future growth. At the time of this study, the Collection System Master Plan anticipates utilizing a growth rate of 2.5 percent based on the J.P. Stravens (Stravens, 2011) medium growth projection.

The Water System Master Plan is based on the KMPO projected growth rate of 2.8 percent but reflects a geographically smaller portion of the City versus the WRF service area, which also includes Rathdrum and an extended portion of the Post Falls ACI.

A review of historical population growth through the US Census shows growth rates from 9.1 percent (1990 to 2000) and 4.8 percent (2000 to 2010). Through a review of the historic Census data, observable "boom and bust" cycles are present, creating considerable variation in the growth rates over shorter terms. This variability necessitates the Facility Plan document and the City staff to periodically adjust planning work and accommodate the changing conditions.

3.2.2 Growth Rates Based on Historic Data

A second method of projecting future flows and loads is based on utilizing historic plant flow and load records.

Statistical regression of the average daily influent historical flows from 2001 to 2011 show varying annual growth rates depending on the range of data being analyzed. Regression utilizing 2001 to 2006 data shows a peak growth of 3.65 percent annually. Utilizing 2001 to 2011 data show 3.0 percent annually following a slight curtailing of the annual flow increases from 2006 to present. Growth during the period from 2006 to 2011 has reduced to an average of 2.77 percent annually, presumably due to current socio-economic conditions.

Loading parameters also have a significant impact on the timing and sizing of required plant improvements and are not always comparable to population and flow-based projections. Growth rates for plant loading parameters were also evaluated to determine the variability and magnitude of their historic growth rates. The various loading parameters and their associated growth rates are shown in **Table 3-1** and graphically in **Figure 3-1**.

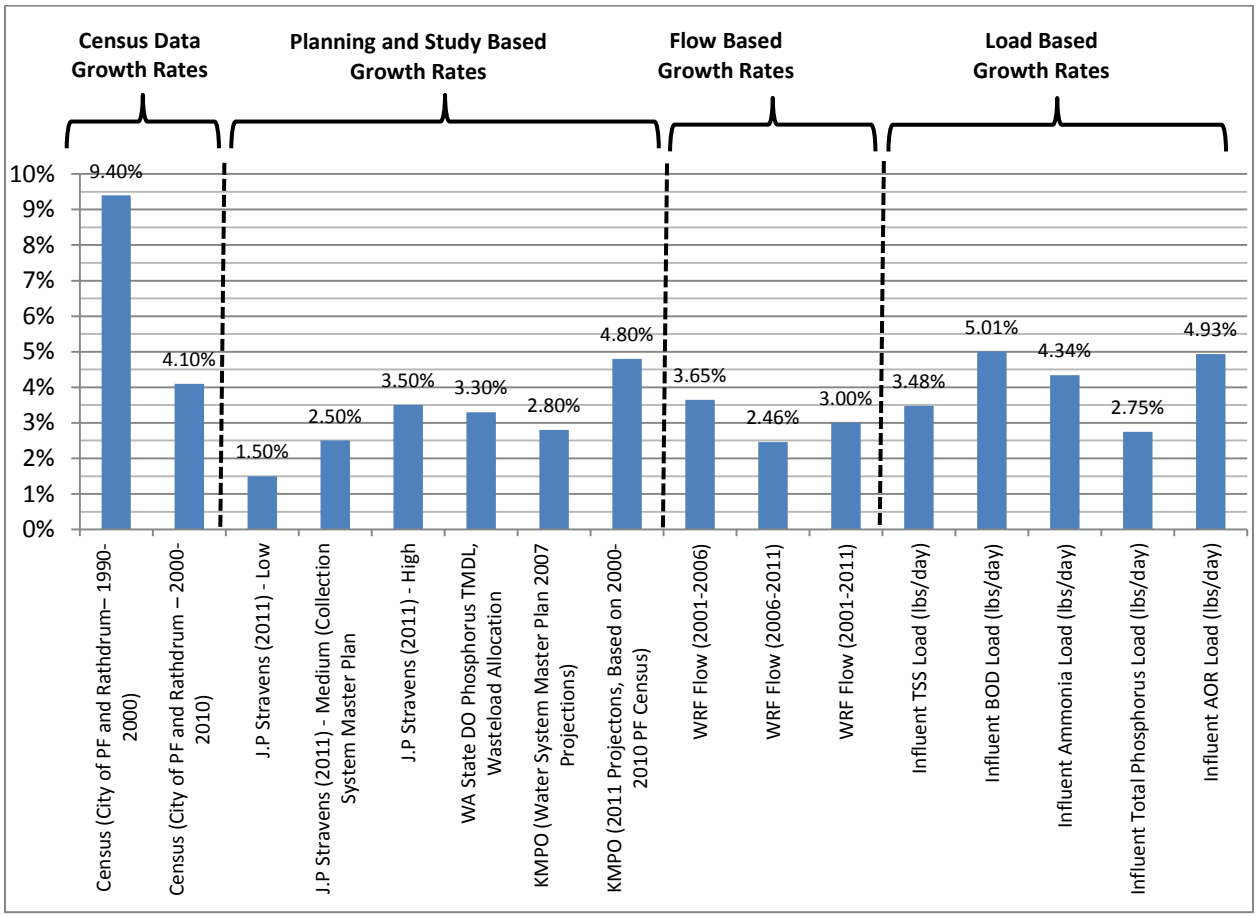
Table 3-1 – Historic and Planning Growth Rate Comparison

	Growth Rate (annual % increase)
Census Data Growth Rates	
Population (City of Post Falls and Rathdrum – 1990-2000 Census)	9.4%
Population (City of Post Falls and Rathdrum – 2000-2010 Census)	4.1%
Planning and Study Based Growth Projections	
J.P. Stravens Growth Trends (April 2011):	
Low Rate	1.5%
Medium Rate	2.5%
High Rate	3.5%
Washington State, DO Phosphorus TMDL Waste Load Allocation	3.3%
KMPO Projections (Post Falls Drinking Water Master Plan, 2011)	2.8%
Sewer Collection System Master Plan (Stravens, 2011 – Medium Rate)	2.5%
Flow Based Growth Rates	
2001 to 2006 - WRF Flow	3.65%
2001 to 2011 - WRF Flow	3.0%
Load Based Growth Rates	
2001 to 2011 - Influent TSS Load (lbs/day)	3.48%
2001 to 2011 - Influent BOD Load (lbs/day)	5.01%
2001 to 2011 - Influent Ammonia Load (lbs/day)	4.34%
2001 to 2011 - Influent Total Phosphorus Load (lbs/day)	2.75%
2001 to 2011 - Influent AOR Load (lbs/day)	4.93%

3.2.3 Growth Rate Comparison and Discussion

If projections are made utilizing higher growth rates , planning will likely predict that necessary improvements to the WRF will occur much sooner. Alternatively, utilizing the lowest historic growth rates will likely predict the timing of upgrades much later. Each of these flow projections is reasonable and valid based on its method of substantiation. The primary issue when selecting the basis for planning is anticipating the timing of the required upgrades and capital fiscal planning for funding the required upgrades. It is critical that adequate capacity fees are generated to fund these needs, while upgrades required for regulatory requirements and replacement projects are funded through user fees and bonding.

Figure 3-1 – Historic and Planning Growth Rate Comparison



Through the Facility Planning process, necessary projects will be developed for each process area, and the timing of the actual implementation will be based on actual plant "trigger flows" and "just-in-time" construction. The selection of the growth rate for planning ultimately only becomes a tool for planning of the anticipated timing of the projected upgrades for budgeting.

Previously-adopted growth by the City (Water System Master Plan) has utilized the 2007 KMPO projected population growth rate of 2.8 percent. However, WRF plant waste loading growth historically has been higher than this rate. As can be seen in **Figure 3-1**, there is significant variability in how each of the different wasteload parameters has grown. TSS, BOD, and AOR loads have all grown at a rate higher than the KMPO population projection (and Census population). This is expected as BOD load strength (concentration) has been increasing, presumably due to the use of low-flow fixtures and the increasing use of garbage disposals. This increasing concentration trend, however, has already begun to slow and the rate of increase is expected to level off.

Alternatively, the only load-based parameter that does not have a higher growth rate is total phosphorus. The reduced growth rate for TP load is presumably due to regulations restricting the sale of phosphate-based soaps and detergents that went into effect in 2008, which have resulted in a marked reduction in influent TP loads to the WRF.

As can be seen, growth rates based on plant loadings generally range from 3.48 to 5.01 percent; in general much higher than the 2007 KMPO projected rate of 2.8 percent and in-line with the 2011 KMPO projection of 4.8 percent. As such, the City has elected to use a conservative annual growth rate of 3.5 percent to project population and loading increases that may be experienced at the WRF. The City will monitor and revise these growth projections periodically to ensure an appropriate level of capital improvement to meet the needs of the community.

The growth rate of 3.5 percent will be assumed for the projected timeline for the growth of future flows and loads based on current 2011 wasteload strengths and flow conditions.

Figure 3-2 shows the selected growth rate for planning and a likely spectrum of potential growth rates that have been or may be experienced. The City will need to review the actual plant flows versus the predicted rates periodically to verify the anticipated timeline is still valid and make adjustments to the CIP as necessary.

3.2.4 Flow Projections

Utilizing the 3.5 percent annual growth rate discussed previously, average daily flow was projected through the 20-year planning period as shown in **Figure 3-2**. To provide a conservative estimate, peaking factors relative to average daily flows were assumed to remain consistent and re-applied to the 10- and 20-year average daily flow projection as shown in **Table 3-2**.

Table 3-2 – Projected Influent Flows

	"2007-2011" Historical Flow (mgd)	2011 Peaking Factor [a]	2021 Projected Flows (mgd)	2031 Projected Flows (mgd)
Peak Hour Flow (Max Instantaneous)	5.54	2.3	8.5	12.0
Observed Maximum Day	4.05	1.68	6.2	8.7
Statistical Maximum Day	3.04	1.26	4.6	6.5
Statistical Maximum Week	2.76	1.15	4.3	6.0
Statistical Maximum Month	2.61	1.08	4.1	5.6
Average Daily Flow	2.41 (2.62) [b]	---	3.7	5.2
Statistical Minimum Month	2.23	0.92	3.4	4.8
Actual Minimum Day	1.84	0.76	2.8	3.9

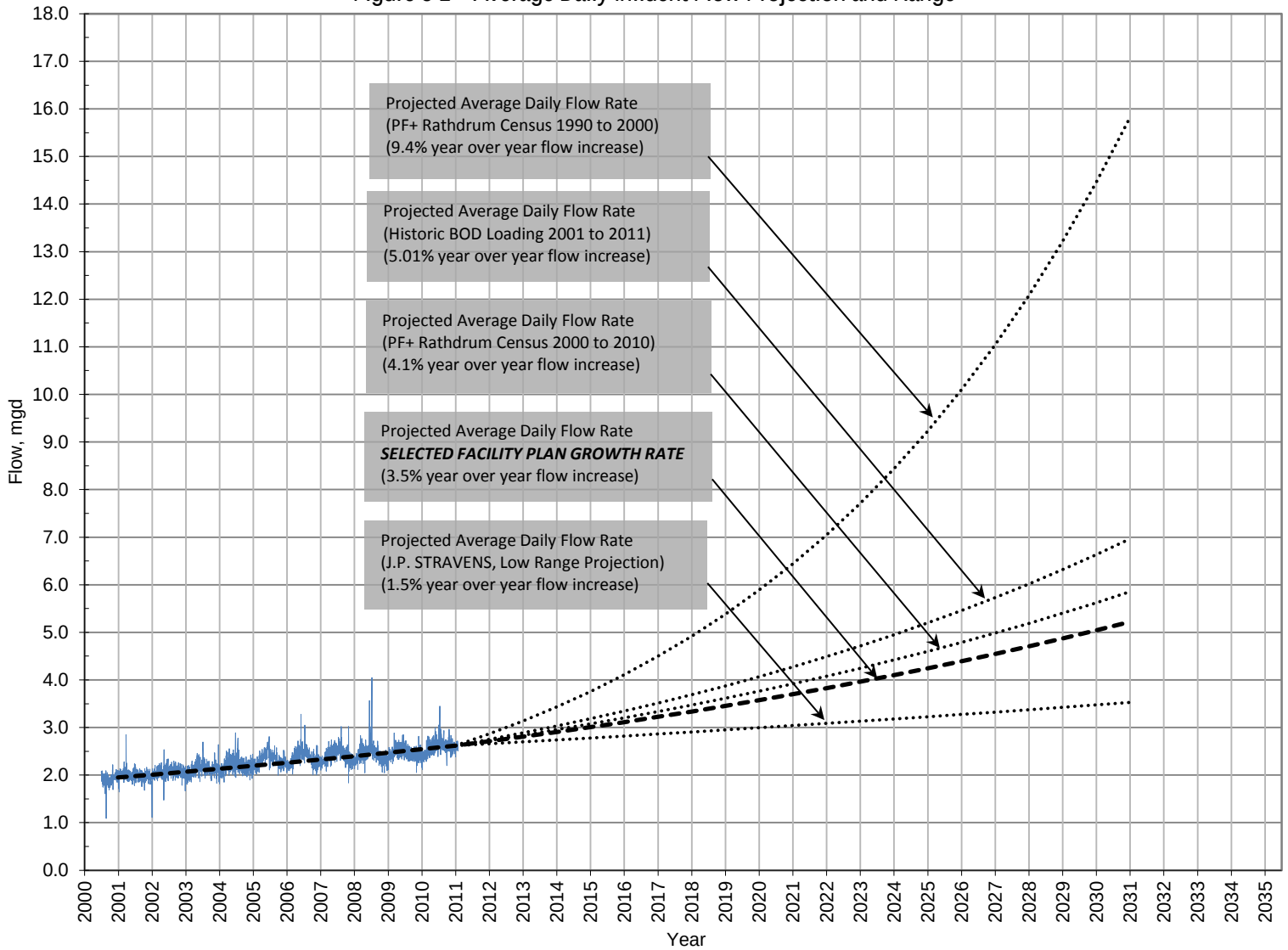
[a] *Relative to Average Daily Flow 2007-2011.*

[b] *Current 2011 average to be used as baseline for projections.*

3.3 Future Wasteload Projections

Current influent wasteload characteristics for BOD, TSS, P, NH_3-N, and calculated AOR from 2007 to 2011 were established and presented previously in TM No. 2. Peaking factors relative to average daily load were established and average daily load normalized to plant influent flow to establish "lbs/mgd-day" at average conditions. The average load was then projected through the 20-year planning period (to years 2021 and 2031) by multiplying the normalized load by the average projected flow.

Figure 3-2 – Average Daily Influent Flow Projection and Range



To provide a conservative estimate, peaking factors relative to average daily loads were assumed to remain consistent and re-applied to the 10- and 20-year average daily load projection, as shown in **Table 3-3** through **Table 3-7.**

Table 3-3 – Projected BOD Loads

	"2007-2011" Historical Load (lbs/day)	2011 Peaking Factor [a]	Normalized Load (lbs/mgd-day)	2021 Projected Load (lbs/day)	2031 Projected Load (lbs/day)
Actual Maximum Day	8,222	1.49		11,598	16,360
Statistical Maximum Day	7,903	1.43		11,148	15,726
Statistical Maximum Week	6,957	1.26		9,814	13,844
Statistical Maximum Month	6,319	1.15		8,914	12,574
Average Daily Load (*2011 Average*)	5,515	1.00	2,103	7,779	10,973
Statistical Minimum Month	4,813	0.87		6,789	9,577
Actual Minimum Day	3,187	0.58		4,495	6,341

[a] *Relative to Average Daily Load*

Table 3-4 – Projected TSS Loads

	"2007-2011" Historical Load (lbs/day)	2011 Peaking Factor [a]	Normalized Load (lbs/mgd)	2021 Projected Load (lbs/day)	2031 Projected Load (lbs/day)
Actual Maximum Day	13,098	2.55		18,476	26,062
Statistical Maximum Day	9,904	1.93		13,971	19,707
Statistical Maximum Week	7,008	1.37		9,885	13,944
Statistical Maximum Month	6,071	1.18		8,564	12,080
Average Daily Load (*2011 Average*)	5,127	1.00	1955	7,232	10,202
Statistical Minimum Month	4,375	0.85		6,172	8,706
Actual Minimum Day	3,198	0.62		4,511	6,363

[a] *Relative to Average Daily Load*

Table 3-5 – Projected NH3-N Loads

	"2007-2011" Historical Load (lbs/day)	2011 Peaking Factor [a]	Normalized Load (lbs/mgd)	2021 Projected Load (lbs/day)	2031 Projected Load (lbs/day)
Actual Maximum Day	971	1.34		1,369	1,931
Statistical Maximum Day	955	1.32		1,347	1,900
Statistical Maximum Week	890	1.23		1,255	1,770
Statistical Maximum Month	829	1.15		1,169	1,650
Average Daily Load (*2011 Average*)	722	1.00	275	1,018	1,436
Statistical Minimum Month	642	0.89		905	1,277
Actual Minimum Day	540	0.75		762	1,074

[a] *Relative to Average Daily Load*

Table 3-6 – Projected Total Phosphorus (TP) Loads

	"2007-2011" Historical Load (lbs/day)	2011 Peaking Factor [a]	Normalized Load (lbs/mgd)	2021 Projected Load (lbs/day)	2031 Projected Load (lbs/day)
Actual Maximum Day	226	1.51		318	449
Statistical Maximum Day	200	1.34		282	398
Statistical Maximum Week	180	1.21		255	359
Statistical Maximum Month	166	1.12		235	331
Average Daily Load (*2011 Average*)	149	1.00	57	210	297
Statistical Minimum Month	129	0.86		181	256
Actual Minimum Day	107	0.72		150	212

[a] *Relative to Average Daily Load*

Table 3-7 – Projected AOR Loads

	"2007-2011" Historical Load (lbs/day)	2011 Peaking Factor [a]	Normalized Load (lbs/mgd)	2021 Projected Load (lbs/day)	2031 Projected Load (lbs/day)
Actual Maximum Day	13,656	1.20		19,263	27,172
Statistical Maximum Day	13,493	1.19		19,033	26,847
Statistical Maximum Week	13,248	1.17		18,687	26,360
Statistical Maximum Month	12,833	1.13		18,103	25,536
Average Daily Load (*2011 Average*)	11,347	1.00	4327	16,006	22,578
Statistical Minimum Month	10,151	0.89		14,319	20,199
Actual Minimum Day	8,143	0.72		11,487	16,203

[a] *Relative to Average Daily Load*

3.4 Seasonal Flow and Load Projections

In some cases, during planning for future facilities, it may be reasonable to evaluate systems using flows and loads on a seasonal basis to more accurately size those facilities. In reviewing the seasonal wasteload evaluation developed in TM No. 2, it was determined that the actual loading conditions did not vary significantly seasonally and were within 5 percent of each other in nearly all conditions. Further, flows were also very similar, with only "Peak Day" flow conditions being significantly different (3.02 versus 4.05 mgd). Upon reviewing this data and the implications in sizing of unit processes, it is prudent to utilize the higher "peak" conditions so that facilities are hydraulically capable of passing peak flows.

As such, for further evaluation herein, there will be no division of flows and wasteload projections to accommodate seasonal variation.

References

J-U-B ENGINEERS, Inc.; Rathdrum Prairie Wastewater Master Plan – Final; April 2009; http://www.postfallsidaho.org/pzdept/Rathdrum%20Prairie%20Waste%20Water%20Plan%20Exec%20Summary.pdf

Kootenai Metropolitan Planning Organization; KMPO Growth Projections; March 5, 2009; http://www.kmpo.net/Data_Publications/KMPO%20Board%20Approved%20Growth%20Projections%203-5-09.pdf

Stravens, J.P. Planning Associates, Inc.; Demographic Analysis & Growth Projections for City of Post Falls, ID; January 2, 2007; April 2011; http://www.postfallsidaho.org/city_info/misc%20docs/Demographiics_GrowthReport.pdf

Washington Department of Ecology; Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load; February 2010; http://www.ecy.wa.gov/pubs/0710073.pdf

Appendices

Appendix 3-A Post Falls' Phosphorus, $CBOD_5$, and Ammonia Waste Load Allocation Needs for Future Population, Memo to City of Post Falls; J-U-B; March 11, 2010

Appendix 3-B KMPO Population and Growth Projections, February 2012.

Appendix 3-A

Post Falls' Phosphorus, $CBOD_5$ and Ammonia Waste Load Allocation Needs for Future Population
Memo to City of Post Falls
J-U-B, March 2010

See enclosed DVD for appendix information

Appendix 3-B

KMPO Population and Growth Projections, February 2012

See enclosed DVD for appendix information

J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Regulatory and Permitting Review

Final

June 2013

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TM 4 – Regulatory and Permitting Review

4.1 Introduction

An important objective of this Facility Plan is to review current and proposed regulatory requirements and consider their impact when developing the range of improvement alternatives. Treatment and reuse alternatives must be implemented to meet current regulatory requirements with as much capability to meet anticipated requirements as is feasible. Staying abreast of emerging regulations is a crucial and continuous process as Post Falls reviews and adapts this Facility Plan's improvement alternatives over the next 20 years.

Regulations ultimately become implemented through permits and rule enforcement. Post Falls operates primarily under one National Pollutant Discharge Elimination System (NPDES) Permit:

- Spokane River discharge permit; NPDES Permit No. ID002585-2; Issued by EPA 0n November 2, 1999; Expired on November 2, 2004; Administratively extended to present; Available at http://yosemite.epa.gov/r10/water.nsf/NPDES+Permits/Current+ID1319

The following sections describe the existing and developing conditions and regulations for NPDES Permits as well as what could be expected under a state-issued Reuse Permit over the next several permit cycles.

4.2 Spokane River Water Quality Issues

Water quality concerns in the Spokane River have required wastewater treatment improvements upstream for a number of decades. Under the federal Clean Water Act (CWA), each state (and Tribe) must promulgate designated beneficial uses of its receiving waters and water quality standards to protect those uses. The state standards must also be approved by EPA. If uses and standards are not promulgated in a timely manner, then the EPA has a duty to perform that task under the CWA.

Under Post Falls' 1999 NPDES permit, Idaho had designated the Spokane River for the beneficial uses of primary and secondary contact recreation, cold water biota, salmonid spawning, domestic water supply, and agricultural water supply. Currently, the river is protected for the cold water aquatic life habitat, salmonid spawning, primary contact recreation, and domestic water supply. All waters in Idaho are also protected for industrial and agricultural water supply, wildlife habitats, and aesthetics. Applicable rules exist within the Idaho Administrative Procedures Act (IDAPA) which can be found at:

- Chapter 2 – "Water Quality Standards" http://adminrules.idaho.gov/rules/current/58/0102.pdf
- Chapter 16 – "Wastewater Rules" http://adminrules.idaho.gov/rules/current/58/0116.pdf

Additionally, permitted activities in an upstream state (or Tribe) must be controlled so as not to cause a violation of a downstream state's (or Tribe's) water quality standards. Therefore, Washington State's and the Spokane Tribe of Indians' standards can materially affect Post Falls' NPDES Permit conditions.

A water body is listed as a "water quality limited segment" under Section 303(d) of the CWA where it is not expected to meet the required water quality standards in the foreseeable future. Currently, the

Spokane River is 303(d) listed for lead, cadmium and zinc in both Washington and Idaho due to historic mining discharges above Coeur d'Alene Lake in Idaho's Silver Valley. It is also listed for dissolved oxygen, total polychlorinated biphenyls (PCB), and 2,3,7,8 tetrachlorodibenzo-p-dioxin (dioxin) in Washington. Idaho also lists the river for total phosphorus due to "excessive aquatic growth" concerns under its narrative criteria for nutrients. Idaho had previously listed the Spokane River as impaired for temperature concerns, but that listing no longer exists. Finally, the Spokane River in Idaho has site-specific criteria for ammonia that are identical to the state-wide site-specific ammonia criteria for protecting cold water aquatic life when early life stages of fish are present.

Cadmium, lead, and zinc are classified as chronically toxic to the cold water biota in the river. That chronic toxicity has historically driven the water quality standards for the Spokane River in both Idaho and Washington. Heavy metals, PCB, and dioxin also bioaccumulate in fish as they are continuously ingested by organisms further up the food chain. Those concentrated level of toxics are then available to be directly ingested by humans. Future regulations regarding the level of consumption of contaminated fish may drive the water quality standards to much more stringent levels than the previous chronic exposure to the cold water biota.

Correspondingly, NPDES permit holders have been subject to lead, cadmium and/or zinc limitations. Additionally, they have been seasonally removing phosphorus since the late 1970s to reduce downstream algae growth and increase dissolved oxygen in the Lake Spokane reservoir. To date, only limited monitoring has taken place for PCB and dioxin, but the Washington Department of Ecology (WDOE), the Spokane Tribe, and environmental groups are moving forward with actions to reduce the allowable levels in permitted discharges.

The Idaho Water Quality Standard for PCB was more stringent than the Washington standard until May 2012 when EPA rejected Idaho's daily fish consumption value. Until that is revisited, both Washington and Idaho have the same standard of 170 picogram per liter (pg/L) based on the National Toxics Rule and a fish consumption standard of 6.5 g/day. Fish consumption essentially sets limits for 187 Water Quality Standards and 88 toxic compounds in Idaho, including PCBs, dioxins, and metals. EPA stated that even though Idaho adopted a state-wide fish consumption standard of 17.5 g/day based on the national recommendation by EPA, that standard may be inadequate. EPA made that decision based on fish consumption studies completed in Oregon (175 g/day), a higher standard adopted by the Spokane Tribe of Indians, and Washington's current state-wide effort to define appropriate consumption standards. Idaho has 90 days to respond to EPA over the ruling. Because of these issues, EPA intends to require Idaho dischargers to regularly sample influent and effluent plus sample river water to determine if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians.

4.2.1 Hydroelectric Operations and Flows

For water quality management, it is helpful to understand the hydrodynamics of the Spokane River. The river flows from the Coeur d'Alene Lake outlet west/northwest 111 miles to its confluence with the Columbia River at Lake Roosevelt behind Grand Coulee Dam. Lake Spokane, also known as Long Lake, is approximately 30 miles northwest of Spokane, Washington. It is impounded by Long Lake Dam 64 river miles downstream from the Idaho/Washington border. Completed by the Washington Water Power Company (now Avista Utilities) in 1915, the Long Lake Hydroelectric Development can produce 71 megawatts (MW) of electricity to meet the energy needs of approximately 35,000 households. The

23.5-mile-long reservoir has a maximum depth of approximately 200 feet. At an elevation of 1,533 feet, Lake Spokane impounds 105,000 acre-feet of water. It is the largest of Avista's Spokane River facilities with an average annual discharge flow of almost 8,000 cfs and historic maximums and minimums of 50,000 cfs and 90 cfs, respectively. It has no minimum discharge flow requirements.

Avista applied to the Federal Energy Regulatory Commission (FERC) for re-licensing of its entire "Spokane River Project" in July 2005. The Spokane River Project includes the Post Falls Dam in Idaho plus the Upper Falls, Monroe Street, Nine Mile, and Long Lake dams in Washington. Avista separately requested State Water Quality Certification from WDOE and IDEQ under Section 401 of the Clean Water Act for the project dams. They proceeded to conduct public outreach and completed reports on potential project impacts on metals, water quality, sediment routing, and total dissolved gas to support their FERC applications.

IDEQ and WDOE issued Water Quality Certifications in 2008. The certifications are intended to regulate minimum stream flows and dissolved gas, among other conditions, to meet water quality requirements. Idaho's certification requires Post Falls Dam to discharge a minimum of 600 cfs through the critical low flow period from June through September. There is a drought year provision to reduce minimum summer flow to 500 cfs after Coeur d'Alene Lake levels fall by at least on foot below normal summer pool. These flows are well above the historical low discharge rates of 200-300 cfs for Post Falls Dam operating under its previous FERC license and are being incorporated into reviews of water quality attainment.

WDOE's certification included compliance with DO levels in Lake Spokane through a required Dissolved Oxygen Water Quality Attainment Plan (DO WQAP) within two years. Avista is required to evaluate and implement reasonable and feasible measures to improve DO conditions in Lake Spokane in proportion to its level of responsibility. WDOE included a 10-year compliance schedule. WDOE is also considering a minimum in-stream flow requirement for the Spokane Gage below the Monroe Street Dam of 850 cfs. This is above historical low flows about 10 percent of the time and it is unclear how it would be enforced since it is not part of Avista's FERC license.

4.2.2 Total Maximum Daily Loads

Surface waters that do not meet the State-established water quality standards must first receive technology-based pollution controls. If technology standards do not achieve the required water quality, the Clean Water Act requires the State to place the surface water on a Section 303(d) list of water quality limited segments. The State must prioritize all their water segments and prepare a Total Maximum Daily Load (TMDL) study for approval by EPA in order of that priority. A TMDL identifies sources of the pollutants of concern, quantifies the assimilative capacity of the water segment for those pollutants, and defines the process by which those pollutants will be controlled to achieve compliance with the water quality standards. The TMDL also allocates the loading capacity among the various sources, both point and non-point. The TMDL usually considers seasonal variations and must include a margin of safety that takes into account any lack of knowledge about the cause of the water quality problem or its loading capacity. If the TMDL limits create unattainable standards for pollutant sources, a Use Attainability Analysis (UAA) can be performed in accordance with the Clean Water Act to determine achievable water quality levels.

The WDOE developed a TMDL for cadmium, lead and zinc on the Spokane River and EPA approved it in 1999. The IDEQ and EPA promulgated a TMDL on the Spokane River for dissolved cadmium, lead and zinc in

August 2000. IDEQ approved the TMDL with the understanding that EPA was prepared to simultaneously approve it. Mining interests in the Silver Valley challenged the TMDL on procedural grounds and the Idaho Supreme Court voided Idaho's approval in 2003. The TMDL included waste load allocations (WLA) for municipal dischargers on the Spokane River, including HASRB. Like Washington's approved TMDL, Idaho's proposed WLAs were concentration-based limits at the "end of pipe" without mass loading limitations. In other words, the effluent must meet the water quality standard which is based on the hardness concentration in the discharge. The approach was to be certain that a discharge could not cause or contribute to a violation of the water quality standard in either state. Currently, neither IDEQ nor EPA has proposed a revised TMDL, even though Idaho lists it as a high priority. Without such a TMDL, IDEQ intends to limits cadmium, lead and zinc mass loading to the Spokane River to 1999 permit values.

WDOE proposed to update their 1992 phosphorus TMDL in 2004 with a dissolved oxygen TMDL on the Spokane River and Lake Spokane. The effort led to stringent proposed discharge limits for phosphorus, ammonia and biochemical oxygen demand (CBOD). Prior to release of the draft TMDL, Washington dischargers submitted a draft UAA to determine what was achievable. After protracted collaboration efforts, a Managed Implementation Plan (MIP) was proposed and draft NPDES Permits were issued by EPA in Idaho and WDOE in Washington in 2007. The depth and breadth of comments received on the draft permits caused both EPA and WDOE to suspend processing of the final TMDL and NPDES permits. Following two more years of modeling, technical and regulatory negotiations, WDOE and EPA approved the *Spokane River and Lake Spokane Dissolved Oxygen TMDL* in mid-2010. The plan requires strict total phosphorus, CBOD, and ammonia controls from March-October but provides some flexibility for Washington dischargers by actively working with Avista, non-point sources and other stakeholder to reach their water quality standards by the end of 10 years. Idaho dischargers promptly challenged EPA's approval of the TMDL based on an inequitable distribution of allowable loading as well as technical concerns with the water quality modeling utilized. Currently, a negotiated settlement appears to be acceptable to all parties within the framework of the approved TMDL and will be considered an equivalent process to a TMDL to satisfy Idaho's phosphorus listing. The settlement will be documented with the anticipated reissued draft Idaho NPDES Permits in 2012. Information on the DO TMDL can be found at http://www.ecy.wa.gov/programs/wq/tmdl/spokaneriver/dissolved_oxygen/index.html.

Washington also proposed a TMDL for PCB on the Spokane River in 2006 which was not completed because of the need for more data. Data needs cited by WDOE in May 2011 included more accurate stormwater data, updated fish tissue sampling results, and the addition of new Spokane Tribe water quality standards for PCBs based on updated fish consumption rates. The draft TMDL was revised with the updated information in 2009 and issued as the Spokane River Source Assessment Report in 2011. WDOE goes on to state that "Ecology is not currently planning to develop a PCB TMDL with wasteload allocations, but this is still a potential tool for the future. Setting waste load allocations through a TMDL to accomplish that would set a target well below the "background" PCB concentrations observed in remote bodies of water with no obvious source of contamination other than aerial deposition. In part because it would establish an impossible near-term target, and based on its experience with the Spokane River Dissolved Oxygen TMDL, which took 12 years to complete, Ecology is opting to proceed directly to implementing measures to reduce all toxics in the Spokane River." WDOE goes on to describe how wastewater permitting, managing stormwater, toxics cleanups, and hazardous waste reduction strategies will accomplish those goals. While Idaho is not explicitly required to participate in these efforts, IDEQ and Idaho dischargers participate in the WDOE-required Regional Toxics Task Force monthly meetings. Information on the PCB TMDL and other toxics reductions initiatives on the Spokane River in Washington can be found at http://www.ecy.wa.gov/programs/wq/tmdl/spokaneriver/index.html.

WDOE's work indicates that the Spokane River in Idaho may be out of compliance with Idaho's water quality standards for PCB. As stated above, it can be assumed that Idaho's discharge permits will at least require regular sampling of influent and effluent as well as river water to determine if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians. That sampling will determine if a TMDL will be required for additional pollutants of concern over the next several permit cycles.

4.3 Existing NPDES Permit Conditions

As discussed in preceding TMs, wastewater generated by the cities of Post Falls and Rathdrum is routed to and treated by the Post Falls WRF. Post Falls then discharges its recycled water year-round to the Spokane River with authorization from the U.S. EPA under NPDES Permit No. ID-002585-2.

Post Falls' current NPDES permit became effective on November 2, 1999, and expired on November 2, 2004, as did the Hayden Recreational Water and Sewer District's (HARSB) and the City of Coeur d'Alene's. Although the entities re-applied for discharge permits in a timely manner, the EPA directed them to operate under their 1999 permits until they issue new permits.

Post Falls' permit generally reflects the fact that it operates a "standard" secondary treatment plant. Current permit limits were first determined by technology performance capabilities with significant operating records to support the fact that similar treatment plants should be held to a minimum performance standard. Several discharged constituents are also driven by Idaho's Water Quality Standards (WQS) limitations in order to protect the Spokane River's designated beneficial uses. Lead, zinc, chlorine, and ammonia concentrations could affect the River's cold-water aquatic organisms in an immediate manner (acute toxicity) and/or in a long-term manner (chronic toxicity). Therefore, discharge concentrations and/or mass limits are further restricted for those constituents. In addition, excessive bacteria in the recycled water could negatively affect the recreational use of the river, so fecal coliform concentrations are restricted in the discharge.

Low dissolved oxygen (DO) concentrations and excess aquatic growth downstream in Lake Spokane (formerly known as Long Lake) have also been targeted for improvement since at least 1978. Besides employing secondary treatment, NPDES Permit holders in both Washington and Idaho reduce seasonal phosphorus to improve those conditions in Lake Spokane. Post Falls' contribution to this effort is to employ year-round biological phosphorus reduction (BPR) at about 90 percent efficiency even though its permit requirement is 70 percent phosphorus removal from March 1 through October 31.

Post Falls has fully complied with their discharge permit since it was issued. The few isolated violations that have occurred over the years, have been promptly reported to the EPA and IDEQ and process changes were immediately implemented to stop the violation.

While efforts to meet Idaho and Washington standards have made significant improvements to river water quality, pressure from the public and organized environmental groups has been building to go further and fully comply with all the WQS. Therefore, future NPDES Permits will be more restrictive than Post Falls' 1999 permit. Existing and anticipated permit conditions are contrasted in the following sections of this TM.

4.4 Anticipated NPDES Permit Conditions

4.4.1 NPDES Permit Review

As stated previously, the primary impetus for this facility planning effort is to meet the increasingly stringent NPDES discharge limits in the Spokane River. The permits are being driven by a concern for diminished dissolved oxygen, chronic heavy metals exposure to cold water biota, and fish tissue concentrations of toxic compounds. Post Falls' draft 2007 NPDES Permit included significant modifications to the current 1999 permit requirements. The anticipated 2013 permit will further modify permit conditions to address water quality concerns. A comparison of the 1999, 2007 (withdrawn), and anticipated 2013 permit conditions is shown in **Table 4-1**. This table includes a summary of the effluent limitations that are of primary concern in the daily operation, expansion, and management of the facility. The current NPDES Permit and Fact Sheet link was listed at the beginning of this TM. The 2007 Draft NPDES Permit and fact sheet can be found at http://yosemite.epa.gov/r10/WATER.NSF/NPDES+Permits/DraftPermitsID.

The 2013 Draft NPDES Permit currently being reviewed by IDEQ for Section 401 Water Quality Certification was obtained by Post Falls through a public records request and is included here as **Appendix 4-A**. A draft Water Quality Certification was issued by IDEQ in April 2013. A copy of the Preliminary Draft Certification and the City's response comments are included in **Appendix 4-B**. The water quality certification and issuance of a Public Review Draft NPDES Permit and Fact Sheet are anticipated to occur sometime in 2013. The following paragraphs review several important elements of the current permitting effort.

The Spokane River and Lake Spokane Dissolved Oxygen TMDL restricts discharge of oxygen-demanding substances, including ammonia-nitrogen, total phosphorus, and five-day carbonaceous biochemical oxygen demand ($CBOD_5$) to among the lowest levels in the United States. Since Idaho permits issued by EPA cannot cause the violation of a downstream water quality standard, EPA plans to issue revised NPDES Permits in 2012 consistent with those issued by WDOE in 2010 and 2011. The anticipated permit for Post Falls will equate to concentration limits of 5.2 mg/L (milligrams per liter or parts per million) for ammonia, 0.05 mg/L phosphorus (50 parts per billion), and 5.2 mg/L $CBOD_5$ at a future flow of 7.65 million gallons per day (mgd). It will also likely include a Compliance Schedule of up to 10 years to fully meet the new requirements. No Compliance Schedule is anticipated for conditions where Post Falls' existing treatment plant can comply immediately (ammonia).

In addition to DO TMDL implementation, WDOE is also requiring Washington dischargers to participate in a Regional Toxics Task Force (RTTF) with the express purpose of reducing polychlorinated biphenyl's (PCBs) and other toxic compounds in the Spokane River. Under the proposed draft NPDES Permit for Post Falls, EPA does not require participation in the RTTF. However, the Idaho Water Quality Standard for PCB will likely be more stringent than the current Idaho and Washington standards of 170 pg/L. It is unclear whether they could approach the Spokane Tribe's standard of 3.37 pg/L since it is currently not possible to quantify PCB in the water column below about 50 pg/L. It is also unclear whether dioxins are significant in Idaho discharges. Because of these issues, EPA intends to require Idaho dischargers to regularly sample influent and effluent for PCB and dioxin plus sample river water for PCBs to determine "if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians."

Table 4-1 – Post Falls WRF NPDES Permit Comparison 1999-2013

Parameter	Units	2013 Preliminary						2007 Public Review Draft						1999				
		Effluent Limits			Monitoring Requirements			Effluent Limits			Monitoring Requirements			Effluent Limits			Monitoring Requirements	
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Location	Frequency	Sample Type	Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Location	Frequency	Sample Type	Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Frequency	Sample Type
Flow	mgd	Report	-	Report	Effluent	Continuous	Recording	Report	-	Report	Effluent	Continuous	Recording	-	-	-	Continuous	Recorder
Five-day carbonaceous biochemical oxygen demand (CBOD5) November – January	mg/L	25	40	-	Influent and Effluent	1/week	24-Hour Composite	25	40	-	Influent and Effluent	1/week	24-Hour Composite	30	45	-	2/week	24-Hour Composite
	lb/day	1043	1668	-			Calculation	726	1161	-			Calculation	871	1306	-		
	% removal	85% (min.)	-	-	% removal	1/month	Calculation	85% (min.)	-	-	% removal	1/month	Calculation	85% (min.)	-	-		
$CBOD_5$ February – October	mg/L	25	40	-	Influent and Effluent	3/week	24-Hr. Comp.	12	19	-	Influent and Effluent	3/week	24-Hr. Comp.					
	lb/day	Seasonal Average Limit: 255 lb/day					Calculation	290	464	-			Calculation					
	% removal	85% (min.)	-	-	% removal	1/month	Calculation	85% (min.)	-	-	% removal	1/month	Calculation					
Total Suspended Solids	mg/L	30	45	-	Influent and Effluent	1/week	24-Hr. Comp.	30	45	-	Influent and Effluent	1/week	24-Hr. Comp.	30	45	-	2/week	24-Hour Composite
	lb/day	1251	1877	-			Calculation	871	1306	-			Calculation	871	1306	-		
	% removal	85% (min.)	-	-	% removal	1/month	Calculation	85% (min.)	-	-	% removal	1/month	Calculation	85% (min.)	-	-		
pH (October – June)	s.u.	6.3 - 9.0 at all times			Effluent	5/week	Grab	Nov. - Mar: 6.3 - 9.0 at all times Apr. - Jun: 6.2 - 9.0 at all times Jul. - Oct: 6.5 - 9.0 at all times			Effluent	5/week	Grab	See Part I.A.2.			5/week	24-Hour Composite
pH (July – September)	s.u.	6.4 - 9.0 at all times			Effluent	5/week	Grab					5/week	Grab				5/week	Grab
E. coli	#/100 ml	126[4] (geometric mean)	-	406 (inst. max.)	Effluent	5/month	Grab	126 [7]	-	406 [5]	Effluent	5/month	Grab	-	-	-	3/week	Grab
Total Residual Chlorine July – September	µg/L	127	-	294	Effluent	5/week	Grab							36	-	161	2/day	Grab
	lb/day	5.03	-	13.6			Calculation							1.04	-	4.67		
Total Residual Chlorine October – June if chlorine is used for disinfection	µg/L	244	-	565	Effluent	1/day	Grab							147	-	662	2/day	Grab
	lb/day	10.2	-	23.6			Calculation							4.27	-	19.2		
Total Residual Chlorine October – June if chlorine is not used for disinfection	µg/L	Report	-	Report	Effluent	1/month	Grab											
Total Residual Chlorine July-October	µg/L							36	-	161	Effluent	1/month	Grab					
	lb/day							1.04	-	4.67			Calculation					
Total Residual Chlorine November-June	µg/L							147	-	662	Effluent	1/month	Grab					
	lb/day							4.27	-	19.2			Calculation					
Total Ammonia as N February – October	mg/L	Report		Report	Effluent	3/week	24-Hr. Comp.											
	lb/day	Seasonal Average Limit: 255 lb/day					Calculation											
Total Ammonia as N July – September	mg/L	8.2	-	29.5	Effluent	3/week	24-Hr. Comp.							8.2	-	29.5	2/week	24-Hour Composite
	lb/day	342	-	1230			Calculation							238	-	856		
Total Ammonia as N November – January	mg/L	25.4	-	91.7	Effluent	1/month	24-Hr. Comp.											
	lb/day	1059	-	3824			Calculation											
Total Ammonia as N October - June	mg/L													25.4	-	91.7	2/week	24-Hour Composite
	lb/day													737	-	2661		
Total Ammonia as N March-October	mg/L							8.2	-	29.5	Effluent	2/week	24-Hr. Comp.					
	lb/day							238	-	856			Calculation					
Total Ammonia as N November – February	mg/L							25.4	-	91.7	Influent and Effluent	1/month	24-Hr. Comp.					
	lb/day							737	-	2661			Calculation					
Total Phosphorus as P February – October	µg/L	Report	Report	-	Effluent	3/week	24-Hr. Comp.											
	lb/day	Report	Report	-			Calculation											
	lb/day	Seasonal Average Limit: 3.19 lb/day. See I.B.11																
Total Phosphorus as P November – January	µg/L	Report	Report	-	Effluent	1/week	24 Hr. Comp.											
Total Phosphorus as P (March)	µg/L							Report	Report	-	Influent and Effluent	3/week	24-Hr. Comp.					
	lb/day							29	43.5	-			Calculation					
Total Phosphorus as P (April – May)	µg/L							Report	Report	-	Influent and Effluent	3/week	24-Hr. Comp.					
	lb/day							7.26	10.9	-			Calculation					
Total Phosphorus as P (June – September)	µg/L							50	75	-	Influent and Effluent	3/week	24-Hr. Comp.					
	lb/day							1.45	2.18	-			Calculation					
Total Phosphorus as P (October)	µg/L							1000	1500	-	Influent and Effluent	3/week	24-Hr. Comp.					
	lb/day							29	43.5	-			Calculation					
Total Phosphorus as P (November - February)	µg/L							Report	-	Report	Influent and Effluent	1/month	24-Hr. Comp.					
Phosphorus (March - October)	% removal													See Part I.A.3.			1/week	24-Hr. Comp.
Copper (July – September)	µg/L	13.8	-	27.7	Effluent	1/month	24-Hr. Comp.	13.8	-	27.7	Effluent	1/month	24-Hr. Comp.	13.8	-	27.7	1/month	24-Hr. Comp.
	lb/day	0.58	-	1.16			Calculation	0.4	-	0.8			Calculation	0.4	-	0.8		
Copper (Oct. – June)	µg/L	Report	-	Report	Effluent	1/month	24-Hr. Comp.											
Lead	µg/L	2.05	-	3.79	Effluent	1/month	24-Hr. Comp.	2.05	-	3.79	Effluent	1/month	24-Hr. Comp.	2.05	-	3.79	1/month	24-Hr. Comp.
	lb/day		-				Calculation	0.059	-	0.11			Calculation	0.059	-	0.11		
Zinc	µg/L	84.3	-	115	Effluent	1/month	24-Hr. Comp.	84.3	-	115	Effluent	1/month	24-Hr. Comp.	84.3	-	115	1/month	24-Hr. Comp.
	lb/day		-				Calculation	2.45	-	3.34			Calculation	2.45	-	3.34		
Temperature	°C	Report	-	Report	Effluent	5/week	Grab	Report	-	Report	Effluent	2/week	Grab	-	-	-	2/week	Grab
Cadmium	µg/L	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/month	24-Hr. Comp.	-	-	-	1/month	24-Hr. Comp.
Silver	µg/L	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/quarter	24-Hr. Comp.					
Alkalinity	mg/L as $CaCO_3$	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/month	24-Hr. Comp.					
Hardness	mg/L as $CaCO_3$	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/month	24-Hr. Comp.					
Oil and Grease	mg/L	Report	-	Report	Effluent	1/quarter	Grab	See I.B.11			Effluent	3x/5 years	Grab					
Total Dissolved Solids	mg/L	Report	-	Report	Effluent	1/quarter	24-Hr. Comp.	See I.B.11			Effluent	3x/5 years	24-Hr. Comp.					
Total Polychlorinated Biphenyls (PCBs)	pg/L	Report	-	Report	Influent and Effluent	1/2 months	24-Hr. Comp.	Report	-	Report	Influent and Effluent	1/quarter	24-Hr. Comp.					
2,3,7,8 tetrachloro-dibenzo-p-dioxin (TCDD)	pg/L	Report	-	Report	Influent and Effluent	1/quarter	24-Hr. Comp.											
Orthophosphate as P	µg/L	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/month	24-Hr. Comp.					
Total Kjeldahl Nitrogen	mg/L	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/month	24-Hr. Comp.					
Nitrate + Nitrite as N	mg/L	Report	-	Report	Effluent	1/month	24-Hr. Comp.	Report	-	Report	Effluent	1/month	24-Hr. Comp.					
Dissolved Oxygen	mg/L	Report minimum and average			Effluent	1/month	Grab	Report minimum and average			Effluent	1/month	Grab					
NPDES Application Form 2A Effluent Testing	See I.B.10	See I.B.10			Effluent	3x/5 years	-	See I.B.10			Effluent	3x/5 years	-					
Whole Effluent Toxicity	TU_c	See I.C.			Effluent	2/year	24-Hr. Comp.	See I.C.			Effluent	Annual	24-Hr. Comp.	See Part I.C.			Semi-Annually for 5 Years	See Part I.C.

Heavy metals also tend to accumulate in fish tissues and create concern for human health. Idaho's "TMDL for Dissolved Cadmium, Lead, and Zinc in the Surface Waters of the Lake Coeur d'Alene Basin" was ruled void on procedural grounds by the Idaho Supreme Court in 2003 and has not been revisited. Since Idaho has the Spokane River listed as a high priority water body, IDEQ contended during the facility planning process that existing permit holders are limited to the mass loadings currently allowed in approved permits until a TMDL is approved. In a letter dated May 21, 2013 from Curt Fransen, Director of IDEQ, to Eric Anderson and George Eskridge in the Idaho State Legislature, it was detailed that subsequent interpretations for the purpose of 401 Water Quality Certifications would define that effluent metals limits would be based on concentration, rather than mass when determining toxicity and relation to the water quality standards. It remains critical to work with IDEQ to complete this evaluation, including any necessary TMDL to avoid expensive quaternary processes that would produce little or no water quality benefit.

As previously mentioned, Post Falls and Rathdrum purchased 932 acres of farm land on the Rathdrum Prairie several years ago in order to eventually apply recycled water to fodder crops and hybrid poplars. Irrigation must be conducted at agronomic rates – rates that meet the crop needs without percolating reuse water and dissolved constituents into the underlying groundwater. All reuse water must be retained in a double-lined storage pond awaiting irrigation. The river discharge permit would allow Post Falls to match irrigation needs much more closely to recycled water flow in order to reduce construction of storage ponds. Maintaining the ability to discharge to the Spokane River is critical to managing future needs for expanded land purchase and storage volumes. Further limiting river discharge will have the opposite effect. This "zero discharge" approach to reuse is generally applied across the state but is monitored even more closely over the Rathdrum Prairie Aquifer, which underlies Post Falls' and Rathdrum's future reuse sites. Recycling and reuse is explored more fully in the following section.

4.5 Wastewater Recycling and Reuse Standards

The wastewater recycling and reuse standards are governed by the Idaho Administrative Procedures Act (IDAPA) Part 58, Title 01. IDAPA is available on the State of Idaho website at http://adminrules.idaho.gov/rules/current/58/index.html.

The primary IDAPA chapters that apply are:

- Chapter 2 – "Water Quality Standards"
- Chapter 8 – "Idaho Rules for Public Drinking Water Systems"
- Chapter 11 – "Groundwater Quality Rules"
- Chapter 16 – "Wastewater Rules"
- Chapter 17 – "Rules for the Recycling and Reuse of Municipal and Industrial Wastewater" (Reuse Rules)

Table 4-2 provides a brief summary of the requirements for reuse of recycled municipal wastewater under Chapter 17. It subdivides reuse into five classes (A through E) from the most stringent treatment and reliability standards to the least stringent treatment standard with the most restrictive buffer zones and access requirements, respectively. With coagulation, filtration, and enhanced disinfection, Post Falls could practice Class B or even Class A reuse, depending on their available treatment trains and reuse location. **Figure 4-1** provides a pictorial representation of how Class A recycling and reuse may be presented to potential users and the general public.

Table 4-2 – Summary of Treatment and Use Requirements for Recycled Municipal Wastewater

Classification	Class A	Class B	Class C	Class D	Class E
Treatment (Municipal Wastewater must be treated by the following:)	• Oxidized, clarified, and coagulated, with filtration approval requirement or treated by an equivalent process. • Highest level reliability. • Nitrogen removal requirements. • Turbidity limits below 2 NTU. • Adequately disinfected and tested. • Pilot testing required.	• Oxidized, coagulated, clarified, and filtered or treated by an equivalent process. • Turbidity limits below 2 NTU. • Adequately disinfected and tested. • Pilot testing required.	• Oxidized and adequately disinfected.	• Oxidized and adequately disinfected.	• At least primary effluent quality.
Disinfection	Total Coliform not to exceed two and two tenths (2.2) per one hundred (100) milliliters.	Total Coliform not to exceed two and two tenths (2.2) per one hundred (100) milliliters.	Total Coliform not to exceed twenty three (23) per one hundred (100) milliliters.	Total Coliform not to exceed two hundred and thirty (230) per one hundred (100) millimeters.	Total Coliform organisms up to "too numerous to count."
Uses	• Irrigation at individual homes. • Groundwater recharge using surface spreading, seepage ponds, unlined surface water features, or subsurface distribution. • Fire suppression from dedicated, marked hydrants. • Dust suppression at construction sites. • Toilet flushing at some industrial and commercial sites. • Class B, C, D, or E uses.	• May contact any edible portion of raw food crops. • Irrigation for golf courses, parks, playgrounds, or schoolyards. • Class C, D, or E uses. • Toilet flushing at some industrial and commercial sites.	• Irrigation for orchards and vineyards during the fruiting season if no fruit harvested for raw use comes in contact with the irrigation water or ground or will contact the edible portion of raw food crops. • Irrigation for cemeteries or roadside vegetation. • Toilet flushing at some industrial and commercial sites. • Class D or E uses.	• Irrigation for fodder, seed, or processed food crops. • Class E uses.	• Irrigation for forested sites.
Access Restriction	Irrigation during periods of non-use.	Irrigated during periods of non-use by public.	Irrigated during periods of non-use by public.	Public access restricted.	Public access restricted.
Buffer Distances	None, except no spray to contact drinking fountains, picnic tables or public eating facilities. Also, no effluent is allowed to be applied to surface waters where a NPDES Permit is required. One hundred feet minimum to drinking water wells (1,000 feet for recharge).	Site specific (see IDAPA 58.01.17). No effluent is allowed to be applied to surface waters where a NPDES Permit is required.	Site specific (see IDAPA 58.01.17). No effluent is allowed to be applied to surface waters where a NPDES Permit is required.	Site specific (see IDAPA 58.01.17). No effluent is allowed to be applied to surface waters where a NPDES Permit is required.	Site specific (see IDAPA 58.01.17). No effluent is allowed to be applied to surface waters where a NPDES Permit is required.
Grazing	Grazing allowed only with approved grazing management plan.	Grazing allowed only with approved grazing management plan.	Grazing allowed only with approved grazing management plan.	Grazing not allowed.	Grazing not allowed.

Figure 4-1 – Class A Recycling and Reuse

CLASS A WATER RECLAMATION AND REUSE REQUIREMENTS (IDAPA 58.01.17)

A. TREATMENT REQUIREMENTS:
1. OXIDIZED, COAGULATED, CLARIFIED AND FILTERED WITH APPROVED IDEQ TITLE 22 FILTRATION TECHNOLOGY SYSTEM OR TREATED BY AN EQUIVALENT FILTER PROCESS (RE:C.6 BELOW).
2. ADEQUATELY DISINFECTED.
3. NUTRIENT REMOVAL.
4. TURBIDITY REMOVAL.

B. WATER QUALITY REQUIREMENTS:
1. TOTAL COLIFORM: MEDIAN < 2.2 COUNT/100 ML; MAXIMUM < 23 COUNT/100 ML AS DETERMINED FROM DAILY SAMPLING DURING PERIODS OF USE.
2. TOTAL NITROGEN: MONTHLY ARITHMETIC MEAN < 30 MG/L–N AS DETERMINED FROM WEEKLY COMPOSITE SAMPLING DURING PERIODS OF USE.
3. TURBIDITY: DAILY ARITHMETIC MEAN < 2 NTU; MAXIMUM < 5 NTU AS DETERMINED FROM CONTINUOUS MONITORING DURING PERIODS OF USE.
4. TURBIDITY SHALL BE MET PRIOR TO DISINFECTION.
5. CHLORINE: RESIDUAL < 1 MG/L FREE CHLORINE AFTER CONTACT TIME OF 30 MINUTES AT PEAK FLOW AS DETERMINED FROM CONTINUOUS MONITORING.
6. BOD5: MONTHLY ARITHMETIC MEAN < 10 MG/L AS DETERMINED FROM WEEKLY COMPOSITE SAMPLING DURING PERIODS OF USE.
7. pH: MINIMUM > 6.0; MAXIMUM < 9.0 AS DETERMINED FROM DAILY SAMPLING OR CONTINUOS MONITORING.

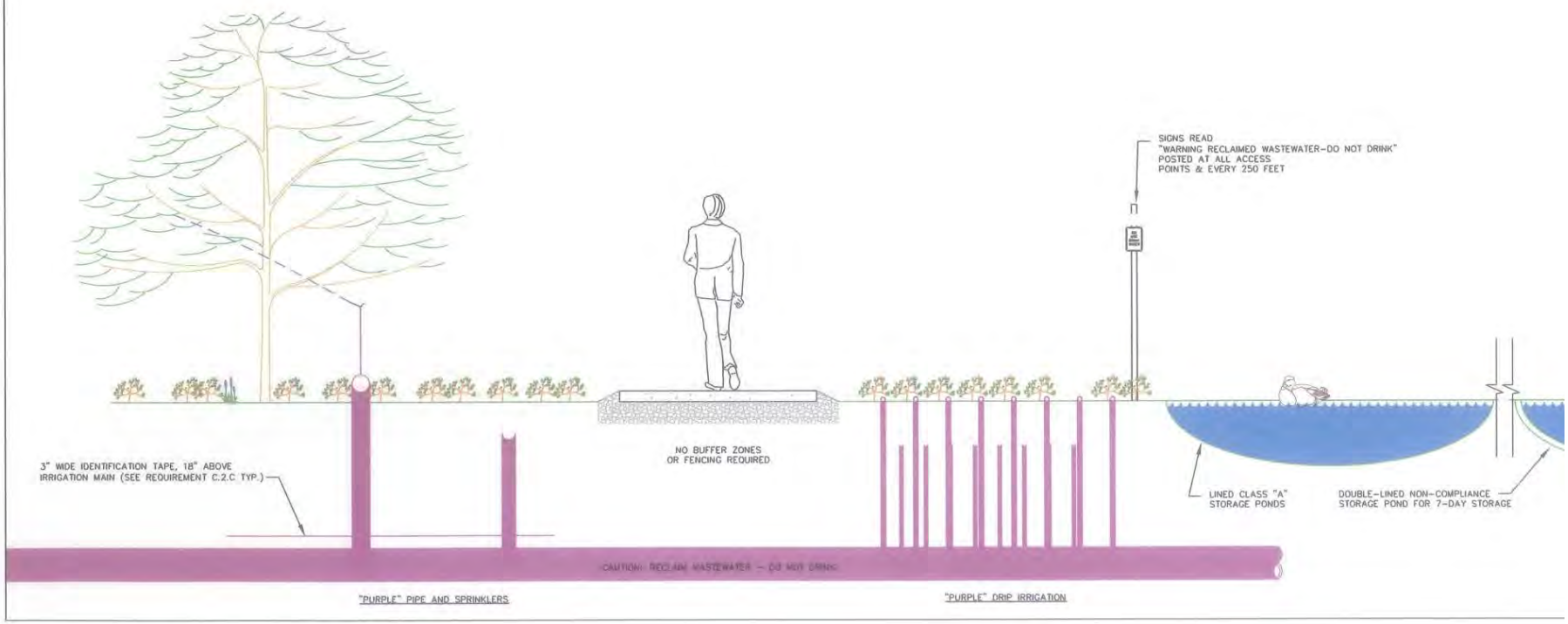
C. OTHER REQUIREMENTS:
1. ENGINEERING REPORT, AND PLANS AND SPECIFICATIONS STAMPED WITH APPROVAL BY IDEQ PRIOR TO CONSTRUCTION.
2. DISTRIBUTION SYSTEM:
A. MARKED AND IDENTIFIED WITH MINIMUM DISTANCE BETWEEN DRINKING WATER SOURCES.
B. ALL PIPE, SERVICES, VALVES, AND APPURTENANCES COLORED PURPLE AND LABELED EVERY 10 FEET "CAUTION:RECLAIMED WASTEWATER– DO NOT DRINK".
C. IDENTIFICATION TAPE INSTALLED 18" ABOVE BURIED EFFLUENT PIPE AND LABELED "CAUTION:RECLAIMED WASTEWATER– DO NOT DRINK".
3. RELIABLE AND REDUNDANT TREATMENT SYSTEMS:
A. REDUNDANT TREATMENT TRAINS TO TREAT PEAK FLOW.
B. ALTERNATIVE DISPOSAL OR LINED STORAGE FOR STORING 7–DAYS EFFLUENT FOR PEAK FLOW DURING UPSET CONDITIONS.
C. STANDBY POWER.
4. 10,000 GPD MINIMUM TREATMENT FLOW.
5. FILTER TO WASTE OPERATION FOR EACH FILTER START UP.
6. PILOT TEST TREATMENT SYSTEM IF NOT AN APPROVED IDEQ TITLE 22 FILTRATION TECHNOLOGY SYSTEM.
7. LOCAL PERMITS AND IDEQ PERMIT MODIFICATIONS.
8. CLASS A EFFLUENT DISTRIBUTION SYSTEM OPERATORS.
9. REPORT ON TECHNICAL, FINANCIAL AND MANAGERIAL CAPACITY OF SYSTEM.

D. WATER USE:
1. RESIDENTIAL IRRIGATION AND OTHER USES ACCEPTABLE TO IDEQ.
2. GRAZING ALLOWED ONLY WITH APPROVE GRAZING MANAGEMENT PLAN.

E. ACCESS RESTRICTION: IRRIGATED DURING PERIOD OF NON–USE.

POSSIBLE ADDITIONAL REQUIREMENTS FOR REUSE OVER SPOKANE VALLEY–RATHDRUM PRAIRIE "SENSITIVE RESOURCE" AQUIFER

- LINED STORAGE PONDS (IDEQ (GUIDANCE FOR RECLAMATION AND REUSE SECTIONS 12.8 THROUGH 12.11)
- RESTRICTIONS ON IRRIGATION – PURVEYOR MUST DOCUMENT THAT USE IS CLOSE TO CONSUMPTIVE RATE OF GRASS ETC.
- TOTAL NITROGEN IN EFFLUENT LESS THAN 10 MG/L
- GROUND WATER MONITORING



4.5.1 Reclamation and Reuse over the Rathdrum Prairie Aquifer

It is important to recognize that the study area is over the Rathdrum Prairie Aquifer (RPA), also known as the Spokane Valley-Rathdrum Prairie Aquifer (SVRPA). It is the only designated "Sensitive Resource Aquifer" in Idaho. As such, there are several special provisions that impact reuse practices in the study area. In particular, the "Reuse Rules" (IDAPA 58.01.17.602) allow groundwater recharge using surface spreading, seepage ponds, unlined surface water features, or subsurface distribution. The recharge activities must meet the "Groundwater Quality Rule" (IDAPA 58.01.11) and must be located at least 1,000 feet and at least six months of travel time from any downgradient drinking water.

IDAPA 58.01.11.300-350 also requires the following:

- The aquifer shall not be degraded, as it relates to beneficial uses, as a result of point source or non-point source activity unless it is demonstrated by the person proposing the activity that such change is justifiable as a result of economic or social development.
- Activities with the potential to degrade Sensitive Resource Aquifers shall be managed in a manner that maintains or improves existing groundwater quality.
- Sensitive Resource Aquifer groundwater is of better quality than the groundwater quality standards in Section 200, and maintenance of this quality is needed to protect an identified beneficial use.

The net result of these rules is that groundwater recharge is not feasible in most instances over the RPA for two reasons. First, the high quality and readily available quantity of water has led to a proliferation in the number of drinking water wells present. Second, horizontal hydraulic conductivities in the study area range from an estimated 12,100 to 22,100 feet per day, so groundwater travels very quickly (USGS, 2007). These two facts make it unlikely that a recharge site could be located less than six months travel time from a downgradient drinking water well. As a result, this Facility Plan concentrates on irrigation and other reuse practices that will not lead to groundwater recharge.

4.5.2 SVRP Aquifer Special Supplemental Guidelines

Reuse is a permitted activity in Idaho under IDAPA 58.01.17 which references the "Idaho Guidance for Recycled Water" (IDEQ, 2007). The IDEQ Guidance "provides assistance in applying and interpreting" the Reuse Rules for permitting and operating reclamation and reuse facilities. Of particular importance to this guidance is Section 12.11, titled "Wastewater Land Application Sites Overlying Designated Special Resource Water." It outlines the background behind the need for possible "special considerations" for nutrient management of land application reuse over the RPA, including calculation of the nitrogen and phosphorus balance and calculation of loss to groundwater.

4.5.3 Anticipated Wastewater Reclamation and Reuse Standards over the Rathdrum Prairie Aquifer

Regulators continue to trend toward tighter discharge restrictions into the Spokane River. Consequently, reuse over the RPA will likely become an ever-increasing part of the long-term management strategy for Post Falls and Rathdrum. Anticipated regulations to govern reuse over the RPA also become more

important in planning that strategy. Since only one reuse site is active over the main body of the aquifer, evaluating additional reuse sites will be critically important.

Although every activity over the aquifer has the potential to degrade it, reuse practices are some of the most carefully managed and controlled. That management and control appears to be warranted in order to balance the need for proper wastewater management with the protection of this exceptional water resource. Key actions that balance reuse irrigation with aquifer quality appear to include:

- Site-specific soil sampling and testing to a depth of 60 inches to characterize the physical and chemical characteristics of all soil types composing 10 percent or more of the site as part of the reuse proposal
- Site-specific crop selection and agronomic and/or silvicultural plan to balance water and nutrient uptake to those available in reuse water, supplemental irrigation, and supplemental fertilizer
- Establishing and sampling a representative dedicated monitoring well network prior to reuse activities to adequately characterize background water levels and constituents in the uppermost 10 feet of the aquifer
- Developing a site-specific soil moisture monitoring and irrigation management strategy so that water is applied within the water-holding capacity of the soil and depleted prior to the non-growing season
- Conducting soil and soil water sampling to establish existing conditions and manage to reduce or eliminate potential ongoing leaching losses to the aquifer
- Conducting ongoing monitoring well sampling and analysis to verify no significant impact to the RPA as a result of the reuse activities

The proposed characterization and monitoring of reuse activities over the RPA may be reduced for Class A reuse water that includes nutrient reduction. The Class A standard in all other parts of the State already allows for such “unrestricted” reuse. Previous calculations show that nutrient removal standards would likely be required in order to be protective of RPA water quality due to the non-degradation standard. In such instances, it may also be necessary to exercise some level of control over supplemental fertilizer addition to meet the non-degradation standard. This would certainly be possible on publicly controlled spaces (parks, play fields, rights-of-way, etc.) and may be possible with contractual water sale agreements as well.

In summary, reuse activities over the Rathdrum Prairie Aquifer are likely to increase over time due to population growth and tightening restrictions on discharge to the Spokane River. Stringent regulations designed to protect the high quality of the RPA also mean that reuse water quality, monitoring, and management practices will be held to a higher standard than in other areas of the State. In reviewing the proposed Post Falls and Rathdrum reuse sites, these standards can be met but will require significant initial background work to characterize the soil and groundwater as well as propose a suitable cropping and monitoring plan. Class A reuse water with nutrient removal may alleviate a number of groundwater protection concerns. However, even Class A reuse water may require a management agreement with the end users to avoid overloading the soil system with nitrogen or other constituents of concern.

Appendices

Appendix 4-A – 2011 Pre-Certification Draft NPDES Permit
Appendix 4-B – 2011 Draft Water Quality Certification/City Response and Comment Letter

Appendix 4-A

2011 Pre-Certification Draft NPDES Permit

See enclosed DVD for appendix information

Appendix 4-B

2011 Draft Water Quality Certification City Response and Comment Letter

See enclosed DVD for appendix information

J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Unit Process and Improvement Options

Final

June 2013

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TM 5 – Unit Process and Improvement Options

5.1 Introduction

5.1.1 General

As discussed in Technical Memorandum (TM) 2, the existing treatment plant requires upgrading to continue to provide adequate service. Tightening permit conditions discussed in TM No. 4 and expansion due to service area growth will require additional capacity and unit processes. This memorandum reviews treatment options to meet these future discharge requirements.

The treatment options are divided into major physical, biological, and tertiary treatment processes to meet permit conditions. Solids handling and required ancillary processes are also reviewed. Overall treatment trains are recommended, with preliminary opinions of construction cost.

Each of the major treatment options was developed by a team of wastewater process engineers considering specific permit and future capacity requirements. The best alternatives have been retained for further evaluation.

5.1.2 Expected Treatment Requirements

As discussed in TM 4, the future discharge permit requires nutrient removal (specifically, very low phosphorus concentrations); therefore, wastewater treatment technologies and systems that can meet the projected nutrient limitations are considered. This memorandum summarizes treatment facility sizing to meet the 2031 projected flows and loads.

5.1.3 No Action Alternative

Portions of the current facility cannot handle anticipated peak flows adequately through existing processes, thus compromising system reliability to comply with normal secondary effluent standards. Additional upgrades will be required to handle peak flows and loads at the headworks as well as UV disinfection and the river outfall.

The anticipated future discharge permit will likely have effluent phosphorus limits that the City cannot currently meet, resulting in significant and ongoing permit violations, and degradation of receiving water quality will be experienced.

5.1.4 Wastewater Treatment Process Alternatives

Wastewater treatment unit process selection is driven by both projected wastewater flows/loads and expected permit conditions. These processes are divided into preliminary treatment (headwork and flow equalization), primary treatment, basic biological treatment, and tertiary treatment. Additionally, solids handling, disinfection, plant outfall, reuse opportunities, and ancillary support processes are reviewed. Tertiary treatment is required to meet effluent quality goals prior to discharging.

A summary of the major treatment processes considered to meet expected future capacity requirements and permit conditions is presented in **Table 5-1**.

Table 5-1 – Pre-Screened Alternatives

Element	Alternatives
Preliminary Treatment and Flow Equalization	Multiple physical layout alternatives
Primary Treatment	Salsness (gravity belt) Primary clarification
Biological Treatment	Conventional activated sludge (oxidation ditch) Conventional activated sludge (diffused aeration) Membrane bioreactors
Tertiary Treatment	Continue backwash Upflow granular media filtration Tertiary membrane microfiltration Conventional sedimentation and filtration AlgEvolve
Disinfection/Advanced Oxidation	Ultraviolet light Chlorination/Dechlorination Ozone Granular activated carbon
Effluent Disposal	River discharge (Spokane River) Reclaimed Water Reuse (lawn irrigation, land application, wetlands)
Solids Treatment and Disposal	Aerobic digestion Anaerobic digestion Multiple final disposal alternatives (City, third party, public)

5.2 Preliminary Treatment and Flow Equalization

5.2.1 Preliminary Treatment Alternatives

The Post Falls WRF existing preliminary treatment system includes influent screening, grit removal, and chemical alkalinity adjustment (magnesium hydroxide addition). Future systems required to remove phosphorus will likely be added to the secondary and/or new tertiary treatment systems. The sizing of these systems will be influenced by peak hydraulic flow rates. To more efficiently size these systems and aid in secondary process stability, alternatives for flow equalization have been evaluated.

A cursory review of process and overall site considerations revealed the following initial criteria:

- Although equalization is to be added primarily for mitigating peak flows to future tertiary treatment systems, early in the evaluation it was evident that the advantages of equalizing the plant influent would help relieve portions of the plant that are nearing their hydraulic capacity and would help equalize both flow and load to the plant. If equalization is to be added, it will be configured near the plant influent to benefit all downstream processes.

- In-line or side-stream equalization:
  - With in-line equalization, the entire plant flow enters the equalization storage tank. The tank is then operated at varying levels throughout the day such that at periods when the influent flow is above "average" daily flow, the excess volume is retained in the basin. This causes the volume retained in the basin to increase for a period of time. Later, when plant influent has dropped below average daily flow, the volume is pumped out of the basin such that the flow rate to the secondary system is maintained near "average" daily flow values. The primary advantage to this type of equalization is that a certain degree of influent load equalization is often realized. Further, peak flows and loads from recycled process streams from downstream processes are equalized (belt press reject, filter reject, etc.).
  - Side-stream equalization essentially allows a constant flow to the plant, and peak flows above "average" are diverted to the equalization basin. This system then holds the peak volume for a period of time and is later discharged to the secondary system when influent plant flows are below "average". The disadvantage to this type of system is that "wasteload" is generally not equalized, as loads are generally "diluted" during peak flow conditions.
  - Based on a review of these options, future equalization storage system should be configured in-line.
- An analysis of previous influent flow records indicates that a flow equalization volume of 15 percent of the plant influent is necessary to equalize flow fluctuations caused by daily influent diurnal variations. Additionally, to account for recycle flows streams (belt press filtrate, tertiary filtration reject, etc.), it is prudent to size the equalization facility to accommodate an additional 10 percent, totaling 25 percent. Seasonal variation of peak day versus average daily flow will still need to be accommodated by downstream processes.
  - Peak daily flow projections vary depending on whether the peak observed value is used versus the peak statistical value. Further, the actual "peak hour" to average daily flow was likely decreased during this period, and in order to not construct unnecessarily large basins, the "statistical peak day" flow will be utilized for sizing the equalization basin.
  - Based on a 25 percent daily volume equalization and a projected peak daily flow of 4.3 mgd in 2021 and 6.1 mgd by 2031, the required equalization volume is 1.08 million gallons (MG) in 2021 and 1.52 MG in 2031. As the incremental cost for storage is very small, it is recommended to construct the equalization storage in phases beginning with a 1.0 MG tank and construct parallel tanks in 0.5 MG increments as plant flows increase.
- Headworks Equipment:
  - The headworks facility will require modifications to their screening equipment to increase peak hydraulic capacity to accommodate the peak hour projected flow of 12.0 mgd. Current capacity is limited to 7.1 mgd for the Rotamat Screen No. 1. The Huber step-screen has a 12.0 mgd capacity. Replacing the Rotamat unit will increase the hydraulic capacity of the system.
  - The current headworks contains two parallel grit channels with 7.0 mgd and 12.0 mgd capacity. By the end of the 20-year period, the peak hydraulic capacity of the grit removal equipment will likely be exceeded, requiring both units to be brought on line during peak flow events. For budgetary purposes, the addition of a third grit channel with 12.0 mgd capacity will be evaluated for alternatives that retain the current headworks facility.
  - Relocation or modification of the headworks facilities will be evaluated in conjunction with flow equalization alternative configurations.

5.2.2 Discussion of Alternatives

Based on the preliminary criteria identified previously, three viable alternatives were identified for modification of the Preliminary Treatment/Flow Equalization System:

- **Alternative 1**
  - Retain and upgrade headworks in existing location.
  - Construct new equalization tank southeast of headworks and west of OD #1.
  - Construct new influent pump station.
- **Alternative 2**
  - Relocate and construct new headworks to northwest corner of WRF property (near entrance gate).
  - Construct new equalization tank adjacent to new headworks.
  - Construct new influent pump station.
- **Alternative 3**
  - Retain and upgrade headworks in existing location.
  - Construct new equalization tank to northwest corner of WRF property (near entrance gate). Locate upstream of headworks.
  - Construct new influent pump station.

Each of these alternatives can be seen schematically in Figure 5-1, Figure 5-2, and Figure 5-3.

Discussion

Each of these alternatives has multiple advantages and disadvantages to operations, maintenance, overall process performance, maximizing lifecycle of existing infrastructure, and interaction with existing and future unit processes. A discussion of the advantages and disadvantages for each alternative follows.

- **Alternative 1**

  <u>Advantages</u>

  - The current headworks was upgraded in 2011. This option will retain existing headworks and equipment with only minor modifications and improvements required.
  - The existing northern influent force mains and the east Centennial Trail (C-Trail) Forcemain would not need to be re-configured.

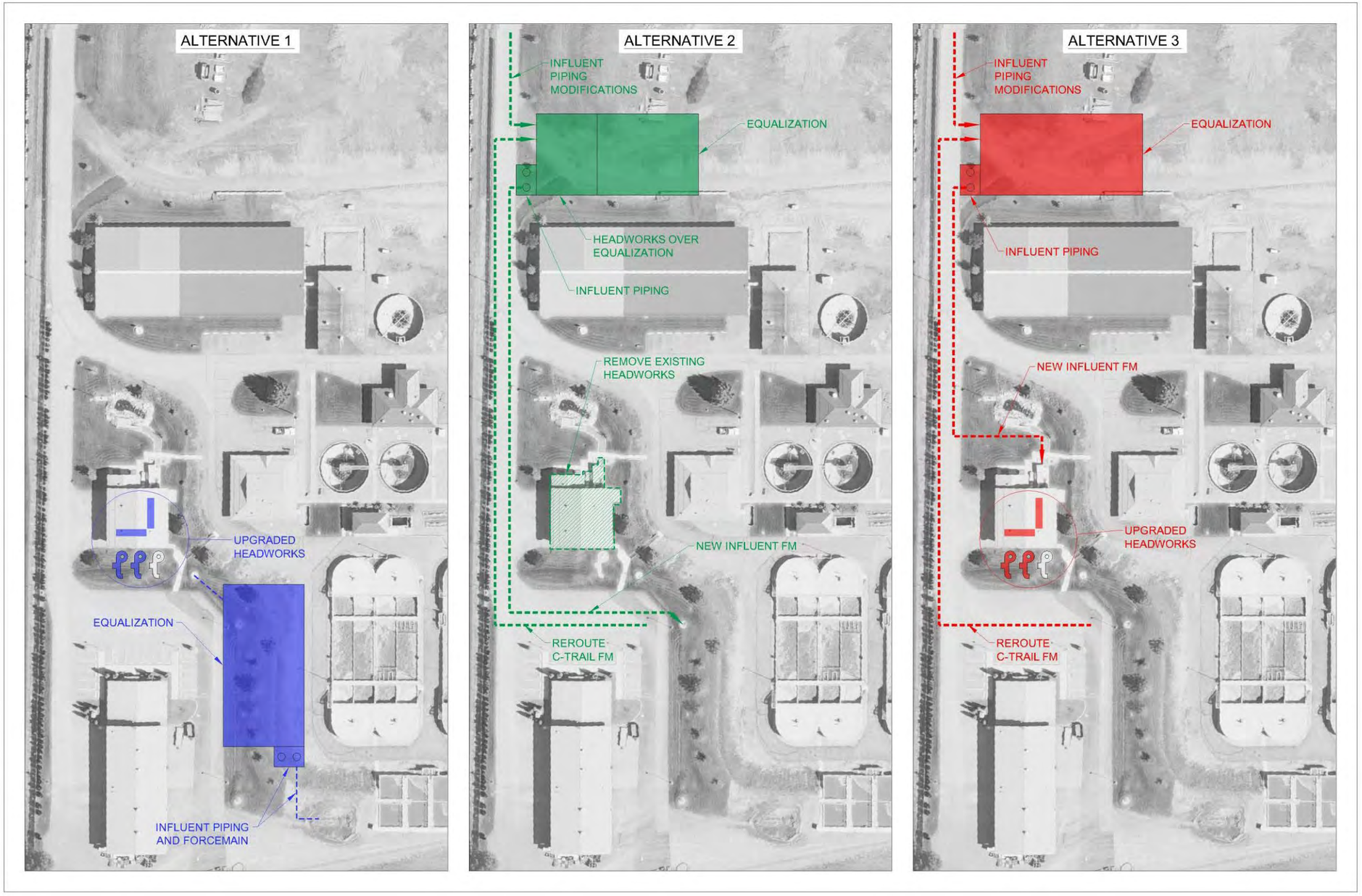
  <u>Disadvantages</u>

  - Construction of a new equalization tank requires temporary pumping or relocation of the screened influent parallel pipes (24-inch and 30-inch) to construct equalization tank.
  - Does not leave much space for expansion of future preliminary treatment expansion. Equalization and headworks become constrained by the “water building” for expansion beyond 5.2 mgd average flow.

Figure 5-1 – Preliminary Treatment Alternative 1 Process Schematic

Figure 5-2 – Preliminary Treatment Alternative 2 Process Schematic

Figure 5-3 – Preliminary Treatment Alternative 3 Process Schematic



- **Alternative 2**

  Advantages

  - New headworks facility and equipment.
  - Utilize existing WRF property to north (logical headworks location) and create space within the core of the WRF property for expansion of offices or primary treatment.
  - Headworks, equalization tank, and influent pump station are sized for 20-year period, with provisions and space planned for facility build-out.

  Disadvantages

  - Lose existing remaining lifecycle value in the existing headworks facility.
  - Significant re-route of the east C-Trail Force Main.
  - Aging pipe from grit chambers to Splitter Box S-1 is not repaired or eliminated as part of this work.

- **Alternative 3**

  Advantages

  - The current headworks was upgraded in 2011. This option will retain existing headworks and equipment, with only minor modifications and improvements required.
  - Equalization tank and influent pump station are sized for 20-year period, with provisions and space planned for facility build-out.

  Disadvantages

  - Equalization is located upstream of the headworks, causing increased potential for solids settling and rag buildup in equalization tank and on mixing equipment. This will increase maintenance and total required energy input to maintain material in suspension.
  - Aging pipe from grit chambers to Splitter Box S-1 is not repaired or eliminated as part of this work.

Each of these alternatives must be evaluated in conjunction with the other overall plant unit processes to determine site layout interactions and long-term expansion of the site.

5.2.3 Design Criteria

The overall process design criteria for preliminary treatment are summarized in **Table 5-2**.

Table 5-2 – Preliminary Treatment Design Criteria

Item	Design Criteria Parameter
Equalization	
Type	In-Line
Location	Plant Influent
Design Flow	Statistical Peak Day Flow (6.1 mgd)
Percentage of Design Flow	25%
Volume	1.52 MG
Mixing	Submerged Mechanical (no air entrainment)
Tank Configuration	Hopper Bottom, partitioned to allow maintenance
Tank Considerations	Covered, interior coated for corrosion protection
Odor Control	Required
Alkalinity Adjustment	
Chemical	Magnesium Hydroxide
Storage and Delivery	Bulk, with bulk liquid delivery
Headworks (Screening and Grit)	
Screening Size	⅛" (3 mm) or smaller
Design Flow	Peak Hour (12.0 mgd) firm capacity or higher, with one unit out of service
Influent Pump Station	
Design Flow	Peak Hour (12.0 mgd) firm capacity or higher

5.2.4 Cost

Preliminary opinions of capital and operating costs for each of these alternatives are presented in **Table 5-3**. Operational costs were assumed utilizing average 20-year projected flow. Detailed cost opinions for each alternative are included in **Appendix 5-A**.

Table 5-3 – Preliminary Treatment Alternatives Capital Costs

Alternative No.	Description	Capital Cost (Present Worth)	O&M Cost (20-Year Present Worth)	Total Cost (Present Worth)
1	Modify Existing Headworks, New EQ near OD 1	$7,359,500	$898,000	$8,257,500
2	New Headworks and New EQ near WRF Entrance	$10,173,200	$898,000	$11,071,200
3	Modify Existing Headworks and New EQ near WRF Entrance	$7,493,600	$1,059,000	$8,552,600

5.2.5 Recommendations

Preliminary treatment will add flow equalization to the current screening and de-gritting process. Equalization will be constructed to the northwest area of the property. The construction of the new headworks and equalization will be phased with the required tertiary treatment improvements.

The preferred equalization layout will implement Alternative 2 as follows:

- Position the equalization tank at the northwest corner of the WRF property.
- Relocate the Headworks and pH/Alkalinity adjustment chemical feed equipment to the new headworks as necessary.
- Interim, phased improvements may require temporarily routing flow from the existing headworks to the new proposed Equalization tanks. Hydraulic grade considerations would need to be addressed, but under this scenario. In this case, it is likely that the lower half of the Equalization tanks would likely only be able to be used until the headworks was fully re-located (i.e., not operated at full depth), and influent wastewater could be pumped directly to the new headworks at an elevated hydraulic grade.

5.2.6 Environmental

The primary environmental concerns with the recommended improvements are related to Air Quality (Odor generation) and Energy. Both the new headworks and equalization basin will require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating them on-site. Because the equalization basin is new process to the Post Falls WRF it will require additional energy (power) to maintain mixing in the basin. The overall lifecycle cost for the additional power however is considerably lower than the savings in capital costs provided by the improvement.

5.3 Primary Treatment

5.3.1 Primary Treatment Alternatives

Primary treatment is utilized to reduce incoming TSS and BOD. Primary treatment can be performed with several physical unit operations, including sedimentation tanks (clarifiers) or screening equipment (gravity belt filter).

The discussion of primary treatment is often blended with secondary biological alternatives due to the interaction of the two processes. For the Post Falls WRF, the facility currently has no primary treatment systems. Flow from the headworks pass directly to the secondary biological treatment systems.

If primary treatment were to be implemented at the Post Falls WRF, it would be positioned downstream of the headworks facilities. Regarding influent flow equalization, the position of the primary treatment system (upstream or downstream) would likely be dependent on the primary treatment technology utilized.

5.3.2 Discussion of Alternatives

Based on the preliminary criteria identified previously, three potential options were identified as possible primary treatment process modifications:

- **Alternative 1** – Do Nothing
- **Alternative 2** – Gravity Belt Filter (Salsness)
- **Alternative 3** – Primary Sedimentation

Alternative 1 – Do Nothing

The Post Falls WRF currently has no primary treatment facilities. As such, the system operates well within design parameters. If no primary treatment facilities are added, expansion and operation of the downstream processes will occur based on the current operational loading trends.

Alternative 2 – Gravity Belt Filter (Salsness)

The Salsness Filter™ is a mechanical screening device. The filter removes solids through a continuous-loop fine mesh belt screen. As the screen moves, it acts like a conveyer and carries solids out of the incoming wastewater. A proprietary air-knife system cleans the solids from the belt screen and deposits them into the screenings hopper, virtually eliminating any solids carryover. Periodic hot-water flushes further clean the belt screen by removing oil and grease that may have accumulated. An auger press dewaters the collected screenings between 20 to 40 percent dry solids while screened wastewater continuously passes through the unit. Periodic cold water flushes keep the unit clean.

The Salsness Filter™ removes between 40 to 70 percent TSS and 20 to 35 percent BOD from the wastewater stream, and the unique design allows for removal of organic and inorganic solids as fine as 15 to 30 micron as they are captured on the 350 micron belt. A Salsness Filter™ pilot study was performed at the Post Falls WRF in the winter of 2007/2008. The results of the pilot study indicated typical TSS removal of 53 percent and BOD removal of 27 percent, with cake solids averaging 24 percent.

A photo of a Salsness Filter installation is shown on Figure 5-4.

Preliminary discussions with the equipment manufacturer indicate sizing of the units such that each is capable of passing 3.0 mgd would likely be installed. Initial phasing would include installation of three units (two duty, one standby). These units will provide a 6.0 firm capacity (one unit off line) capable of passing 9.0 mgd with all units operating.

Figure 5-4 – Example-Salsness Filter Unit

Photo Courtesy Blue Water Technologies

The second phase of construction would add a fourth unit to bring the firm capacity to 9.0 mgd with 12.0 mgd peak capacity capable of passing the 20-year peak hour flow of 12.0 mgd. Under normal circumstances, these units will be capable of providing adequate capacity. If one unit fails, the system does not fail entirely and will still be capable of treating 9.0 mgd (3 out of 4 units), resulting in only a marginal increase in load (12 percent TSS and 6 percent BOD) sent to the secondary process.

The Salsness Filter would ideally be positioned upstream of any flow equalization facilities to improve operations of the equalization system. Further, the system would not necessarily need redundant equipment, but would rather be sized to accommodate peak flows. In the event of a single equipment failure, the plant would be capable of operating under higher loading conditions until the equipment could be repaired.

Solids from the system are typically disposed either through bagging and disposal at a landfill or through anaerobic digestion. Either alternative is viable. If the system were to be implemented with the WRF's current solids processing systems, it would likely be necessary to "bag" and dispose of the solids cake, as the current aerobic holding tank system would not adequately treat the primary solids. If the WRF eventually converts their solids processing system to anaerobic digestion, converting the Salsness system and sending the primary screened solids to the anaerobic digester would be advantageous for gas generation and potential energy recovery.

Alternative 3 – Primary Sedimentation

Primary sedimentation removes readily settleable solids and floating material to reduce the suspended solids content of the influent wastestream. Well-designed and operated primary sedimentation systems can remove from 50 to 70 percent TSS and 25 to 40 percent BOD.

At the Post Falls WRF, primary sedimentation could be positioned either upstream or downstream of flow equalization. Both alternatives have advantages. If positioned downstream, peak flows would be attenuated, having less impact on the overall sedimentation performance. However, the overall sizing of the clarifiers would still be controlled by the average loading conditions. Alternatively, primary sedimentation upstream of equalization will help with mixing and solids issues within the equalization basin. Preliminary sizing indicates three 50-foot clarifiers would be required, with two units capable of handling peak flows. Alternatively, two 90-foot-diameter clarifiers could be used, with a single unit being redundant. To provide budgetary cost opinions, three units have been assumed.

Settled solids generated from the clarifier underflow will need to be processed. Typically, primary settled solids are treated through anaerobic digestion. The Post Falls WRF staff currently does not utilize anaerobic

digestion for solids processing and treatment. If primary sedimentation is selected, a concurrent transition to anaerobic solids digestion will be required to treat the solids generated from the process.

The final position and configuration of primary treatment should be selected in conjunction with the equalization and headworks configurations. The selection of the preferred layout and configuration will be discussed in TM 6.

Discussion

Each of these alternatives has multiple advantages and disadvantages to operations, maintenance, overall process performance, maximizing lifecycle of existing infrastructure, and interaction with existing and future unit processes. A discussion of the advantages and disadvantages for each alternative follows.

Do Nothing

Advantages:

- Simplified operation, similar to current facilities.
- No significant change from current operations.

Disadvantages:

- Continued stress on secondary systems. Biological systems expanded to accommodate increased plant loading.

Salsness Filter

Advantages:

- Very small footprint relative to sedimentation.
- Odors contained within unit for capture and treatment.
- Does not necessarily require additional solids treatment step (anaerobic digestion).
- Reliable solids removal, removing solids stress on downstream systems.

Disadvantages:

- Equipment has higher operating and maintenance requirements.
- Potentially removes too much BOD, hindering the secondary influent BOD:TP ratio that is critical to the BPR process.

Primary Sedimentation

Advantages:

- Low energy input.
- Reliable solids removal, removing system stress created by solids and BOD on downstream systems.

Disadvantages:

- Typically requires anaerobic digestion for solids treatment.
- Can be odorous, and covering can be expensive.
- Larger air volume for odor control.
- Very large footprint relative to Salsness. Preliminary layouts conflict with potential equalization storage layout locations.

- Potentially removes too much BOD, hindering the secondary influent BOD:TP ratio that is critical to the BPR process.

5.3.3 Design Criteria Summary

Preliminary sizing of the primary Salsness Filtration system and typical parameters are shown in **Table 5-4**.

Table 5-4 – Primary Salsness Treatment Design Criteria

Item	Design Criteria Parameter
Equipment	
Number of Units	4 total (@ 3 mgd capacity)
Location	Upstream of Equalization (downstream of screening)
Design Flow	Peak Hour Flow
Odor Control	Required (connected to hood on each unit)
Headloss	< 2 ft

Preliminary sizing of the primary sedimentation system and typical parameters are shown in **Table 5-5**.

Table 5-5 – Primary Sedimentation Treatment Design Criteria

Item	Typical Range	Preliminary Sizing [a]	Preliminary Sizing [b]
Number of Units/Type	--	(3 total) - Circular	(3 total) - Circular
Diameter	10-200 ft	50 ft	50 ft
Depth	12-16 ft	14 ft	14 ft
Overflow Rate			
Average Flow	800-1,200 gpd/SF	1,324 gpd/SF	883 gpd/SF
Peak Hour Flow	2,000-3,000 gpd/SF	3,056 gpd/SF	2,037 gpd/SF
Weir Loading	10,000 to 40,000 gpd/ft	16,552 gpd/ft	11,035 gpd/ft

[a] *Assumes one clarifier off line*

[b] *Assumes all units on line*

5.3.4 Cost

Preliminary opinions of capital and operating costs for each primary treatment alternative are presented in **Table 5-6**. Operational costs were assumed utilizing average 20-year projected flow. Detailed cost opinions for each alternative are included in **Appendix 5-B**.

Table 5-6 – Primary Treatment Alternatives Capital Costs

Alternative No.	Description	Capital Cost (Present Worth)	O&M Cost (20-Year Present Worth)	Total Cost (Present Worth)
1	Salsness Filtration [a]	$4,137,700	$320,000	$4,457,700
2	Primary Sedimentation [b]	$4,542,100	$293,000	$4,835,100

[a] *Assumes solids to be bagged and landfilled.*

[b] *Does not include costs for anaerobic digestion of primary solids.*

5.3.5 Recommendations

As part of the 20-year plan, primary treatment will likely not be implemented. Initial review indicates that removal of BOD from the influent could cause problems with the biological phosphorus removal process stability. Additionally, the capital expenditure and benefits to implement a primary treatment system are not warranted during the 20-year planning period.

5.3.6 Environmental

There are no environmental impacts associated with the recommended alternative.

5.4 Secondary BNR Treatment

5.4.1 Existing Secondary Treatment

The existing Secondary Treatment system at the Post Falls WRF was reviewed in Technical Memorandum No. 2. As discussed, the WRF has two secondary biological treatment trains. Train 1 consists of Oxidation Ditches No. 1-No. 4 and Clarifiers No. 1-No. 5. Train 2 consists of Oxidation Ditch No. 5 and Clarifiers No. 6 and No. 7. The trains can be operated independently, or the RAS from each train can be blended. The biological solids grown in the aeration basins are separated from the effluent by the secondary clarifiers and returned by the return activated sludge (RAS) pumps back to the anaerobic selector to be re-used in the treatment process. Excess biological solids are wasted from the system by the waste activated sludge (WAS) pumps. Both treatment trains are designed to remove BOD, TSS, ammonia, and phosphorus from the wastewater. Train 2 is also designed to remove nitrogen.

The purpose of this evaluation is to determine the appropriate secondary treatment system to meet the 20-year needs of the facility and expansion through build-out.

5.4.2 Discussion of Alternatives

The Post Falls WRF has several potential alternatives available for secondary treatment as the facility expands through the 20-year planning period and beyond. Each of these alternatives impacts the surrounding facility; some alternatives are more easily modified to blend and operate with the current facilities, while others are distinctly different secondary treatment systems. A cursory review was made to prioritize several treatment technologies for further refinement and evaluation. The cursory review revealed the following alternatives:

Alternative 1 - Existing Oxidation Ditch BNR

Expansion of the current BNR oxidation ditch facilities similar to Ditches 5 and 6, including anoxic, anaerobic basins selectors with secondary clarifiers.

Alternative 2 – Diffused Air Activated Sludge

Modification of the current oxidation ditches to activated sludge diffused aeration basins. The existing secondary clarifiers would be retained, with new clarifiers similar to Clarifiers No. 6 and No. 7.

Alternative 3 – Membrane Bioreactor (MBR)

Membrane bioreactor technology utilized membrane microfilters to separate mixed-liquor solids from the wastewater, discharging clarified permeate. Membrane bioreactors utilize diffused-air aeration basin technology similar to Alternative 2 for the base biological treatment processes.

Alternative 4 – PowerStream

The City is interested in emerging technologies, and selected PowerStream technology to be evaluated for secondary treatment. The City is interested in alternative technologies and wants to be abreast of the alternatives available as regulatory conditions change in the future.

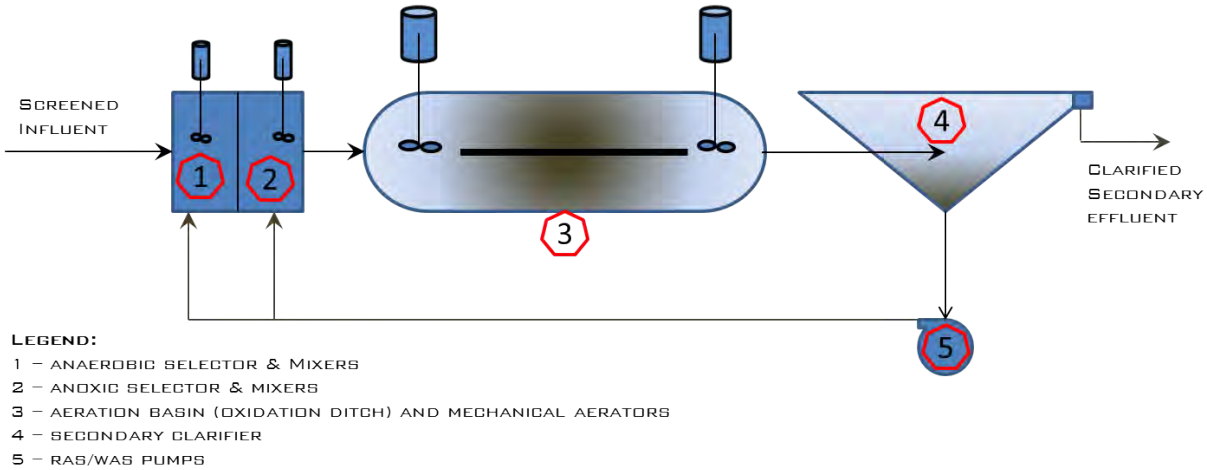
5.4.3 Discussion of Alternatives and Design Criteria

Each alternative was evaluated to determine preliminary process sizing, approximate layout of processes schematically, and interaction of components with existing processes.

Alternative 1 – Existing Oxidation Ditch BNR

The existing oxidation ditch (BNR) process includes anaerobic selectors, anoxic selectors, and aerobic basins. The current ditches 1-4 have a hydraulic capacity of approximately 2.59 mgd. A process schematic of the current facilities (Oxidation Ditches No. 5 and No. 6) is shown on **Figure 5-5**. With the current ditch 5 (and 6 – no equipment) expansion, each ditch is capable of treating 1.41 mgd capacity with the associated clarifier. Clarifier No. 8 would need to be added to provide overall clarifier reliability. Population of the equipment in ditch 6 will increase the firm capacity of the facility to 5.2 mgd. This expanded system will meet the projected 5.2 mgd 20-year projected flow.

Figure 5-5 – Oxidation Ditch Process Schematic



A summary of the overall design criteria for improvements to meet the 20-year projected flow is shown in **Table 5-7**.

Table 5-7 – Oxidation Ditch Improvements Design Criteria

Item	Approximate Hydraulic Capacity	Expected Secondary Effluent Characteristics	Comments
Oxidation Ditches 1-4	2.59 MGD	BOD: <30 mg/L TSS: <30 mg/L Total N: <1 mg/L Total P: <1.0 mg/L	Currently, Ditches 1-4 provide BPR but not full BNR. Add mixers and gates to allow phased operation for nitrate removal.
Oxidation Ditches 5-6	1.41 MGD each ditch	BOD: same TSS: same Total N: <1 mg/L Total P: <1.0 mg/L	Ditches 5 and 6 designed for full BNR. Ditch 6 - Install aeration, mixing and pumping mechanical equipment to provide capacity through 20-year planning period.

Alternative 2 – Diffused Air Activated Sludge

Diffused air aeration of activated sludge uses compressed air blowers to force air through porous diffusers, creating micro-air bubbles that travel upward through the wastewater contacting and transferring oxygen to the wastewater mixed liquor and maintaining mixing in the basins. The current facilities utilize activated sludge oxidation ditches in a "race-track" configuration with a typical sidewater depth of 15 feet in the aeration basins. For diffused-air activated sludge, basin depths are typically deeper (18 to 22 feet) to increase the efficiency of the oxygen transfer to the wastewater. Preliminary sizing of a diffused air activated sludge BNR facility is shown in **Table 5-8**. Preliminary sizing indicates the majority of the existing aeration basin volume (75%+) would need to be converted to diffused-air aeration basins to provide adequate volume for nitrification/denitrification to occur. This would allow both "halves" of the plant (Trains 1 and 2) to be capable of full biological nutrient removal. Additionally, optimum diffuser efficiency would not be realized unless the basins were modified to increase the overall sidewater depth. A schematic is shown in Figure 5-6.

Figure 5-6 - Diffused Air Activated Sludge Process Schematic

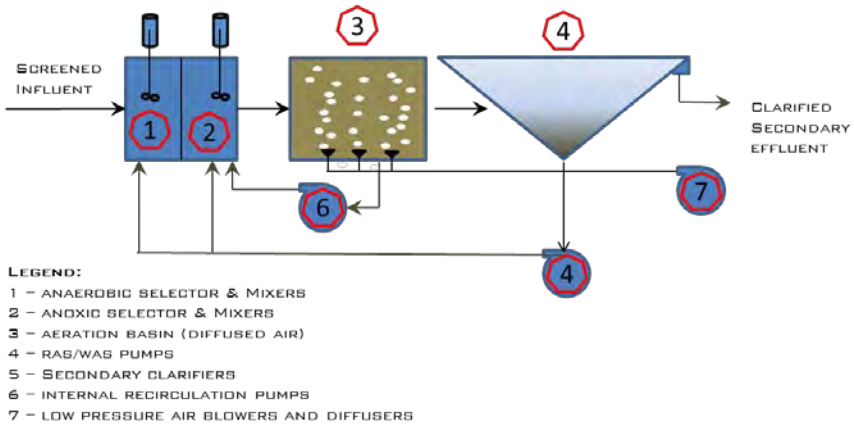


Table 5-8 – Diffused-Air Aeration Alternative

Item	Approximate Hydraulic Capacity	Expected Secondary Effluent Characteristics	Comments
Oxidation Ditches 1-4 Converted to Diffused Air Aeration Basins	2.59 MGD total *(converted)*	BOD: <30 mg/L TSS: <30 mg/L Total N: < 1 mg/L Total P: < 1.0 mg/L	Improvements would require: • Increase in tank sidewall height and partition tank to utilize 75% of current volume (i.e., Ditches 3, 4, 5 and 6 would need to be converted; Ditches 1 and 2 would not be used) • Flow draw-off weirs for plug-flow reactor (not circular flow) • Installation of aeration diffuser and air distribution piping • Building to house blowers
Oxidation Ditches 5-6 Converted to Diffused Air Aeration Basins	1.41 MGD each *(converted)*	BOD: same TSS: same Total N: < 1 mg/L Total P: < 1.0 mg/L	

This alternative would provide a significant reduction in overall plant footprint (i.e., basin sizing). Further, modifications to convert the aeration systems would be significant, with additional facilities being necessary for housing low-pressure blower aeration equipment. In general, the overall process schematic is similar to the oxidation ditch process, but with diffused-air aeration basins. Similar to Alternative 1, Clarifier No. 8 would need to be added for overall clarifier reliability.

Alternative 3 – Membrane Bioreactor

The technologies most commonly used for performing secondary treatment of municipal wastewater rely on microorganisms suspended in the wastewater to treat it. Although these technologies work well in many situations, they have several drawbacks, including the difficulty of growing the right types of microorganisms and the physical requirement of a large site. The use of microfiltration membrane bioreactors (MBRs), a technology that has become increasingly used in the past 10 years, overcomes many of the limitations of conventional systems. These systems have the advantage of combining a suspended growth biological reactor with solids removal via filtration. The membranes can be designed for and operated in small spaces and with high removal efficiency of contaminants such as nitrogen, phosphorus, bacteria, bio-chemical oxygen demand, and total suspended solids. The membrane filtration system in effect can replace the secondary clarifier and sand filters in a typical activated sludge treatment system. Membrane filtration allows a higher biomass concentration to be maintained, thereby allowing smaller bioreactors to be used.

For new installations, the use of MBR systems allows for higher wastewater flow or improved treatment performance in a smaller space than a conventional design. Historically, membranes have been used for smaller-flow systems due to the high capital cost of the equipment and high operation and maintenance (O&M) costs. Today, however, they are receiving increased use in larger systems. High-quality effluent produced by MBRs makes them particularly applicable to reuse applications and for surface water discharge applications requiring extensive nutrient (nitrogen and phosphorus) removal such as the requirements of the Post Falls WRF.

The addition of membrane bioreactor equipment changes the system considerably because a much higher mixed-liquor concentration (8,000 to 12,000 mg/L) can be maintained in the aerobic basins, reducing the overall aeration basin required volume by approximately 50 percent. Further, the secondary clarifiers are not used and replaced by membrane equipment to separate solids from the wastewater. This would free up the secondary clarifiers to potentially be re-purposed for tertiary sedimentation for further phosphorus removal.

The addition of membrane equipment requires several significant modifications to the existing process, including:

- Pumping and screening of mixed-liquor feed to membranes
- Construction of membrane tanks and membrane removal equipment
- Permeate storage (for backpulsing membranes)
- Membrane cleaning and supporting chemical feed equipment
- Internal recirculation pumping
- Partitioning of aeration basins for optimized residence time in anoxic, anaerobic, and aerobic cells
- All modifications identified previously for diffused-air aeration

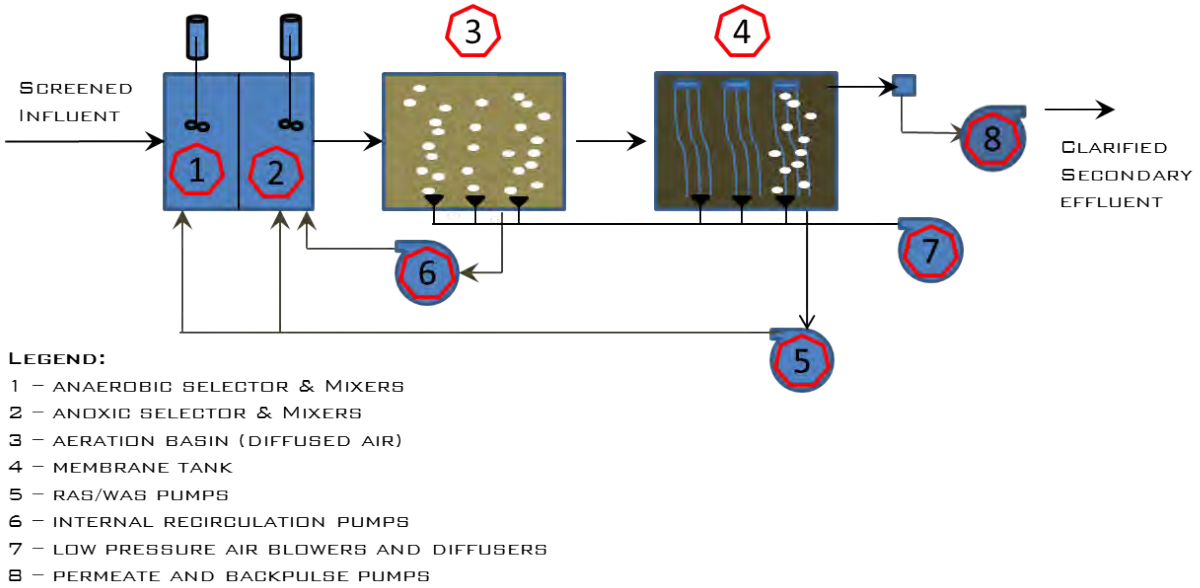
The most significant benefits from these system improvements are:

- Decreased overall secondary system footprint
- Improved secondary effluent water quality (reduced turbidity), but without much improvement to total phosphorus and total nitrogen
- Allows secondary clarifiers to be re-purposed for tertiary sedimentation
- Allows Oxidation Ditches 1-4 to potentially be re-configured for influent equalization

As with the diffused-air aeration basin alternative, the MBR would require significant capital expenditure to make the necessary modifications with only marginal improvement to the overall plant performance and secondary treatment reliability.

A process schematic of a typical diffused air MBR Activated Sludge process is shown in **Figure 5-7**.

Figure 5-7 – Diffused Air MBR Activated Sludge Process Schematic



Alternative 4 – PowerStream

PowerStream is a proprietary system based on Isolated Power (IP) technology. IP includes a fine screen to remove solids from the influent flow stream for future pyrolysis (thermochemical decomposition of organic material at elevated temperatures without the participation of oxygen). The byproduct of pyrolysis produces Syngas that can be harnessed for combustion (ultimately power generation). The liquid wastestream uses electrolysis to break down the waste and produces H_20_2-HOH (sometimes called browns gas) that can also be harnessed to run a generator for excess electricity sale. Additionally, the H_20_2-HOH can act as an oxidant for destruction of organics and as a disinfectant.

The alternative technology has been around for some time and is currently under worldwide attempts for duplication of HOH production to fuel turbine/generators (and automobiles). Recently, the PowerStream technology has been represented by Xogen Technologies, a Canadian-based energy company. Their system breaks down the influent sewage by electrolysis as discussed. Xogen does not propose major energy offset by the HOH or H and O_2 from the process but do acknowledge that it is a valuable byproduct that may potentially be harnessed and used. Another variant of the process is using a zinc oxide catalyst to increase the production of HOH and H_2O_2.

Currently, there are no prototypes, and the technology would be considered "embryonic" in that the technology cannot be verified or supported by a full-scale case study. However, as the technology develops, it may be of interest in the future when evaluating oxidation of PCBs and alternative disinfection. At this point, this technology has not yet been vetted adequately to recommend as a major treatment process. The City should continue to monitor the process as this and similar alternative technologies develop further.

5.4.4 Cost

Preliminary opinions of capital and operating costs for each secondary treatment alternative are presented in **Table 5-9**. Operational costs were assumed utilizing average 20-year projected flow. Detailed cost opinions for each alternative are included in **Appendix 5-C**.

Table 5-9 – Secondary Treatment Alternative Costs

Alternative No.	Description	Capital Cost (Present Worth)	O&M Cost (20-Year Present Worth)	Total Cost (Present Worth)
1	Oxidation Ditch	$3,730,000	$3,183,000	$6,913,000
2	Diffused-Air Aeration	$6,500,000	$4,125,000	$10,625,000
3	Membrane Bioreactor	$25,800,000 [a]	$6,531,000	$32,331,000
4	*PowerStream*	*Not Currently Viable*	*NA*	*NA*

[a] *MBR option allows secondary clarifiers to be re-purposed for tertiary treatment, and oxidation ditches 1-4 to be used for equalization storage. "Salvage value" of the tanks and equipment for these benefits are not specifically accounted-for in this cost evaluation.*

5.4.5 Recommendations

Secondary treatment will remain the same as current operation. Current oxidation ditch capacity will need expanded into biological Train 6 ditch to accommodate the 20-growth with the addition of Clarifier No. 8 to meet reliability requirements. Expansion beyond 5.2 mgd is expected to continue with additional oxidation ditches to the east.

5.4.6 Environmental

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Land Use: No anticipated impact. Land has already been planned for WRF expansion. (potential long-term impact)
- Impacts to Cultural Resources: No anticipated impact.
- Impacts to Flora and Fauna: Temporary impacts associated with site disturbance which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Air Quality: Temporary impacts associated with construction emissions which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: Increased energy consumption with the expansion of treatment (long-term impact)
- Impacts to Public Health: *Positive*, improved ability to meet effluent requirements for discharge to the river (long-term impact)

5.5 Tertiary Treatment

5.5.1 Tertiary Treatment Requirements

Tertiary treatment will likely be required based on future effluent limitations. Tertiary treatment options are based on seasonal average effluent total phosphorus limitations. The total effluent phosphorus limit is expected to be a seasonal average mass-loading basis. Because of this, as the wastewater flow rate increases, the actual effluent concentration required to be achieved will decrease. The total mass-based seasonal load is expected to be 3.19 lb/day based on a February 1 to through October 31 discharge season at a design flow of 7.65 mgd. When adjusted based on average plant flow rate the average daily concentration is determined. **Table 5-10** shows likely phasing and required seasonal average concentration limits.

Table 5-10 – Seasonal Average Effluent Phosphorus Concentration Limits

Phase	Design Flow (seasonal average)	Waste Load Allocation	Seasonal Average Concentration μg/L
1	4 mgd	3.19 lb/day	95 μg/L
2	5 mgd	3.19 lb/day	75 μg/L
Ultimate	18 mgd	3.19 lb/day	21 μg/L

As discussed previously, one of the major elements in sizing of tertiary treatment units is hydraulic capacity. As discussed in previous sections, influent flow equalization will be added to attenuate peak influent flows, reducing peak flows down to essentially "peak day" flow rates. The expected design flow rates for each of the project phases are shown below in **Table 5-11**.

Table 5-11 – Tertiary Treatment Design Flows

Phase	Design Flow (seasonal average)	Peak Flow (Max Day) [a]
1	4 mgd	6.1 mgd
2	5 mgd	7.7 mgd
Ultimate	18 mgd	27.5 mgd

[a] *Peaking factor of 1.53 per TM3, Table 3-2*

5.5.2 Tertiary Treatment Alternatives

Next Level Treatment (NLT) Alternatives for removing phosphorus to very low levels has been evaluated in a detailed "Technical Memorandum No. 8 -Phosphorus Next Level Treatment" by Esvelt Environmental Engineering (EEE) and is included in **Appendix 5-D**. This evaluation uses information from several adjacent communities that have performed piloting and full-scale evaluations of the ability of various technologies to reduce phosphorus to the target levels identified. The information herein is a summary of the results from the EEE TM. The reader is directed to the TM 8 for detailed discussion of the NLT evaluation.

To meet the target effluent levels, many of the proposed systems are using a single-stage approach (essentially a single treatment technology), whereas other systems may require a dual-stage approach (two treatment technologies in series) to meet the lower phosphorus limits. As discussed in TM No. 8 (**Appendix 5-D**), AlgEvolve was not considered as a final treatment alternative due to lack of available cost and sizing information.

Table 5-12 shows the likely treatment technologies required for the various treatment phases and effluent limitations.

Table 5-12 – Tertiary Treatment Systems

	Phase 1 (4 mgd, 0.095 mg/L)	Phase 2 (5 mgd, 0.075 mg/L)	Ultimate (18 mgd, 0.021 mg/L)
Single Stage Alternatives	• Membrane Filtration • Dual Media Downflow Filtration • AlgaEvolve [a]	• Membrane Filtration • AlgaEvolve[1]	• None identified to consistently meet effluent standards.
Dual Stage Alternatives	• Sedimentation and Membrane Filtration • Sedimentation and CBUF • Sedimentation and Dual Media Downflow Filtration • CBUF and CBUF	• Sedimentation and Membrane Filtration • Sedimentation and CBUF • Sedimentation and Dual Media Downflow Filtration • CBUF and CBUF	• Sedimentation and Membrane Filtration

[a] *AlgEvolve is listed as a single stage system, but has multiple stages including filtration, Algae System, and membrane separation.*

5.5.3 Preliminary Process Sizing and Capital Costs

Each of the alternatives identified previously was evaluated for capital and O&M cost and approximate facility size. Specific details of the evaluation are included in **Appendix 5-D.** A copy of the cost evaluation shown in Table 8 from TM 8 is re-presented below as **Table 5-13**.

Table 5-13 – Tertiary Treatment System Preliminary Sizing and Costs

	Final Alternatives		
	Dual-Media Downflow	CBUF-CBUF (2-pass)	Tertiary Membrane Filtration
Initial 4 mgd Implementation Project Cost	$14.1 Million	$18.3 Million	$15.4 Million
O&M cost difference (annual) at 4 mgd	-	-	+$35,000 - +$45,000 per year more
Expansion to 5 mgd requirements	New coag/floc/settling units ahead of filters	Expand by adding more cells	Expand by adding more modules
Total cost of 5 mgd	$23.5 Million	$22 Million	$19.2 Million
O&M cost difference (annual) at5 mgd	+$30,000 to +$40,000 per year more	+$30,000 to +$40,000 per year more	-
Expected O&M at 5 mgd (excluding solids handling)	$575,000	Assumed comparable to Dual-Media Downflow at $575,000	$554,000

As discussed in TM 8 (**Appendix 5-D**), the cost comparison at the initial 4-mgd project favors the dual-media downflow filter alternative. At the 5-mgd level is the tertiary membrane filter has more favorable economics, due to the ability to expand without adding a process, and lower expected chemical costs.

The tertiary membrane alternative has the distinct advantage of permitting direct expansion to occur by adding to the previously constructed facilities, without the need to implement yet another technology. This would be true at to the 5 mgd average flow and likely out to the 8-mgd range at least. Thus, operational experience will be directly applicable to the design and operation of future expansions.

These future expansion considerations, along with the cost comparison for future facilities offset the higher cost of the tertiary membrane system for the initial implementation project.

5.5.4 Metals and Toxics

The Spokane River in Idaho is listed as impaired for cadmium, lead, and zinc under Subsection 303(d) of the Clean Water Act, with a high priority for improvement activities. Consequently, current draft NPDES Permit discussions with IDEQ and EPA indicate they will likely require an effluent wasteload concentration and mass limit as defined by the 1999 NPDES Permit conditions for lead and zinc. They will also limit cadmium through estimated performance for cadmium removals until a TMDL can be developed for the Spokane River. While Idaho's water quality standards appear to create an end-of-pipe concentration limit that would not require a mass load restriction, IDEQ interprets IDAPA 58.01.02.055.04 to require a TMDL or equivalent process to be in place before a change to the 1999 permit levels could be allowed. The WDOE's downstream TMDL has identified that the toxicity conditions created by the metals are due to a concentration-based limitation and will be regulated as an "end-of-pipe" concentration standard. However, it is not considered to be an equivalent process by IDEQ. HARSB, the City of Post Falls, and their attorney have argued against this interpretation by IDEQ, as discussed in a memorandum to IDEQ dated February 29, 2012 (presented previously in **Appendix 4-A**).

Table 5-14 presents a review of past metals data to determine the likelihood that the current effluent will be capable of meeting IDEQ's interpretation and subsequent effluent discharge standards. A total of approximately 141 days of data exist since 2005. This historic concentration data was used, and mass loads

were calculated at current average flow (2.6 mgd) and projected 10-year and 20-year average flows (4 mgd and 5.2 mgd, respectively) from the concentration data. The concentrations and mass loads were then compared to the various permit conditions presented in the current draft 401 Water Quality Certification, as presented in TM No. 4. The resulting potential number of violations determined under each permit condition is presented in **Table 5-14**.

Table 5-14 – Metals Data and Likely Permit Violations under Proposed Permit

	Draft Part 401 Water Quality Certification Limits/Potential Violations			
CADMIUM	*Average Monthly*	*Average Weekly*	*Average Monthly*	*Average Weekly*
	0.0078 lb/day	*0.011 lb/day*	*No Concentration Based Limit*	*No Concentration Based Limit*
Cadmium (2.6 MGD)	1	1	-	-
Cadmium (4.0 MGD)	3	1	-	-
Cadmium (5.2 MGD)	6	3	-	-
LEAD	*Average Monthly*	*Max Daily*	*Average Monthly*	*Max Daily*
	0.059 lb/day	*0.11 lb/day*	*2.05 ug/L*	*3.79 ug/L*
Lead (2.6 MGD)	0	0	0	0
Lead (4.0 MGD)	0	0	0	0
Lead (5.2 MGD)	0	0	0	0
ZINC	*Average Monthly*	*Max Daily*	*Average Monthly*	*Max Daily*
	2.45 lb/day	*3.34 lb/day*	*84.3 ug/L*	*115 ug/L*
Zinc (2.6 MGD)	0	0	1	0
Zinc (4.0 MGD)	4	0	1	0
Zinc (5.2 MGD)	52	1	1	0

From this analysis, it can be seen that under current observed WWTP flows and historic metals concentrations, cadmium and zinc will likely violate the current proposed permit conditions occasionally and will increase as plant flows increase. Zinc violations will increase dramatically to nearly 37 percent of the time (52 violations from 141 data points) by the end of the 20-year planning period.

Proposed treatment steps for reducing total phosphorus and $CBOD_5$ from Post Falls WRF effluent will remove very little lead, cadmium, and zinc. Pilot studies at the City of Spokane's Riverside Park Water Reclamation Facility demonstrated approximately 20 percent removal for lead, 8 percent for zinc, and negligible removal for cadmium (Esvelt, 2012). Therefore, without a TMDL allowing the City of Post Falls to comply with a water-quality-based concentration standard, an additional “quaternary” treatment process may be required.

Pilot testing information from past studies indicates that metals can be reduced from the current low levels in HARSB effluent by increasing pH to a level of 10+ to shift metals from a soluble form to a precipitate. An independent filtration process would then be required to remove the precipitate (J-U-B, 2006).

In contrast, previous discussions describe how phosphorus requires a much lower optimal pH (5.5 to 6.5) for coagulation and settling or filtration. Because of these competing interests, the ability to remove metals in conjunction with simultaneous low-level phosphorus treatment will be a critical outcome required by the anticipated pilot studies. Expected costs for a quaternary pH adjustment/filtration process for metals removal

are expected to range from $4.50 to $5.50 per gallon at average flows for capital costs ($23.4 M to $28.6 M), with annual operating and maintenance expenses to range from 5 percent to 10 percent of capital costs (J-U-B, 2006). As the 2006 metals pilot work was for removal of metals from a secondary lagoon effluent, a quaternary application downstream of tertiary filtration may reduce capital costs due to improved water quality at the start of the unit processes. Those questions should be addressed as part of any proposed pilot testing for the City of Post Falls.

It is crucial for the Idaho dischargers to stay actively involved in working with IDEQ to address this issue. This Facility Plan currently anticipates that the water quality standards for the Spokane River can be addressed through coordination and negotiation with IDEQ and without an expensive quaternary process that would appear to provide no demonstrateable benefit to water quality or the environment.

As discussed in TM #4, concentrations of polychlorinated biphenyls (PCBs), dioxins, and polybrominated diphenyl ethers (PBDE) are also being considered for TMDLs by the State of Washington and/or the Spokane Tribe of Indians. Pilot studies at the City of Spokane and a literature review indicate that these compounds are reduced by 95 percent or higher across full tertiary treatment facilities. It is unclear what other measures may be required to achieve Idaho or downstream water quality standards.

5.5.5 Recommendations and Pilot Study

As discussed in TM 8 (**Appendix 5-D**)**, t**he conclusions presented above favor tertiary membrane filtration for effluent phosphorus polishing.

It is recommended the City of Post Falls incorporate the following into the preparation of the Phosphorus Management Plan that will be prepared in compliance with City's NPDES Permit:

1. Include budgeting for tertiary phosphorus removal in the City's Facility Planning.
2. Include piloting of tertiary membrane filter in the City's Phosphorus Management Plan. Budgeting should be based on soliciting proposals from suitable manufacturers for piloting. Piloting should ideally be performed during the low-phosphorus removal season, including the early part of the season (February), when cooler wastewater temperatures may make effective removal most challenging. The piloting should also overlap, if possible, periods during which EBPR transitions through more and less stable phases.

   The purpose of the piloting would be as follows:

   a. Confirm capability to meet target TP concentrations at the initial implementation phase, as well as at future phases of expansion, when effluent TP concentrations will need to be lower to meet the WLA.
   b. Provide verification of operational parameters that can influent design sizing, including chemical feed capacity for coagulant as well as alkalinity, and to improve the sludge production estimates for use in sizing solids handling improvements.
   c. Determine and review impacts of alternate coagulants and dosing.
   d. One of the primary focuses of the tertiary pilot study will be to identify the ability of the piloted equipment to remove heavy metals, including cadmium, lead, and zinc. Current draft NPDES Permit discussions with IDEQ and EPA indicate a likely requirement for an effluent wasteload concentration and mass limit as defined by the 1999 NPDES Permit conditions for lead and zinc and by estimated performance for cadmium removals until a TMDL can be developed for the

Spokane River. While Idaho's water quality standards appear to create an end-of-pipe concentration limit that would not require a mass load restriction, IDEQ interprets IDAPA 58.01.02.055.04 to require a TMDL or equivalent process to be in place before a change to the 1999 permit levels could be allowed. The WDOE's downstream TMDL has identified that the toxicity conditions created by the metals are due to a concentration-based limitation and will be regulated as an "end-of-pipe" concentration standard but it is not considered to be an equivalent process by IDEQ. Without a TMDL and concentration standard, an additional "quaternary" treatment process may be required. Pilot testing information from past studies indicates that metals can be removed to low levels by increasing pH to a level of 10+ to shift metals from a soluble form to a precipitate. An independent filtration process would then be required to remove the precipitate (J-U-B, 2004). In contrast, previous discussions describe how phosphorus requires a much lower optimal pH (5.5 to 6.5) for precipitation and settling or filtration. Because of these competing interests, the ability to remove metals in conjunction with simultaneous low level phosphorus treatment will be a critical outcome required by the anticipated pilot studies. It is crucial for the Idaho dischargers to stay actively involved in working with IDEQ to address this issue. This Facility Plan currently anticipates that the water quality standards for the Spokane River can be addressed without an additional and expensive quaternary process.

5.5.6 Environmental

The primary environmental concerns with the recommended improvements are related to water quality and energy. If the recommended improvements are not added, continued addition of oxygen-demanding pollutants will continue to degrade the downstream portions of the Spokane River (Long-Term Impact)

The addition of the improvements will require significant additional energy as well as imported chemicals for coagulation and pH/alkalinity adjustment to be added. As the levels of treatment being required are very stringent, the overall lifecycle cost for the additional power and chemical will be refined during pilot testing to provide improved cost opinions and more accurately define the recommended treatment system. Long-Term impacts are expected to be Positive with improved long term water quality considerations.

5.6 Disinfection

The Post Falls WRF currently utilizes a UV light disinfection system as their primary disinfection mechanism. UV disinfection is a process that inactivates microorganisms by causing photochemical damage to their DNA and RNA, rendering them unable to reproduce. UV light is electromagnetic energy generated by mercury vapor lamps. The target UV wavelength range to produce germicidal effects is between 250 and 270 nm, with a 254 nm target wavelength. The effectiveness of the UV depends primarily on the water quality that is measured through ultraviolet transmittance (UVT). Generally, higher quality effluent has a higher UVT.

The plant is also configured with a backup gas chlorine disinfection system with sulfur dioxide dechlorination feed system. The backup chlorination/dechlorination system is utilized when the UV system must be completely taken off line for cleaning and maintenance. The alternatives discussed herein will evaluate disinfection options and methods to correct current system deficiencies, evaluate potential future disinfection alternatives for varying final effluent disposal requirements (river discharge versus reuse), and options for providing system redundancy.

5.6.1 Existing UV System

The treated effluent is disinfected with UV light using low-pressure/high-output UV lamps emitting UV radiation in the 254 nm range. The WRF system has parallel channels of vertical, in-stream modules. Both channels are fed by a single UV controller. The UV modules are set inside a modified chlorine contact chamber. A steel canopy covers the installation. The system is configured such that a single module can be removed for cleaning and maintenance of equipment (10.5 mgd capacity). The primary limitation, however, is that in order to clean the influent channel to the UV areas, the UV system must be taken off line and replaced with a secondary disinfection method. Historically, this has been done by adding chlorine gas and sulfur dioxide dechlorination. During cleaning, the backup system used and flow is routed through the western two contact chambers (buried 4-foot-diameter pipes). Each chamber has a contact volume of 18,800 gallons. The peak capacity while maintaining a minimum of 15 minutes of contact time is approximately 3.6 mgd. Historic records indicate that a dose of 2.3 mg/L or lower has typically been adequate during these conditions to maintain adequate kill. Alternatively, higher chlorine dose could be used at higher flows with shorter contact time to maintain kill, but the effectiveness begins to diminish and is not recommended. Typical chemical disinfection systems would have the capability of dosing at rates of up to 6 mg/L for activated sludge facilities to accommodate system upsets, including nitrite blocking and ammonia breakthrough.

Sodium bisulfite has been dosed during these periods of UV maintenance at a rate of 0.8 mg/L or less to adequately remove residual chlorine. Assuming this historic dose rate of 0.8 mg/L, the peak capacity of the current sulfonator equipment is approximately 12 mgd.

As discussed in TM 2, the current UV system capacity is as follows:

UV Channels	Infilco Degremont, Inc. (IDI) 8 (two parallel trains of 4) In-Channel vertical tube	Dosage at 13.8 mgd peak hour flow = 35.5 mWs/cm^2 • *6.0 mgd average-day flow assuming a peaking factor of 2.3* • *Assumes all modules operating* Dosage at 10.5 mgd peak hour flow = 35.0 mWs/cm^2 • *4.56 mgd average-day flow assuming a peaking factor of 2.3* • *Assumes one redundant module out of service in each channel since proportional flow splitting control is not possible.*	• Influent TSS: <= 30 mg/l • Ultraviolet transmittance at 254 nm: >65% • Max 30 day geometric mean: 50 mpn/100 ml • Max avg weekly fecal coliform: 200 mpn/100 ml • Max daily fecal coliform count: 500 mpn/100 ml • No more than 10% of the samples shall exceed a fecal coliform count of 200 mpn/100 ml over a 30-day period

From TM 2, several system deficiencies and limitations were identified, including:

- The plant has had approximately five maximum daily fecal coliform violations while using the UV system. At the times of the violations, the plant was not experiencing an upset, and the corresponding effluent total suspended solids were always low. The violations seem to be random, and the operators have not been able to correlate them to any cause. There could be many potential causes, but it seems most likely they are caused by a particulate collected in the sample. If this is the cause, effluent filtration would be required to prevent it.
- The UV structure is an open-air canopy structure. Windblown debris and birds nesting in the area are also potential causes of fecal coliform violations. Modification to the structure to prevent birds and debris from contaminating the channel areas would potentially help mitigate these coliform violations.
- The backup chlorine gas disinfection and sulfur dioxide dechlorination system has limited capacity based on chlorine contact chamber volume and feed equipment capacity. The system equipment, is also aging and in need of replacement, or another backup system needs to be provided.
- Influent UV feed channel (old chlorine contact channel) must be taken off line periodically for cleaning.

5.6.2 Disinfection Alternatives

Disinfection systems are utilized to inactivate or kill any pathogens in the effluent to acceptable levels prior to disposal. The type of disinfection system and method of disinfection/inactivation depends primarily on cost and the level of disinfection required. Because of this, the discussion of disinfection is often blended with effluent disposal requirements due to the interaction of the two processes.

The Post Falls WRF currently disinfects and disposes of effluent in the Spokane River. However, additional, more stringent discharge limitations may force all or a portion of the effluent to be sent to a water reclamation and reuse system. Because of the varying disposal methods, the City may end up pursuing changes to the disinfection system that may be required; several alternatives and associated budgetary costs have been evaluated. In general, the City plans to continue using UV disinfection (or some variation). Additionally, it has been assumed that an independent backup disinfection system should be provided at the facility. A summary of the alternatives to meet these criteria were evaluated as follows:

1. **River Discharge Effluent Disposal (Modify Existing System)**
   - UV disinfection at current dose and modification to current in-channel system, including required improvements to meet future capacity requirements and improvements to mitigate current deficiencies. Analysis includes *either:*
     i. Improvements to provide complete parallel UV redundancy (control panels, power feed, etc.), or
     ii. Backup disinfection system (chlorination/dechlorination)
2. **Effluent Reuse Disposal (Class A Reuse)**
   - UV disinfection at increased dose with modifications to existing UV system to mitigate current deficiencies and improvements as required meeting future capacity requirements. Analysis includes *either:*
     i. Improvements to provide complete parallel UV redundancy (control panels, power feed, etc.)
     ii. Backup disinfection system (chlorination/dechlorination) as required to meet river discharge requirements in the event of a UV system failure (same system as 1.ii,above).

5.6.3 Discussion of Alternatives

In the subsequent sections, each of the disinfection system alternatives is evaluated. Preliminary sizing and hydraulic calculations have been developed to determine budgetary opinions of probable cost for each system.

5.6.4 Alternative 1 – River Discharge Effluent Disposal (Modify Existing System)

5.6.4.1 Discussion

To mitigate current system deficiencies and upgrade the UV system to the projected flows, the following items will need to be addressed:

- **Capacity and Dose:**
  - Modify the UV channels and install additional modules as necessary in each channel to provide firm capacity to meet peak anticipated hydraulic conditions at a UV dose of 30 mJ/cm^2. The design flow rate is typically peak hour flow; however, it is anticipated that the City will likely pursue flow equalization, allowing the hydraulic design flow rate for the disinfection system to be reduced to an approximate "peak day" observed flow rate of 8.0 mgd in 2031.
  - UV transmittance analyzers should also be added to more accurately control UV dose and energy consumption.
- **Site Issues:**
  - Modify the current structure by adding walls to mitigate windblown debris and issues with birds nesting; or relocate the system.
  - Eliminate the feed channel with a piped bypass to eliminate the need for channel maintenance and UV shutdown; or relocate the system.
- **Redundancy/Reliability:**
  - The UV system was analyzed to determine what modifications would be required for the current control panels such that each UV channel is fed by independent UV control panels. The intent of this modification is to provide complete system redundancy, allowing one-half of the system to be taken off line. Additionally, additional UV modules will be required in each channel to meet peak flow requirements.
  - If it is deemed that it is not cost-effective to provide complete parallel redundant UV systems, an independent backup chlorination/dechlorination similar to the current system will need to be added. It is unlikely that the current chlorination/dechlorination system could be utilized due to its age and system deficiencies; a new system will be evaluated for the purpose of this study. Cost opinions have been developed for:
    - New liquid sodium hypochlorite equipment, or
    - New calcium hypochlorite tablet chlorination, and
    - Additional contact chamber volume to meet peak hydraulic capacity at current historic dose and minimum of 15 minutes contact time.
    - The current sulfur dioxide system appears to be adequate for future anticipated conditions. Sizing for a comparable liquid sodium bisulfite (SBS) system has been provided, should the City decide to abandon the current sulfur dioxide system. If SBS is pursued, more detailed

costs for storage and feed systems will need to be evaluated but in general will be higher capital and O&M cost.

  - Chlorine gas was not evaluated, as the required volumes would require the use of one-ton cylinders. Due to new EPA regulatory and risk management requirements, it is unlikely that gas chlorination would be a viable alternative.

- If the City pursues tertiary membrane filtration (TMF) for phosphorus removal, most TMF systems utilize liquid chlorine (sodium hypochlorite) systems for chemical cleaning of the membranes. If TMF is pursued, there may be opportunities to reduce capital costs by increasing the hypochlorite storage capacity beyond that required for TMF and provide additional feed pumps to provide redundant disinfection capacity.

5.6.4.2 Design Criteria

Design criteria for the required improvements for Alternative No. 1 are shown in **Table 5-15**.

Table 5-15 – Alternate 1-River Discharge Disinfection Design Criteria

Item	Design Criteria Parameter
UV System (current system)	
Configuration	2 Channels
Modules Required Per Channel	4 (Assume firm capacity achieved with one module removed from each channel) – *No change to current configuration required*
UV Dose and Design Flow Rate	Capacity and Dosage at 10.3 mgd peak flow = 35.5 mWs/cm^2 • Capacity is in excess of 8.0 mgd peak day capacity (assumes plant flow is equalized)
Target Effluent Fecal Coliform	< 100 CFU/100ml (weekly)
Additional modifications to provide fully redundant UV System	Additional UV module control panel (independent controller for each channel)
Secondary Disinfection System (Redundant)	
Disinfection (Capacity Required for Various Chemicals)	
Calcium Hypochlorite (tablet)	400 ppd free chlorine at 6 mg/L dose at 8.0 mgd (peak day)
Liquid (Sodium Hypochlorite 12.5%)	381 gpd at 6 mg/L dose at 8.0 mgd (peak day)
Additional Chlorine Contact Chamber Volume Required	Total volume of 50,000 additional gallons
Dechlorination	
Gas (Chlorine Gas)	72.3 ppd at 1.2 mg/L total chlorine residual (1.5 factor of safety) at 8.0 mgd (peak day) (2 bottles on line with maximum draw-off at 40 ppd per bottle Existing system assumed to be retained *(no modifications)*
Liquid (Sodium Bisulfite 38%)	29.9 gpd at 1.6 mg/L total chlorine residual at 8.0 mgd (peak day)

5.6.4.2 Layout Alternatives

The design criteria above were reviewed with the current system deficiencies and current layout to develop alternatives that are feasible modifications to the current system, and alternatives that would significantly modify the current configuration but allow for more uniform future expansion of the system. Additionally, tertiary filtration is likely to be implemented and secondary effluent will need to be routed to a "filter feed pump station".

The four system configurations that were developed are as follows:

Layout Option 1 – Modify Existing System (UV with backup chlor/dechlor)

- Modify existing UV structure (enclose building)
- Additional chlorine contact chamber volume (total volume of 50,000 additional gallons)
- New disinfectant chemical feed system (tablet calcium hypochlorite system assumed for budgeting)

Layout Option 2 - Modify Existing System (UV with parallel UV backup)

- Modify existing UV structure (enclose building)
- Modify current UV system to mitigate influent channel maintenance issues (bypass pipeline, and influent feed channel structure/box)
- Additional parallel UV control panel (fully redundant control systems)
- Provide tablet chorine feed equipment but no contact chamber

Layout Option 3 – Relocate UV System (full UV redundancy)

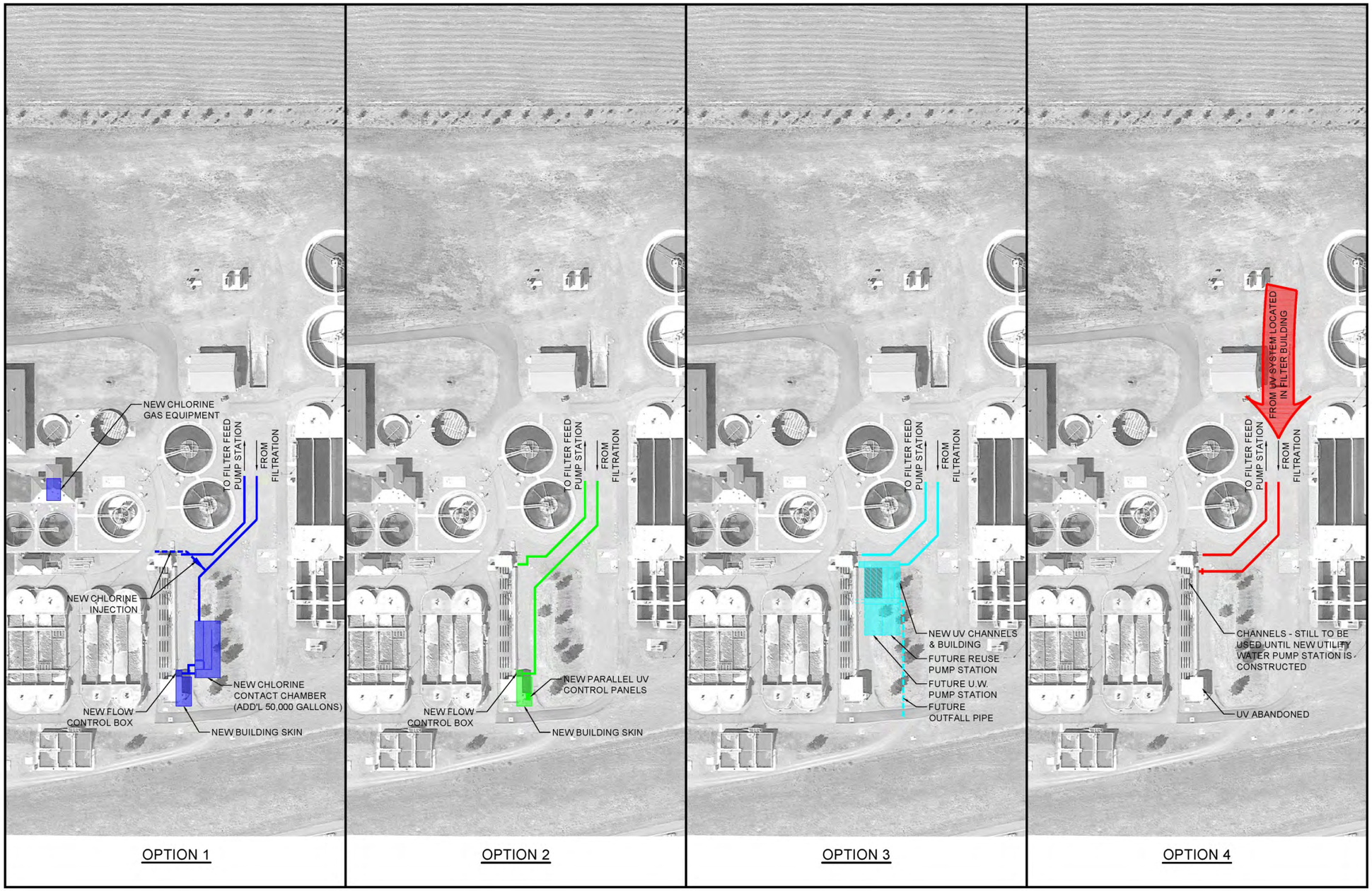
- Construct new UV system channels:
  - New inlet feed channel and outlet splitter/control box.
  - Re-configure with 3 channels of 3 modules, each with independent controllers for each channel. (includes 1 new module beyond existing system)
  - Expandable to 4 modules per channel (14 mgd firm capacity) and ability to add fourth channel to build-out.
  - Stub-outs for future non-potable pump station and/or reuse pump station structure
  - Inlet/outlet piping to connect to existing system.
  - Provide tablet chlorine feed equipment but no contact chamber.

Layout Option 4 – New Pressurized Module UV System at Filter Building (full UV redundancy)

- Construct new Pressurized Module UV System:
  - Modifications to existing channels (to allow existing NPW pump station to receive filter flow)
  - Piped manifold system with 2 mgd modules (4 duty modules, 1 standby.)
  - Stub-outs for future non-potable booster station and/or reuse pump station structure
  - Inlet/outlet piping to connect to existing systems.
  - Assume sodium hypochlorite feed equipment but no contact chamber.

These layout alternatives are shown in **Figure 5-8**.

Figure 5-8 – Disinfection Improvements Layout Options



5.6.4.4 Cost

Table 5-16 presents preliminary opinion of probable capital costs for construction and O&M costs for the UV and redundant disinfection system for each Alternative. Additional detailed cost breakdowns are included in **Appendix 5-E**.

Table 5-16 – Alternative 1 River Discharge - Disinfection Treatment Costs

Item	Description	Capital Cost (Present Worth)	O&M Cost (20-Year Present Worth)	Total Cost (Present Worth)
1	Layout Option 1 – UV +Chlor/Dechlor backup [a]	$542,000	$182,000	$724,000
2	Layout Option 2 – UV + full UV backup	$550,500	$182,000	$732,500
3	Layout Option 3 – Relocate UV with full UV backup	$1,543,000	$182,000	$1,725,000
4	Layout Option 4 – New Pressurized UV with full UV backup	$2,384,000	$182,000	$2,566,000
5	Improvements to Dechlor System [b]	$338,000	NA	NA

[a] *Assumes upgraded gas chlorination equipment and reuse of (no modifications) existing sulfur dioxide dechlorination system.*

[b] *Assumes complete new Sulfur Dioxide Dechlorination Building and equipment. System is adequately sized, but may need refurbishment in the future.*

5.6.5 Alternative 2 – Effluent Reuse Disposal (Class A Reuse)

5.6.5.1 Discussion

Should the City pursue effluent disposal that includes partial or complete reclaimed water reuse, UV has been shown to be highly effective with the following advantages, specific to the Post Falls WRF:

- Ability to deactivate cryptosporidium and giardia cysts at normal doses required for current reuse criteria targeting total coliform bacteria.
- Ability to kill viruses at normal doses required for current reuse criteria targeting total coliform bacteria.
- UV does not generate disinfection byproducts, unlike chlorine, which has the potential to contribute to the formation of tri-halomethanes (THMs).
- Current secondary effluent discharged has a very high UVT and is expected to improve as filtration to meet Class A reuse is added.

To provide Class A reuse water, the following performance criteria must be achieved under the current regulatory framework:

Total Coliform Organisms: Geometric mean less than or equal to 2.2/100 ml
Maximum sample less than or equal to 23/100 ml

To achieve these levels of inactivation/kill, the disinfection UV dose will need to be increased from their current 30 mJ/cm^2. To meet the Idaho Rules for the Reclamation and Reuse of Municipal and Industrial

Wastewater (IDAPA 58.01.17) for Class A reclaimed water, a 5-log virus inactivation must be achieved. The virus targeted for 5-log removal is typically the polio virus. The required UV dosage to achieve the 5-log inactivation has been presented in the National Water Research Institute (NWRI) guidelines and is summarized in **Table 5-17**.

Table 5-17 – UV Dose

Description	Minimum Design UVT %	UV Dosage at Maximum Day Flow mJ/cm^2
Media Filtration [a]	55	100
Membrane Filtration	65	80
Reverse Osmosis	90	50

[a] *Media filtration or non-membrane filtration includes granular or mixed media filters.*

In general, 100 mJ/cm^2 has been adopted as the target design dose at minimum 65 percent UVT for reuse applications and will be used herein.

5.6.5.2 Design Criteria

Design criteria for the required improvements for Alternative No. 2 are shown in **Table 5-18**.

Table 5-18 – Alternative No. 2-Class A Reuse Disinfection Criteria

Item	Design Criteria Parameter
UV System	
Configuration	3 Channels
Modules Required per Channel	5 (Assumed firm capacity achieved with one module removed from one each channel and one redundant channel)
UV Dose and Design Flow Rate	Dosage at 8.0 mgd *peak day* flow (for Class A) = 100 mWs/cm^2 • *5.2 mgd average day flow* • *Assumes full plant flow equalization (above peak day)* • *Assumes one module out of service in each channel* • *Assumes one channel will be taken off line for cleaning and still provide 10.5 mgd disinfection capacity for river discharge*
Target Effluent Fecal Coliform	< 2.2 CFU/100ml (weekly)
Additional Modifications to provide fully redundant UV system	Modify influent pipe and add flow distribution box to equally split flow between each channel Independent controller for each channel Relocated system with new structure and channels
Secondary Disinfection System (Redundant)	
It is assumed that during periods when adequate dose for Class A UV is not available, water would be diverted to river discharge. This is a very unlikely situation as the system has been configured with parallel redundant controls and equipment.	

5.6.5.3 Cost

Table 5-19 presents preliminary opinion of probable capital costs for construction and O&M costs for the UV and redundant disinfection system for Alternative 2 – Class A Reuse Disinfection. Additional detailed cost breakdowns are included in **Appendix 5-E**.

Table 5-19 – Alternative 2-Class A Reuse Disinfection Treatment Costs

Item	Description	Capital Cost (Present Worth)	O&M Cost (20-Year Present Worth)	Total Cost (Present Worth)
1	UV Disinfection (Class A) (includes full redundancy for river discharge requirements)	$1,943,000	$1,052,000	$2,995,000

5.6.6 Emerging Contaminant Treatment

As discussed in previous sections, the issue of regulating emerging /trace contaminants is likely to affect upcoming NPDES permit cycles. The contaminants identified to be likely candidates in upcoming permit cycles include:

- Polychlorinated biphenyl (PCBs)
- 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD)
- Pharmaceuticals and Personal Care Products (PPCPs)
- Endocrine-disrupting compounds (EDCs)
- Disinfection Byproducts – Toxic compounds resulting from chemical disinfection are now being regulated in California discharges to streams because of the way regulators are interpreting disinfection byproduct rule changes
- Metals (Hg, Pb, Cd, Zn, Cu, Al) or others

Pharmaceutically active compounds, household hazardous waste chemical, hormones, and other endocrine disruptors have been found in streams utilizing relatively new, ultra-low detection methods. Little knowledge is currently available on the health effects of these compounds at the low concentrations observed downstream of wastewater treatment plant discharges. However, it is foreseeable, that as additional data is gathered from discharges and receiving waters, technology based limits will likely be implemented on some or all of these contaminants. It is assumed that new treatment requirements would likely not be implemented until the completion of two additional permit cycles at a minimum.

Treatment methods for removing/destroying these contaminants are being investigated at the research level to determine their effectiveness for the various compounds. The primary difficulty at this phase is the unknown target effluent requirements for each potential contaminant. Tertiary coagulation and filtration, following secondary treatment will remove these contaminants to some degree, but will likely not be capable of reducing them to levels anticipated. Further, some compounds may require different treatment methods for treatment of refractory organics versus pharmaceuticals for example.

Research has identified that the most difficult to oxidize organic compounds passing through biological processes may be best removed through advanced oxidation processes (AOPs). AOPs typically combine Ozone, UV_{254} and H_2O_2 (hydrogen peroxide) or Ozone in some fashion to create an advanced oxidation

process. Further, Granular Activated Carbon adsorption (GAC) may also chemically bind some of these contaminants to allow their removal in as a "solid" that can then be landfilled. Alternatively, Reverse Osmosis may also be required, but would be very difficult to implement in the north Idaho climate due to the large volumes of brine generated as a waste-product. Based on the regulatory discussions that are occurring, it is likely that AOP, and/or GAC will likely need implemented.

To provide for planning level layout and budgetary considerations we are making the following assumptions and conclusions:

- It is assumed that new treatment requirements would likely not be implemented until the completion of two additional permit cycles at a minimum.
- AOP, GAC and/or RO will likely need to be implemented.
- Ongoing and future monitoring efforts to determine the contribution of the contaminants from each source are critical to defining future regulations (as discussed by EPA in the current NPDES Permit).
- Status of on-going research and performance of various treatment technologies for the target contaminants is critical to determining the most cost effective treatment method to implement at the City's WRF.
- Providing space (layout) and hydraulic profile considerations when considering near-term tertiary and disinfection upgrades.

5.6.6.1 AOP Process Considerations

Advanced oxidation processes (AOPs) refers to a set of chemical treatment procedures designed to remove organic and inorganic materials in waste water by oxidation. One such type of process is called in situ chemical oxidation.

Contaminants are oxidized by four different reagents: ozone, hydrogen peroxide, oxygen, and air, in precise, pre-programmed dosages, sequences, and combinations. These procedures may also be combined with UV irradiation and specific catalysts. This results in the development of hydroxyl radicals.

The AOP procedure is particularly useful for cleaning biologically toxic or non-degradable materials such as aromatics, pesticides, petroleum constituents, and volatile organic compounds in wastewater. The contaminant materials are converted to a large extent into stable inorganic compounds such as water, carbon dioxide and salts, i.e. they undergo mineralization. A goal of the wastewater purification by means of AOP procedures is the reduction of the chemical contaminants and the toxicity to such an extent that the cleaned wastewater may be reintroduced into receiving streams.

The advanced oxidation process (AOP) is successfully used to decompose many hazardous chemical compounds to acceptable levels, without producing additional hazardous byproducts or sludge that require further handling. The term advanced oxidation processes refers specifically to processes in which oxidation of organic contaminants occurs primarily through reactions with hydroxyl radicals. AOPs usually refer to a specific subset of processes that involve O3, H2O2, and/or UV light.

AOP can act on organic compounds in water in several ways: convert one compound into another (conversion), conversion with a reduction in toxicity and mineralization (breaking the organic down to CO2 and inorganic salts). In some cases, discharge permits simply require conversion from a compound of interest to another compound that is not covered by the permit. In other cases, permitting requires the toxicity of the

compound/wastewater to be reduced prior to discharge. In some cases, mineralization is needed as measured by a reduction of TOC.

The most widely applied advanced oxidation processes (AOP) have been:

- Peroxide/ultraviolet light (H2O2/UV),
- Ozone/ultraviolet light (O3/UV),
- Hydrogen peroxide/ozone (H2O2/O3)
- Hydrogen peroxide/ozone/ultraviolet (H2O2/O3/UV) processes.

Advantages of Advanced Oxidation Processes

- Rapid reaction rates
- Small foot print
- Potential to reduce toxicity and possibly complete mineralization of organics treated
- Does not concentrate waste for further treatment with methods such as membranes
- Does not produce materials that require further treatment such as "spent carbon" from activated carbon absorption
- Does not create sludge as with physical chemical process or biological processes (wasted biological sludge)
- Non selective pathway allows for the treatment of multiple organics at once

Disadvantages of Advanced Oxidation Processes

- Capital Intensive
- Complex chemistry must be tailored to specific application
- For some applications quenching of excess peroxide is required
- The selection of a specific advanced oxidation process is application dependent. Piloting would need to be performed during preliminary design to determine which AOP fits best based on the type of compounds to be removed, treatment objectives, concentrations, site considerations, and budget.

5.6.6.2 GAC Process Considerations

Granular activated carbon (GAC) adsorption has been used successfully for the advanced (tertiary) treatment of municipal and industrial wastewater. GAC is used to adsorb the relatively small quantities of soluble organics (See Table 1) and inorganic compounds such as nitrogen, sulfides, and some metals remaining in the wastewater following biological or physical-chemical treatment. Adsorption occurs when molecules adhere to the internal walls of pores in carbon particles produced by thermal activation.

GAC systems are generally composed of carbon contactors, virgin and spent carbon storage, carbon transport systems, and carbon regeneration systems. The carbon contactor consists of a lined steel column or a steel or concrete rectangular tank in which the carbon is placed to form a “filter” bed. A fixed bed downflow column contactor is often used to contact wastewater with GAC. Wastewater is applied at the top of the column, flows downward through the carbon bed, and is withdrawn at the bottom of the column. The carbon is held in place with an underdrain system at the bottom of the contactor. Provisions for backwash and surface wash

of the carbon bed are required to prevent buildup of excessive headloss due to accumulation of solids and to prevent the bed surface from clogging.

Expanded bed and moving bed carbon contactors have been developed to overcome problems associated with headloss buildup experienced with fixed bed downflow contactors. In an expanded bed system, wastewater is introduced at the bottom of the contactor and flows upward, expanding the carbon bed, much as the bed expands during backwash of a fixed bed downflow contactor. In the moving bed system, spent carbon is replaced continuously so that the headloss does not build up. Carbon contactors may be operated under either pressure or gravity flow. The choice between pressure and gravity flow generally depends on the available pressure (head) within the wastewater treatment plant and cost.

All carbon contactors must be equipped with carbon removal and loading mechanisms to allow spent carbon to be removed and virgin or regenerated carbon to be added. Spent, regenerated, and virgin carbon is typically transported hydraulically by pumping as a slurry. Carbon slurries may be transported with water or compressed air, centrifugal or diaphragm pumps, or eductors.

When the carbon contactor effluent quality reaches minimum water quality standards, the spent carbon is removed from the contactor for regeneration. Small systems usually find regeneration of their spent carbon at an off-site commercial reactivation facility to be the most convenient and economical method. In this case, the spent carbon is hydraulically transported from the contactor to a waiting truck. Regenerated or virgin carbon is then hydraulically transported from a second truck or from a separate compartment in the first truck to the contactor, then to a commercial reactivation facility. Generally, systems which contain at least one million pounds of carbon find on-site regeneration to be cost effective.

Carbon regeneration is accomplished primarily by thermal means. Organic matter within the pores of the carbon is oxidized and thus removed from the carbon surface. The two most widely used regeneration methods are rotary kiln and multiple hearth furnaces. Approximately 5 to 10 percent of the carbon is destroyed in the regeneration process or lost during transport and must be replaced with virgin carbon. The capacity of the regenerated carbon is slightly less than that of virgin carbon. Repeated regeneration degrades the carbon particles until an equilibrium is eventually reached providing predictable long term system performance.

Applicability

Typically, GAC adsorption is utilized in wastewater treatment as a tertiary process following conventional secondary treatment or as one of several unit processes composing physical-chemical treatment. In wastewater treatment plants utilizing biological secondary treatment, GAC adsorption is generally located after filtration and prior to disinfection. When utilized in a physical-chemical treatment process, GAC adsorption is generally located following chemical clarification and filtration and prior to disinfection. In addition, GAC adsorption systems have a relatively small footprint making them suitable for facilities with limited land availability.

The successful application of carbon adsorption for municipal wastewater treatment depends on the quality and quantity of the wastewater delivered to the adsorption system. For a carbon contactor to perform effectively, the feed water to the unit should be of uniform quality (suspended solids concentrations less than 20 mg/l) and without surges in flow. Wastewater constituents that may adversely affect carbon adsorption include suspended solids, BOD5, and organics such as methylene blue active substances or phenol and dissolved oxygen. Environmental factors that must be considered include pH and temperature because they may impact solubility, which affects the adsorption properties of the wastewater components onto carbon (WEF MOP 8, 1998).

Advantages and Disadvantages

Before deciding whether carbon adsorption/regeneration meets the needs of a municipality, it is important to understand the advantages and disadvantages of both the adsorption and regeneration process.

Advantages (Adsorption)

- For wastewater flows which contain a significant quantity of industrial flow, GAC adsorption is a proven, reliable technology to remove dissolved organics.
- Space requirements are low.
- GAC adsorption can be easily incorporated into an existing wastewater treatment facility.

Advantages (Regeneration)

- Systems are reliable from a process standpoint.
- Reduces solid waste handling problems caused by the disposal of spent carbon.
- Saves up to 50 percent of the carbon cost.

Disadvantages (Adsorption)

- Under certain conditions, granular carbon beds may generate hydrogen sulfide from bacterial growth, creating odors and corrosion problems.
- Spent carbon, if not regenerated, may present a land disposal problem.
- Wet GAC is highly corrosive and abrasive.
- Requires pretreated wastewater with low suspended solids concentration. Variations in pH, temperature, and flow rate may also adversely affect GAC adsorption.

Disadvantages (Regeneration)

- Air emissions from the furnace contain volatiles stripped from the carbon. Carbon monoxide is formed as a result of incomplete combustion. Therefore, afterburners and scrubbers are usually needed to treat exhaust gases.
- The induced draft fan of a multiple hearth furnace may produce a noise problem.
- The process is most effective when operated on a 24-hour basis, requiring around-the clock operator attention.
- The process is subject to more mechanical failures than other wastewater treatment processes.

GAC Design Criteria

Prior to the design of GAC systems, a pilot plant study should be performed to determine if the technology will meet discharge permit requirements and to quantify optimum flow rate, bed depth, and operating capacity on a particular wastewater. This information is required to determine the dimensions and number of carbon contactors required for continuous treatment.

The sizing of carbon contactors is based on contact time, hydraulic loading rate, carbon bed depth, and number of contactors. The carbon contact time typically ranges from 15 to 35 minutes depending on the application, wastewater constituents and desired effluent quality. Hydraulic loading rates of 4 to 10 gpm/SF

are typically used for upflow carbon columns. For downflow carbon columns, hydraulic loading rates of 3 to 5 gpm/SF are used. Carbon bed depth varies typically within a range of 10 to 40 feet depending on carbon contact time (Tchobanoglous, 1991). The number of contactors should be sufficient to ensure enough carbon contact time to maintain effluent quality while one column is off line during removal of spent carbon or maintenance. The normal practice is either to use two columns in series and rotate them as they become exhausted or to use multiple columns in parallel so that when one column becomes exhausted, the effluent quality will not be significantly affected (WEF MOP 8, 1998).

Regeneration facilities are typically sized based on carbon dosage or use rate. The dosage rate depends on the strength of the wastewater applied to the carbon and the required effluent quality. Typical dosage rates for filtered, secondary effluent range from 400 to 600 lbs/MG, while typical dosage rates for coagulated, settled and filtered raw wastewater (physical-chemical) range from 600 to 1800 lbs/MG.

Operation and Maintenance Considerations

The proper operation and maintenance of GAC adsorption and regeneration systems ensures the efficient removal of soluble organics from secondary effluent. A routine O&M schedule following manufacturer's recommendations should be developed and implemented for any GAC adsorption and regeneration system. Regular O&M includes the following:

- Backwash of carbon contactor based on headloss or flow.
- Flush carbon transport piping to prevent clogging.
- Backwash frequently after loading carbon to minimize clogging of backwash nozzles by carbon fines.
- Store an adequate supply of spent carbon to allow continuous operation of the regeneration furnace.
- Test and calibrate instrumentation and controls on a routine basis.

The construction and operation and maintenance costs of carbon adsorption and regeneration depend on the characteristics of the wastewater to be treated, the capacity of the plant, and the plant site. Therefore, the designer is responsible for selecting a system that will meet the National Pollutant Discharge Elimination System NPDES permit requirements at the lowest cost possible. Once the optimum flow rate, bed depth, and operating capacity of GAC for a particular wastewater are determined, comparative costs for different carbon contactor configurations and the cost of on-site regeneration versus off-site regeneration can be estimated. Following a thorough engineering and economic analysis of alternatives, the final equipment configuration can be selected.

Cost Considerations

Construction costs include the carbon contactors, carbon transport system, carbon storage tanks, carbon regeneration system (if applicable), influent wastewater pumps (if applicable) and contactor backwash system. Operation and maintenance costs include the purchase of virgin carbon, on-site regeneration or purchase of regenerated carbon, electrical power to operate pumps and controls, flushing of carbon slurry piping, and replacement of parts. Currently, the cost of virgin carbon ranges from $0.70 to $1.20 per pound and the cost to purchase regenerated carbon ranges from $0.50 to $0.78 per pound. Operational costs depend on the characteristics of the influent wastewater and the adsorption capacity of the GAC. For example, influent wastewater which contains suspended solids concentrations greater than 20 mg/l will require more frequent backwashing of the contactor to prevent clogging of the carbon bed.

5.6.7 Conclusions/Recommendations

Each layout option has advantages and disadvantages relative to cost, ability for phased construction, reliability, interaction with other processes and flexibility for future expansion.

A summary of the advantages and disadvantages of each alternative is shown in **Table 5-20**.

Table 5-20 – Comparison of Disinfection Layout Options

	Layout Option 1	Layout Option 2	Layout Option 3	Layout Option 4
	Modify Existing System (UV with backup chlor/dechlor)	Modify Existing System (UV with parallel UV backup)	Relocate UV System (full UV redundancy)	New Pressurized Module UV System at Filter Building (full UV redundancy)
Advantages:	Provides independent secondary disinfection system.	Eliminates UV influent channel cleaning	Provides for logical expansion UV system and new Reuse and Utility Water pump stations Eliminates UV channel cleaning Allows for future demolition of Utility Water Pump Station, Existing UV and contact chambers.	Provides for logical expansion UV system and new Reuse and Utility Water pump stations Eliminates UV channel cleaning Allows for future demolition of Utility Water Pump Station, Existing UV and contact chambers.
Disadvantages:	Still need to clean UV influent channel System is "landlocked" and will require significant modification for expansion in the future.	Reuse and Utility water pump stations are not easily modified or expanded	Significant capital expenditure without full understanding of pending emerging contaminant treatment requirements.	Significant capital expenditure without full understanding of pending emerging contaminant treatment requirements.
Cost (Lifecycle)	Mid-range capital cost	Low capital cost	High capital cost	Highest capital cost
Chlorination/Dechlorination Backup System?	Full chlor/dechlorination system with new contact chamber provided.	New chlorination equipment; retain existing dechlorination equipment but no revisions to chlorine contact chamber(s)	New chlorination equipment; retain existing dechlorination equipment. Existing chlorine contact chambers abandoned.	New chlorination equipment; retain existing dechlorination equipment. Existing chlorine contact chambers abandoned.
Ability to expand to Class A Reuse?	System is not easily expanded	System is not easily expanded	Easily expanded to provide Class A Reuse Disinfection	Easily expanded to provide Class A Reuse Disinfection
Ability to expand to Advanced Oxidation Process?	System is not easily modified for advanced oxidation processes.	System would likely need significant modifications later to convert to advanced oxidation process.	Additional UV modules could be added easily for increased dose, but hydraulic grade requirements for advanced oxidation processes are unknown. Unknown footprint in layout for advanced oxidation processes.	Additional UV modules could be added easily for increased dose, but hydraulic grade requirements for advanced oxidation processes are unknown. Unknown footprint in layout for advanced oxidation processes.

5.6.8 Discussion and Recommendations

As can be seen in the summary of advantages/disadvantages, each alternative has pros and cons affecting the coordinated expansion of the WRF. Summarizing:

- Option 1 has significant capital cost and will ultimately limit expansion beyond the anticipated 20-year growth.
- Option 2 has the lowest capital cost, and will likely meet the requirements for the 20-year period, but would be in need of significant modification (likely conversion to options 2 or 3) at the end of the period as additional treatment for emerging contaminants is required.
- Option 3 has a higher capital investment than Options 1 and 2, but allows for more uniform and systematic expansion of the UV System, Utility Water Pump Station and Reuse Pump Stations, and retains much of the original capital investment in the UV equipment. However, significant capital investment will be made with unknown requirements for emerging contaminant treatment.
- Option 4 has the highest capital investment, but completely relocates the facility to a new facility, new style of equipment, and hydraulic elevation within the plant. Similar to Option 3, significant capital investment will be made with unknown treatment requirements for emerging contaminants.

Several improvements will be required over the next 20-years to improve operation for river discharge standards. Should the City decide to develop a Class A reuse system, the disinfection will need expanded accordingly. Phasing of improvements for Class A reuse should be constructed concurrently with the development of the reuse land application system. The major recommended improvements to the disinfection system over the 20-year planning period include the following:

Phase I: (Interim Improvements)

- *Construct interim chlorination system improvements to eliminate outdated equipment*
- *Enclose UV structure to mitigate windblown debris and birds near effluent channels*
- *Re-route piping from Tertiary improvements to and provide flow split box to eliminate feed channel maintenance.*
- *Provide parallel UV controllers and electrical feed as necessary (independent for each channel) to provide full system reliability at each channel.*

Phase II: (expected next NPDES Permit Cycle or later)

- *Relocate existing UV Equipment to a new structure adjacent to the current utility water pump station (Layout Option 3 from TM No. 5), expand with full reliability.*
- *Construct adjacent/contiguous Utility Water Pump Station as system demands require.*
- *Construct adjacent/contiguous Reuse Pump Station as reuse is implemented.*
- *Expand to Class A requirements and AOP processes as regulatory conditions require*

5.6.9 Environmental

The primary environmental concern with the recommended alternative is related energy (power) use for the UV light system. When compared to the chemical alternatives, it has the least significant environmental concerns. All raw chemical feed options chlorine gas, bulk hypo (and dechlorination) require the import of chemicals. Both chemical options have the potential of developing disinfection byproduct materials that, although currently unregulated, are becoming an increasing concern in receiving water quality. Further, chemical options pose an increased potential risk to operator and adjacent properties in the event of a chemical leak. The recommended alternative has the least long-term environmental impacts.

5.7 Outfall (Final Effluent Line)

The existing outfall pipe continues to serve as the only discharge point for the WRF since its original construction in 1984. The current flows to the effluent line have it operating at capacity, with recent flows creating gravity-to-full-pipe flow transitions that cause hydraulic jumps to move throughout the piping. These hydraulic jumps are violent enough to create air movement within the piping, forcing manhole covers to be lifted off their rings. City staff has replaced several manhole covers with bolt-down lids until a future outfall line is installed.

5.7.1 Existing Outfall Characteristics

The existing outfall consists of approximately 1,700 linear feet of gravity sewer piping. The existing outfall line characteristics are determined from As-Built Drawings (dated December 1984) provided by the City. The existing outfall line leaves the WRF east along the south side of I-90 and travels beneath I-90 through an 18-inch AWWA C-200 steel pipe inside 450 linear feet of 36-inch steel casing under the I-90 right-of-way. The line travels through another 100 linear feet of 36-inch steel casing pipe under the old Burlington Northern Railroad right-of-way and continues south towards the Spokane River where the pipe slope increases and the pipe transitions to 15-inch-diameter gravity line (unknown pipe type). The line transitions to a 12-inch-diameter pressure-rated line as the pipe drops into the river channel and out to the final outfall in the Spokane River. The existing diffuser assembly is composed of a single 12-inch-diameter 90 degree fitting (according to As-Built Drawings). The top of the diffuser is at an elevation of approximately 2,051.5 feet above mean seal level, presumably on the NGVD 29 vertical datum.

The upper portion of the outfall (18-inch steel) is constructed similar to a typical gravity sewer installation with manholes and channeled bottoms. The steel line has likely undergone considerable corrosion during its 27 years of operation with chlorine off-gassing from the highly chlorinated effluent running through it, prior to the installation of UV disinfection.

There is no information on the drawings showing the pipe material used for the construction of the 15-inch portion of the line. It is likely this line is also steel or “Blue-Brute – PVC”, as Blue Brute is used for a portion of the subsequent 12-inch-diameter section.

The 12-inch-diameter line starts as Blue Brute near the top of the steep slope into the river and transitions to 12-inch cast flanged iron pipe at Station 15+47 (above the high water mark). The pipe then transitions to 12-inch Clow Ductile Iron Ball Joint River Crossing Class 54 pipe with cast iron fittings at Station 15+73, which continue through the 12-inch outlet elbow.

River levels from the 1984 As-Built Drawings are as follows (vertical datum appears to be NGVD 29):

- Shoreline (November 3, 1982) – 2,064.10 feet
- Normal Low Level – 2,055.70 feet
- High Water Mark – 2,070.1 feet

5.7.2 Flow Analysis Results

The flow capacity of the outfall line was evaluated to determine the hydraulic grade line along the length of the outfall pipe. This evaluation ultimately determined the water surface profile and available capacity of the line.

The analysis determined the outfall line has limited available capacity above 4.5 to 5.5 mgd due to the 12-inch-diameter line and outlet elbow in the river. This flow causes surcharge conditions in the outfall pipe and an unstable hydraulic jump. Velocities in the discharge diffuser elbow exceed typical velocity guidance of a maximum discharge velocity of 9 to 10 feet per second (fps) as flows approach 5.0 mgd, as shown in **Table 5-21**.

Table 5-21 – Existing Outfall Capacity Analysis

Flow, Q (mgd)	Velocity (fps)	Velocity Head (ft)
4.5	8.8	1.2
5.0	9.85	1.5
6.0	11.8	2.2
7.0	13.8	2.9
8.0	15.8	3.9

The 15-inch and 18-inch portions of the outfall line are limited to approximately 6.5 to 7.0 mgd, as the pipes will be flowing full and no longer acting as gravity pipes.

5.7.3 Improvement Alternative Phases

Project phases of the outfall analysis are discussed below. The phases build on one another. Phase 1 must occur before Phase 2, but both phases could be completed together.

Project phases include:

- **Phase 1** – Eliminate the primary bottleneck
- **Phase 2** – Outfall improvement north from end of Phase 1

Phase 1 – Eliminate the Primary Capacity-Limiting "Bottleneck"

This phase eliminates the primary capacity-limiting "bottleneck" by replacing the existing 12-inch piping from the discharge elbow currently installed in the Spokane River to the top of the steep bank above the river (approximately 190 linear feet pipe) north through the existing 15-inch pipe to City-owned property just south of I-90. A visual representation appears on **Figure 5-9**, which includes Phase 1 pipe improvements shown in red.

Construction of the Phase 1 piping will be very challenging, consisting of installing large-diameter pipe on 30 to 50 percent ground slopes directly above the Spokane River. Permits and easements from Idaho Department of Lands, Army Corps of Engineers, and adjacent landowners in addition to significant shoring, tree removal, and limited construction access will likely be major challenges requiring significant planning and lead time.

Three sizes of outfall line (24-, 30-, and 36-inch inside diameter pipes) were evaluated for the outfall line. City staff prefers to replace the outfall line with a 30-inch pressure class pipe, which allows up to 25 mgd peak flow through Phase 1 and Phase 2 piping. The City may choose to upsize this pipe to a 36-inch pipe for a substantial increase in gravity flow potential of 42 mgd, as shown in **Table 5-22**.

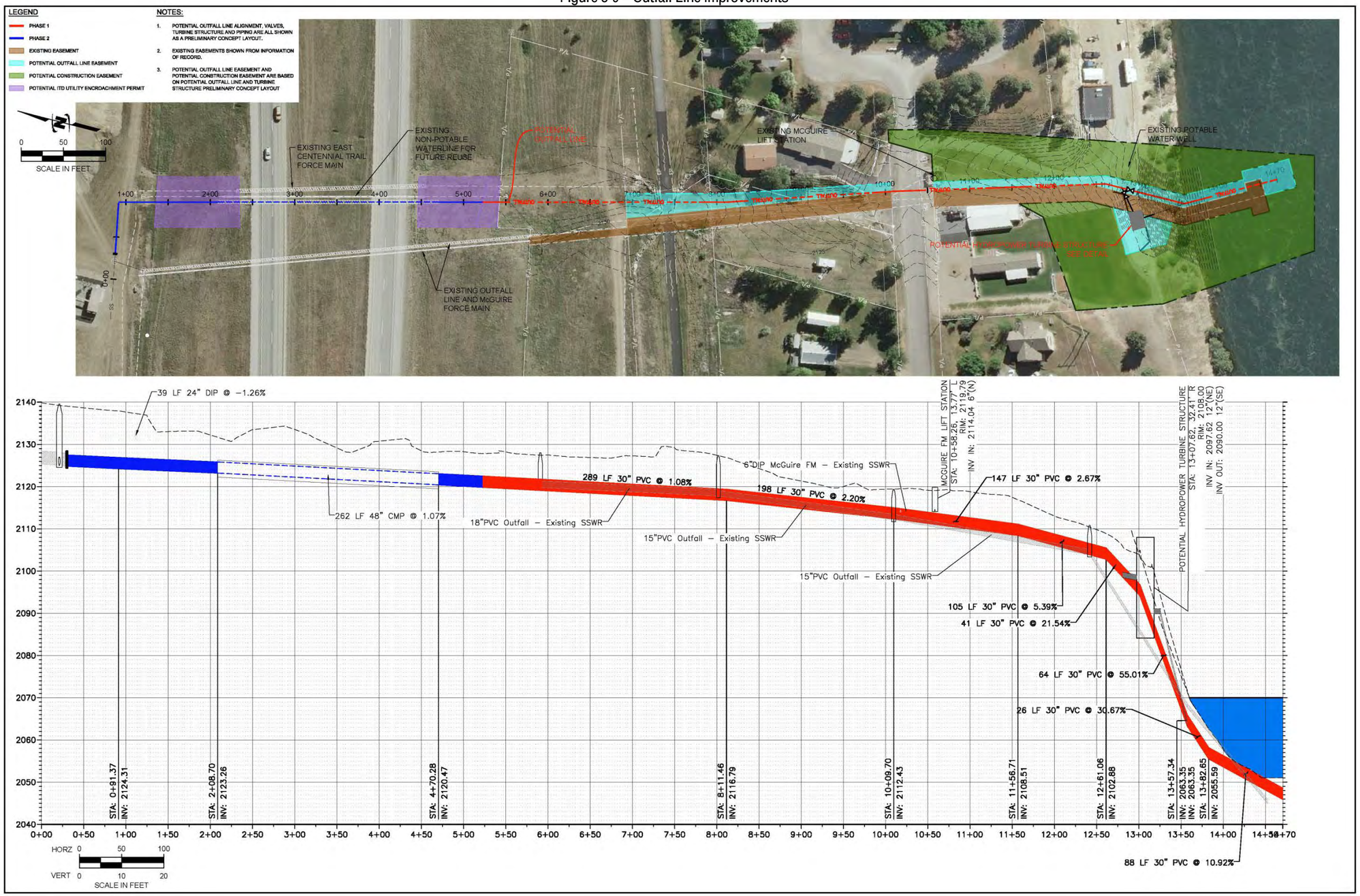
Table 5-22 – Gravity Flow Capacity of Various Outfall Sizes

Inside Diameter (in)	Gravity Flow Capacity (mgd)
24	14
30	25
36	42

The river discharge should include a multiple port diffuser to distribute flow across the river. The diffuser should have minimal headloss for flows approaching the design flow. The details of the diffuser sizing and number of diffusers will be determined in design. An interim flow transition point at the northern end of Phase 1 will be required to transition flow from the existing line to the new line until Phase 2 occurs. The preliminary layout of the outfall incorporates the necessary depth and grades.

Although Phase 1 provides additional flow capacity, it does not address the potential issues of the 27-year-old steel piping beneath I-90 (installed in 1984), which may be approaching its design life. Phase 1 does increase capacity of the outfall line to approximately 6.5 mgd, with the upstream 15- and 18-inch piping controlling the outfall capacity and becoming the capacity-limiting bottleneck.

Figure 5-9 – Outfall Line Improvements



Phase 2 – Outfall Line Improvement North from End of Phase 1 (following Phase 1)

This phase provides a significant increase in the outfall line capacity by eliminating the secondary "bottleneck." Phase 2 consists of continuing Phase 1 piping upstream to the WRF effluent "cell tower" Parshall flume. This phase consists of approximately 500 linear feet of piping routed through the existing 48-inch bore (currently empty) under I-90 and connecting to the northern end of Phase 1.

Similar to Phase 1, the piping should be sized with a minimum inside diameter piping of at least 30-inch pressure class pipe, which allows up to 25 mgd through Phase 1 and Phase 2 piping. The City may choose to upsize this pipe for additional capacity, as shown in **Table 5-22**.

When the new outfall line is installed, the existing 18-inch steel pipe may be temporarily removed from service for inspection. An assessment of its condition should occur to determine its replacement rehabilitation timeline. This pipe is likely a candidate for trenchless rehabilitation by cured-in-place pipelining. If the pipe is determined to be viable, it could be kept in service, providing approximately 6.5 mgd of additional flow capacity in addition to Phase 1 and Phase 2 improvements.

Phase 1 and Phase 2 Permits and Easements

The U.S. Army Corps of Engineers (USACE), Idaho Department of Water Resources (IDWR), Idaho Department of Lands (IDOL), and Idaho Transportation Department (ITD) will be major partners in securing permits and easements for Phase 1 and Phase 2. A 404 Joint Application for Permits will be required for Phase 1 permits and easement processing. The application requires notification of adjacent property owners and/or all other ownership on the waterway that may be affected by the proposed activities/project. A Mitigation Plan, which will cover water quality issues, and a silt curtain during construction will most likely be required. USACE may require the stream bed sediment to be sampled for toxics. If the toxics exceed the EPA criteria, the sediment must be removed. Preliminary planning and discussion with regulatory agencies should be done to determine what toxics should be tested for, concentration limits, and potential mitigation plans. The sampling could be conducted when the geotechnical sampling and evaluation are performed.

In addition to USACE, IDWR, IDOL, and ITD, adjacent landowners are also key partners for construction and outfall line easements required for improvements. Tentative required easement areas for Phase 1 and Phase 2 appear on **Figure 5-9.**

5.7.4 Discussion of Alternatives

As the current outfall has a significant vertical elevation difference from the treatment plant to the river discharge, it has been identified as a likely candidate for hydraulic power generation. To evaluate potential improvements for the City, the analysis has been broken into two alternatives:

- **Alternative 1** – Outfall improvements without power generation facility but construct critical buried infrastructure for future connection and installation of equipment.
- **Alternative 2** – Outfall improvements with power generation.

Alternative 1 – Outfall Improvements without Power Generation

Alternative 1 does not include power generation on the outfall line for Phase 1 piping but does allow for future connection by providing critical infrastructure for future power generation connection. Phase 2 must be complete prior to the future connection and operation of the power generation equipment since the existing gravity line was not intended as a pressure sewer. The critical elements that should be installed to

allow for an easy connection at any time in the future are the turbine/generator structure and bypass piping, inline tees or wyes, and valves. This infrastructure appears on **Figure 5-10**.

Alternative 2 – Outfall Improvements Incorporating Power Generation

This alternative completely incorporates power generation on the outfall line. There are several types of power generation facilities, each with their own advantages and disadvantages. **Table 5-23** lists each option, provides a discussion of each, and summarizes their advantages and disadvantages.

Table 5-23 – Power Generation Options

Option	Description/Discussion	Advantages	Disadvantages
Pelton wheels	An impulse turbine that extracts energy from the momentum of moving water	Quiet operation (low rumble), very efficient	Does not allow for "suction head" downstream of turbine to aid in power generation
Centrifugal pump turbine	A split case/double section type pump (turbine) connected to a belt-driven generator with control valves and electrical interface	Possible to utilize the head downstream from the pump/turbine at a maximum of 15 feet below the turbine to prevent cavitation	Noisier relative to Pelton wheel
Kaplan and Turgo type turbine	Not considered viable options		Head requirements larger than available Equipment too expensive

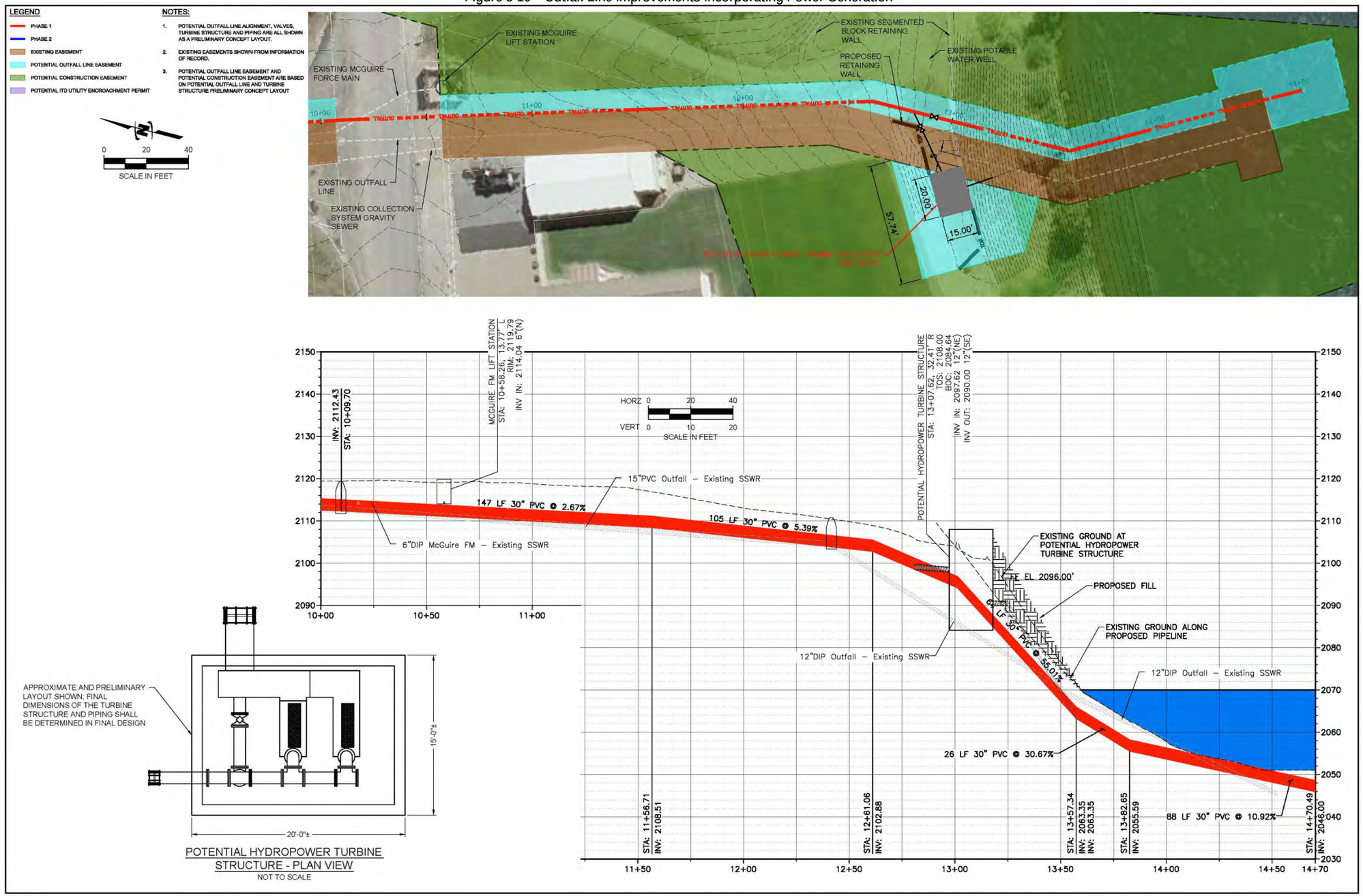
Recommendations for Power Generation Facility

The Pelton wheel appears to be the best fit for this specific application due to its efficiency and relatively low noise. The Pelton wheel turbine will be assumed as the basis for evaluating feasibility and to size all required infrastructure, including the turbine structure.

Flow could be drawn from the outfall line with inline fittings and valve clusters into a nearby underground concrete structure (turbine structure) containing the Pelton wheel(s). The turbine structure would be dug into the hillside and allow equipment access through an at-grade roof hatch. A daylight basement man-door would allow operator access from the east.

The turbine structure could initially contain one Pelton wheel with firm capacity of the plant average daily flow at the time of construction and ancillary electrical generation equipment. The turbine structure should contain a primary control valve that would open, bypassing the turbine when outfall flow is higher than the turbine capacity (i.e., peak flow would bypass the turbine). This would protect the upstream portion of the penstock from overtopping and flooding the WRF effluent Parshall flume, as no inline storage is provided under this type of design. The facility should be designed with room for additional turbines and expandability as effluent flow increases. To propel the wheel, effluent flow would need to be backed up to create full pipe flow through a penstock in the outfall line and discharged onto the Pelton wheel, maximizing pressure and therefore electrical power generation.

Figure 5-10 – Outfall Line Improvements Incorporating Power Generation



When the water-jet contacts the Pelton wheel paddle, the water momentum is transferred to the wheel, decelerating the water and propelling the Pelton wheel. Water flows out the other side of the paddle at low velocity. Water would drain from the discharge side of the Pelton wheel and be piped via gravity flow back to the outfall line. Flow could easily bypass the turbine structure and Pelton wheels by adjusting outfall line valving for straight flow through the outfall line to the Spokane River. A visual representation of this concept appears on **Figure 5-10**, showing the possible location of outfall line valves, piping, and turbine location. Additional easement will be required for the turbine structure and construction beyond the existing easement. **Figure 5-9** shows the additional easements.

Based on preliminary elevations of the proposed structure and the effluent Parshall flume, a total of 28 feet of static elevation head is available under the proposed layout. As previously stated, the power generation infrastructure forces the outfall line to full pipe flow conditions to the effluent Parshall flume to maximize energy production potential. Full pipe flow through the outfall slightly decreases flow capacity compared to open channel flow due to increased headloss associated with open channel flow. **Table 5-24** shows the full pipe flow capacity maximizing energy production potential as compared to the previously stated gravity pipe capacity from **Table 5-22**.

Table 5-24 – Full Pipe Flow Capacity of Various Outfall Sizes

Inside Diameter (in)	Full Pipe Flow Capacity Maximizing Energy Potential (mgd)	Gravity Flow Capacity (mgd)
24	12.5	14
30	21.5	25
36	33.0	42

Figure 5-11 demonstrates the power generation potential as flows increase through various sizes of outfall lines. Under the proposed layout, with a 30-inch outfall line at 5.0 mgd, approximately 27.4 feet of elevation head remains available for power generation at the turbine after pipe friction losses. A properly designed turbine can be up to 88 percent efficiency and induction motor for generator approximately 90 percent. Under these assumptions, initial calculations from typical efficiencies of the Pelton wheel and generators indicate a power generation capability of approximately 14 kW at 5.0 mgd. The 30-inch line has a peak power generation potential of approximately 41 kW at 21.5 mgd but may be operated up to 35.0 mgd, leaving minimal power generation potential.

Figure 5-11 – Power Generation Potential

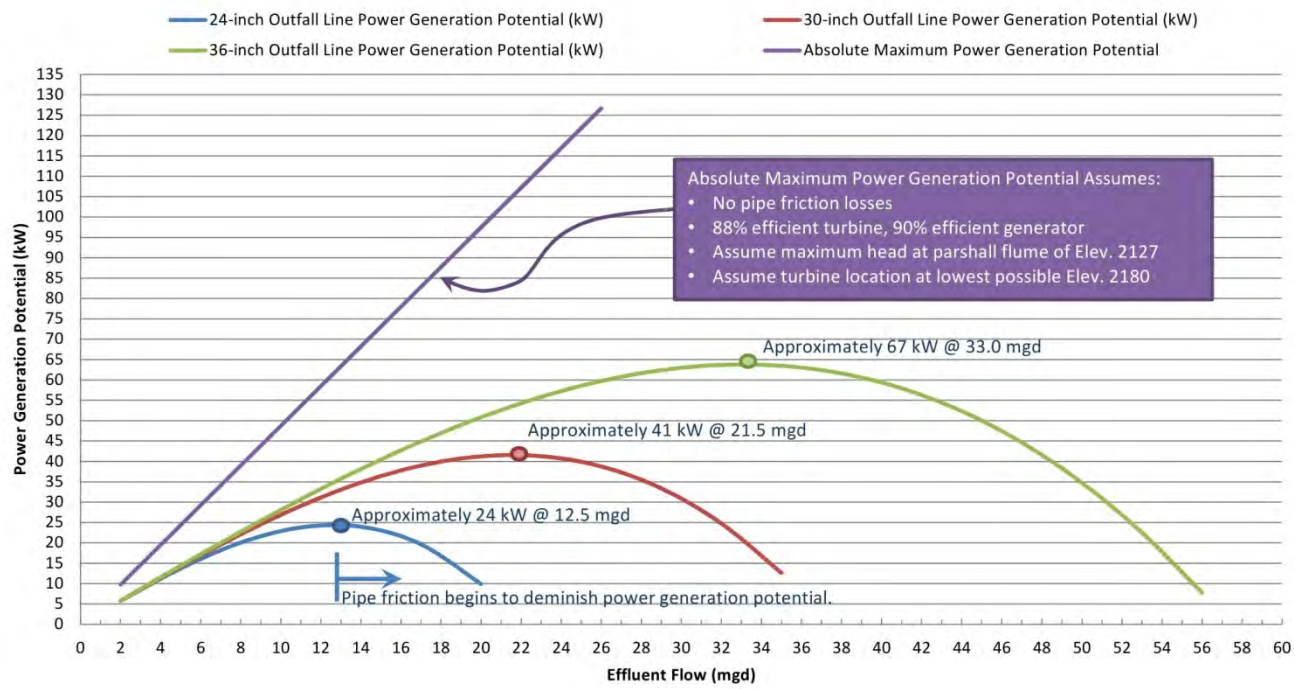


Figure 5-11 also demonstrates the absolute maximum power generation potential of the outfall line, assuming the following:

- No pipe friction losses
- 88% efficient turbine, 90% efficient generator
- Maximum head at the Parshall flume is elevation 2,127
- Turbine location at lowest possible elevation 2,180 (10 feet above existing high water mark)

Electrical and Metering

Two options were considered for utilizing the generated power; net metering and parallel cogeneration production.

Net metering is an electrical utility policy for consumers who own renewable energy facilities. Under Avista Utilities net metering agreement, the owner receives retail credit for the portion of the electricity that they generate via a renewable energy source. Avista Utilities Schedule 63 "Net Metering Schedule Option – Idaho" describes the availability and limits of net metering in Idaho. The net metering agreement requires the customer to use the power generated on their own premise; Avista will not transmit power over utility lines to another location.

Two net metering options were considered; a net metering connection at the McGuire Lift Station and a net metering connection at the Water Reclamation Facility.

The McGuire Lift Station is a small horsepower duplex lift station. The power usage at the lift station is intermittent and less than the average output of the potential generator. Because a net metering agreement

only permits crediting of excess generation, and all credits zero out at the end of each calendar year this option does not provide adequate power consumption to justify the connection cost.

The second option of providing a net metering connection at the Water Reclamation Facility allows for full consumption of all possible generated power. Based on generating an average of 14KW to 41KW and $0.06 per KWhr the Water Reclamation Facility would realize an annual Avista Utility savings of between, $7,358 and $21,549. In addition to the cost of the generating equipment and structure, a 50 amp, 480 volt feeder would be required between the Water Reclamation Facility and the generator. The feeder routed with the effluent discharge piping, at a distance of approximately 1500 feet, adds $25,000 to the overall construction cost.

Parallel cogeneration was also considered. The Public Utility Regulatory Policies Act (PURPA) of 1978 requires utility companies to buy power back from "Qualifying Facilities" at an "avoided rate." Avista Utilities Schedule 62 “Cogeneration and Small Power Production Schedule - Idaho” describes the terms and limits of parallel operation in Idaho. The generating facility would fall under the Standard Non-Fueled Firm Energy Rates and would be subject to a Seasonal Factor and Daily Shape Adjustment. The resultant rate shall be applied to the project output, for all kilowatt-hours up to 10 average megawatts in any given month. The applicable rate would be negotiated, but in general would be 85 percent of the weighted average of the daily on-peak and off-peak Dow Jones Mid-Columbia Non-Firm Index prices for non-firm energy. Based on generating an average of 14KW to 41KW and $0.051 per KWhr the Facility would receive an annual Avista Utility payment of between, $6,254 and $18,317.

The economic feasibility of either option (net metering or parallel production) is questionable (simple payback much greater than 10 years) considering the construction cost and annual maintenance cost to the City. However, other private entities which may be eligible for tax incentives or alternate funding may be able to partner with the City to provide an economically viable solution. Under this arrangement the City could receive some income or benefit from a reduced energy charge from the generating facility which would be owned and operated by a private entity. Further investigation would be required to determine the feasibility of this type of arrangement.

5.7.5 Cost

Preliminary opinions of capital and operating costs for each project phase and alternative appear in **Table 5-25**. Operational costs were assumed utilizing average 20-year projected flow. Detailed cost opinions for each alternative are included in **Appendix 5-F**.

Table 5-25 – Opinion of Probable Costs for Alternatives

Description	Capital Cost (Present Worth)	O&M Cost (20-Year Present Worth)	Total Cost (Present Worth)
Outfall Improvements without Power Generation			
• Phase 1 Piping - Eliminate the primary bottleneck	$1,620,000	NA	$1,620,000
• Phase 2 Piping - Provide secondary flow path (new outfall line) to existing outfall line	$280,000	NA	$280,000
Additional Costs for Power Generation			
• Alternative 1 - Critical infrastructure to add power generation in the future	$350,000	($81,360) *20-Year Net Revenue* [a]	$608,640
• Alternative 2 - Power Generation Facilities	$340,000		

[a] *O&M Costs assumes operator time for O&M of facility and power generation revenue at 5 mgd (14kw) power production.*

5.7.6 Conclusions and Summary

Phase 1 improvements should be completed as soon as possible to allow for continued flow increases and to alleviate bottlenecks at the lowest portions of the outfall. Phase 2 improvements are not likely to be necessary until late in the 20-year planning period.

Based on the cost analysis performed and presented previously, the additional costs to convert the current outfall, or planned future outfall to a power generation facility are significantly higher than the potential revenue to be generated. At this point, the alternative is not economically feasible. As flows increase, the evaluation becomes more economically viable as the power generation revenue increases. Based on the evaluation, the only potential methods of making a power generation alternative economically viable is by either:

- Obtaining green energy credits/grants to subsidize the initial capital outlay for construction of the facility, or
- Modify the system design to decrease the capital cost for construction and increase the power generation capacity.

5.7.7 Environmental

The recommended improvements related to the new pipelines have more potential environmental concerns versus improvements located within the current City WRF property. These improvements have potential impacts as follows:

- Land Use – The addition of the new river discharge pipeline will require utility easements when crossing private property. It will also require coordination for use of public rights of way for portions of the project.

- Cultural Resources – All projects will be crossing areas currently habited and may potentially be within areas of sensitive Cultural Resources. Further review and consultation of agencies will help identify if any Cultural Resources are expected as part of the project.
- Flora and Fauna – Impacts to Flora and Fauna will be short-term during construction, but are not expected to produce any long term impacts.
- Recreation and Open Space - Impacts to Recreation and Open Space will be short-term during construction, but are not expected to produce any long term impacts.
- Agricultural Lands - Impacts to Agricultural lands (if impacted) will be short-term during construction, but are not expected to produce any long term impacts. No agricultural lands are expected to be impacted.
- Air Quality - Impacts to Air Quality will be short-term during construction, but are not expected to produce any long-term impacts. Short-term impacts will be mitigated through the use of Best Management Practices during construction to mitigate fugitive dust.

5.8 Reuse of Reclaimed Wastewater

Wastewater treatment systems have long utilized land application as the final treatment step in Idaho and around the United States. However, land application is now part of the broader scope of wastewater reclamation and reuse. Reuse is increasingly being used to meet non-potable irrigation demands in areas of the country where water resources are constrained. Seasonal reclamation and reuse will be imperative to serve the projected level of build-out over the Rathdrum Prairie, including Post Falls and Rathdrum, while protecting the assets of the Rathdrum Prairie Aquifer as well as the Spokane River.

5.8.1 Existing and Potential Reuse Irrigation Areas

The cities of Post Falls, Rathdrum, and Hayden have realized that the availability of large parcels of land on the Rathdrum Prairie is rapidly diminishing while land costs are escalating. The cities have taken a proactive approach to secure land for future reuse. Rathdrum and Post Falls are distinct and antonymous municipalities. However, this analysis groups the two entities together because they have chosen to work cooperatively to treat and discharge wastewater. These cooperative agreements will require expansion to address their proportionate needs for wastewater reclamation and reuse.

Post Falls (618 acres) and Rathdrum (314 acres) currently own a total of 932 acres intended for reuse, with an estimated future capacity of 3.2 mgd. To serve expanded growth, the cities (Post Falls and Rathdrum) will need to obtain or have access to additional land for reuse.

Additional land acquired adjacent to existing and future reuse sites would be ideal. It would allow conveyance, storage, and irrigation infrastructure to be efficiently consolidated while minimizing unused land due to setback requirements. While those sites are ideal and should be prioritized for the entities, there is also potential for reuse at existing large irrigated sites in the study area. Existing parks, schools, transportation corridors, and golf courses are all potential candidates for reuse water and were identified in the Rathdrum Prairie Master Plan.

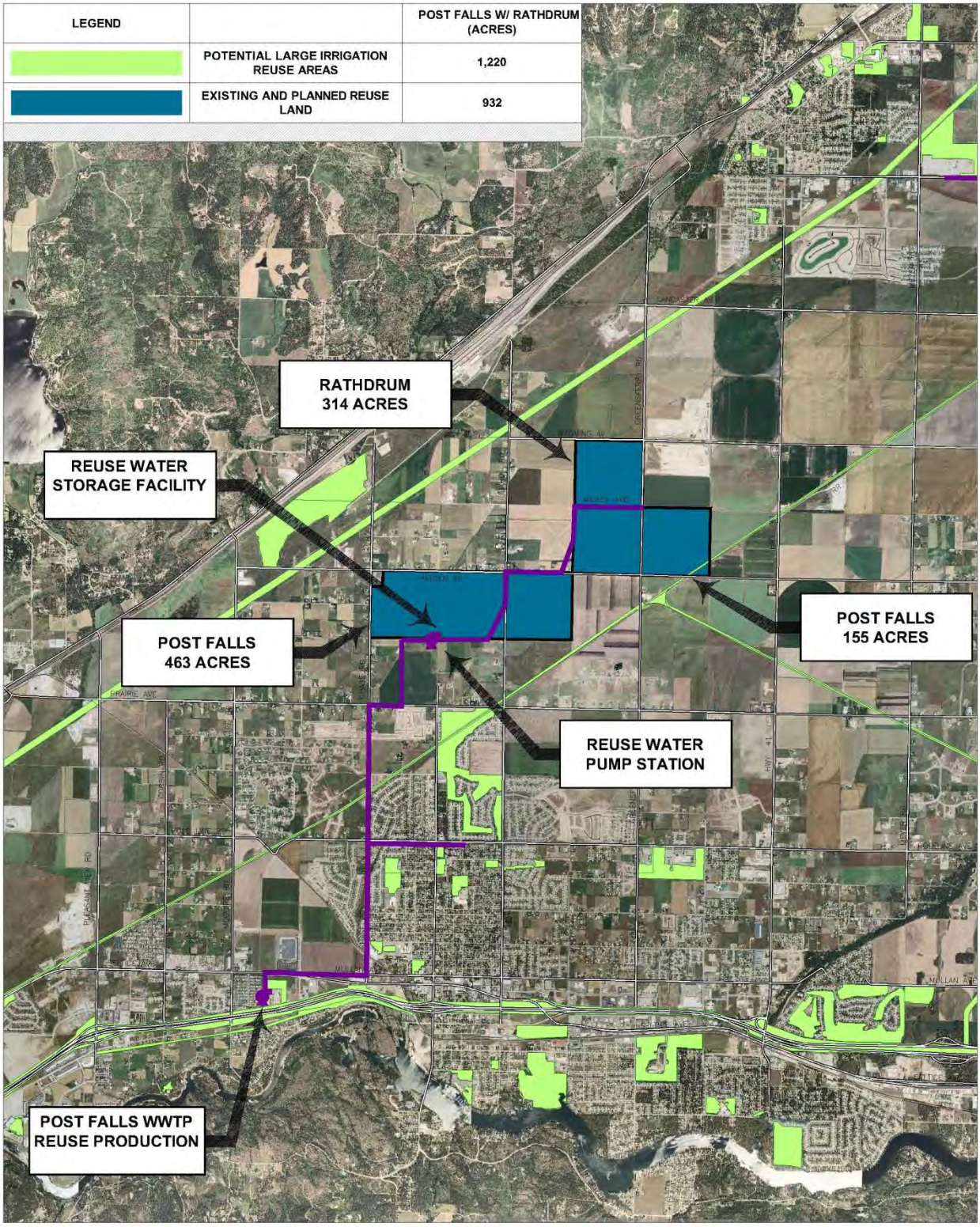
Post Falls' purchase of 618 acres of property in the Study Area (and Rathdrum's 314 acres) for future reuse set their initial prioritization in motion. As stated in the introduction of this section, the next step is obtaining an appropriate Reuse Permit. Groundwater monitoring, soil monitoring, and other data will be required along with a public comment process through IDEQ. The City should next develop the transmission, storage,

irrigation, and monitoring system to transition from an East Greenacres Irrigation District (aquifer) water supply to a reclaimed wastewater irrigation source.

The City of Rathdrum's land (314 acres) was purchased independent of any joint treatment or reuse efforts between the two cities. Although Rathdrum's land has been included in the total acreage available for reclaimed water irrigation and it is well suited for that purpose, it (or an equivalent acreage) must be purchased to achieve the reuse goals under all alternatives evaluated. Through discussions with both entities during the facility planning process, it was mutually determined that the City of Rathdrum is willing to sell their 314 acres to the City of Post Falls. Therefore, purchase of the City of Rathdrum's 314 acres as a reuse site will be included in the capital financial plan for the City of Post Falls.

Finally, reuse water must be transported from where it is treated to where it will be stored and utilized. Figure 5-12 shows the proposed locations of storage ponds and transmission main alignments to provide reuse wastewater to the current 932 acres of potential reuse property. An additional 582 acres of land will be required should the City plan to provide reuse application area for the entire 5.2 mgd 20-year planning period flow. Additional potential future land application areas identified during the Rathdrum Prairie Wastewater Master Plan (J-U-B, 2010) are also shown but are not currently under control by either City. Wastewater treated at the Post Falls WRF will be pumped from the treatment plant to the Post Falls and Rathdrum proposed reuse sites.

Figure 5-12 – Reuse Area



It is assumed that adequate storage and transmission capacity will be constructed for the Phase I project to adequately supply the entire 932-acre site with reuse water, with Phase II expanding the system to 5.2 mgd. The storage capacity requirement for land application of reuse wastewater is summarized in **Table 5-26**. It also sets the minimum pumping and transmission rates that will be required to deliver reuse water from the reclamation plant to the irrigated land. Class A reuse requires a minimum of 7 days storage of average flow, or an alternate discharge. The Post Falls plant has retained its river discharge point and may be able to utilize this in lieu of storage to manage Non-Compliance Class A reuse water.

Table 5-26 – Pumping, Transmission, and Storage Capacity Requirements

Stage	Land Application Area (Acres) [a]	Average Daily Reuse Flow (mgd)	Required Class "A" Non-Compliance Storage and Seasonal Storage (MG)
Post Falls w/Rathdrum Land (Phase I)	932	3.2	22.4 (assumed not required if river discharge is retained)
Expanded Land Application Area (Phase II)	582 Additional acres to be acquired	2	14 (assumed not required if river discharge is retained)
Total	1,514	5.2	36.4 mgd (assumed not required)
Full Reuse (No River Discharge) [b]	2,298 Additional acres to be acquired	5.2	1,092

[a] *Assumes 290 acres/mgd plant flow. Based on 2010 Rathdrum Prairie Wastewater Master Plan (J-U-B, 2010).*

[b] *Based on year-round reuse system with non-growing season storage and agronomic uptake rates from 2010 Rathdrum Prairie Wastewater Master Plan (J-U-B, 2010).*

In addition to non-compliance storage, additional storage is often required for holding water during the non-growing season. It has been assumed that storage during the non-growing season will likely not be pursued due to the extremely large storage volumes that must be provided. Rather, reclaimed water will be applied to irrigated areas during the growing season (reducing annual wasteloads discharged to the river); during the non-growing season, wastewater will be treated to NPDES requirements and discharged to the river outfall. For the purpose of comparison, both storage alternatives have been evaluated, including a "full reuse" year-round alternative for 5.2 mgd capacity. A Reclaimed Water Master Plan detailing SCADA, pumping, storage, and conveyance systems should be developed before implementation.

5.8.2 Reuse Permit Considerations

5.8.2.1 Permitting and Regulatory Considerations

The wastewater reclamation and reuse standards for the study area are governed by the Idaho Administrative Procedures Act (IDAPA) Part 58, Title 01. IDAPA is available on the State of Idaho website at http://adm.idaho.gov/adminrules/rules/idapa58/58index.htm. The primary IDAPA chapters that apply are:

- Chapter 2 – "Water Quality Standards"
- Chapter 8 – "Idaho Rules for Public Drinking Water Systems"

- Chapter 11 – "Groundwater Quality Rules"
- Chapter 16 – "Wastewater Rules"
- Chapter 17 – "Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater"

TM 4 outlines the requirements for reuse of municipal reclaimed wastewater under Chapter 17 "Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater". It subdivides reuse into five classes (A through E) from the most stringent treatment and reliability standards to the least stringent treatment standard with the most restrictive buffer zones and access requirements, respectively. With the addition of coagulation, filtration, and enhanced disinfection, Post Falls could practice Class B or even Class A reuse, depending on their available treatment trains and reuse location.

As discussed in TM 4, additional requirements and regulations exist over the SVRP Special Resource Aquifer. Reuse is a permitted activity in Idaho under IDAPA 58.01.17.300, which references the "Idaho Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater" (IDEQ, 2007). Section 12.11 of the Guidance includes the "Spokane Valley-Rathdrum Prairie Aquifer Wastewater Land Application Special Supplemental Guidelines" (IDEQ, 1995). Conclusions and recommendations of the Special Supplemental Guidelines include the following:

Conclusions:

1. Land application of treated effluent has occurred over the Rathdrum Prairie Aquifer under carefully managed conditions with limited increases for monitored constituents in vadose zone water.
2. Irrigation scheduling using daily soil moisture measurements can be used to minimize migration of nutrients past the root zone.
3. Nutrients can be applied with wastewater effluent with little or no observable migration beyond the root zone of the crops.
4. The tradeoffs between crop production and fertilizer use should be evaluated for each site considering the potential for nutrient migration and the need to establish and maintain vigorous crops.
5. Crop selection is critical to the successful operation of a land application system.

Recommendations:

1. Limit the hydraulic loading rate to the mean monthly crop water requirement. (Initial design should be based on a 5- to 10-year precipitation occurrence interval, with daily irrigation based on soil moisture monitoring always greater than 10 centibars.)
2. Limit nitrogen to crop nitrogen requirements. (Include a fraction above crop uptake to allow for losses that occur in the soil, initially 10 to 20 percent.)
3. Select deep rooting crops with high uptake rates.
4. Apply effluent with an irrigation system that is well maintained and efficient in distributing water evenly across the site. (Allow for supplemental irrigation water in years with less than design precipitation rates.)
5. Assess the site soils, hydrology, and climate. (An unacceptable evaluation on soil, buffer zones, land use, or wellhead protection can eliminate a site from consideration.)
6. Prepare a management plan that integrates effluent management with suitable agricultural best management practices (BMPs). (Include harvest schedule, hydraulic requirements, nutrient requirements, crop rotation, and pest control.)

7. Phosphorus should also be monitored, but annual application rates need not be limited to agronomic rates.
8. To determine acceptability of loading rates beyond the agronomic rates recommended, additional studies are needed.
9. Provide lagoon storage for all systems. Size the storage to retain all reclaimed water (in a single outfall system) or at least one week's flow to accommodate temporary irrigation cessation due to weather or harvest schedules (multiple outfall system). Construct all lagoons with a synthetic liner. Lagoons greater than 500,000 gallons must be constructed with a second level of protection approved by DEQ.
10. A monitoring and sampling program should include wastewater effluent sampling, soil moisture monitoring, soil water sampling, soil sampling, and groundwater monitoring in accordance with the "Interpretive Supplement to the Guidelines for Land Application of Municipal and Industrial Wastewater, March 1988" (Idaho Division of Environmental Quality, 1994). It is important to note that the "Interpretive Supplement" referred to above has been superseded by the current IDEQ Guidance for Reclamation and Reuse.

5.8.2.2 Crop Considerations

A healthy vegetative cover is essential for a wastewater land treatment system to effectively treat wastewater. The primary role of vegetation in a land treatment system is to recycle nutrients in the wastewater into a harvestable crop. In order to reuse and remove nutrients applied from wastewater land treatment, the crop must be harvested and removed from the treatment site. Harvesting operations should be conducted when soil moisture conditions are below field capacity. In slow rate systems designed for agricultural reuse, nitrogen is generally the limiting nutrient.

Hydraulic loading of wastewater and supplemental irrigation water are fundamental land treatment design and operational parameters. Appropriate hydraulic loading rates, in both the growing and non-growing seasons, are of critical importance to minimize adverse environmental impacts from wastewater reuse. The length of the growing season is an important criterion when designing a wastewater land treatment system. The growing season is determined by climatic conditions, which vary throughout the state. The IDEQ Reuse Guidance shows 135 to 155 frost-free days typically for the Rathdrum Prairie. Additional information for growing season and hydraulic loading rates for individual crops are shown on the Agrimet Web site at http://www.usbr.gov/pn/agrimet/cropdates.html.

5.8.3 Reuse Demonstration Projects

The City is interested in developing an active large-scale reuse system, but would initially like to develop smaller areas using reclaimed wastewater that could be used for demonstrating to the public and regulatory agencies the safety, reliability, and value of this resource and improve public perception of reuse activities. Initial screening identified the following areas where reuse water could be applied for a demonstration project:

- WRF and Public Works office property (12 acres for irrigation)
- Centennial Trail corridor - Spokane Street to Pleasant View (28 acres)
- I-90 right-of-way irrigation - Spokane Street to Pleasant View (90 acres)

These areas are contiguous to the WRF, allowing for reuse piping to be more easily constructed. Further, all have existing or potential irrigation demand. The primary requirements for developing reuse projects in each of these areas are shown in **Table 5-27**. As can be seen, until increased UV disinfection, coagulation, and filtration are added (to meet Class A requirements), the viability of developing a reuse demonstration project outside the City's property is very unlikely. As such, costs were developed for a demonstration project on only the WRF/Public Works Property.

Table 5-27 – Reuse Demonstration Project Requirements

Site	Land Area (acres)	Irrigation Requirement (in/day) [a]	Total Volume (gal/day)	Reuse Class Required
WRF and Public Works office property	12	0.14	45,600	Class C or D; irrigation to be contained within fence of facilities, with no public access.
Centennial Trail corridor	28	0.14	106,400	Class A required; unrestricted access.
I-90 right-of-way irrigation [b]	90	0.14	342,000	Class A required; unrestricted access.

[a] *Assumes average for lawn irrigation applied at 22 inches ET over 150 growing days.*

[b] *May be capable of irrigating with Class C or D effluent if determined acceptable to IDEQ.*

5.8.4 Costs

Table 5-28 presents preliminary opinion of probable capital costs for construction of a Class A Reuse System on the City's 618-acre site, Rathdrum's 314 acres (plus an additional 582 acres) utilizing wheel-line irrigation. Additional detailed cost breakdowns are included in **Appendix 5-G**.

Table 5-28 – Class A Reuse Site Costs

Item	Description	Capital Cost (Present Worth)	O&M Cost	Total Cost (Present Worth)
1	3.2 MGD Class A Land Application Reuse (Existing City Owned Property and Rathdrum land)	$17,800,000	$982,000	$18,782,000
2	5.2 MGD Class A Land Application Reuse [a]	$27,890,000	$1,547,000	$29,437,000
3	5.2 MGD Class A Land Application Reuse [b]	$109,900,000	$2,784,000	$112,684,000
4	Class A Disinfection *(presented previously, 5.2 mgd)*	$1,943,000	$1,052,000	$2,995,000

[a] *Includes costs for Item 1 - 3.2 mgd capacity, and additional costs for expanded land application area, and new land acquisition. Assumes no additional storage for non-growing season or non-compliance water storage.*

[b] *Assumes no river discharge retained and storage for non-growing season provided.*

Table 5-29 presents a preliminary opinion of probable capital costs for construction of the Reuse Demonstration Project.

Table 5-29 – Reuse Demonstration Project Costs

Item	Description	Capital Cost (Present Worth)
1	WRF and Public Works office and adjacent property (Class C or D)	$167,600

5.8.5 Recommendations

The City should continue developing their Water Reclamation and Reuse system on their 618 (and Rathdrum's' 314) acre agricultural land as funding allows to begin to offset phosphorus being discharged to the Spokane River, reducing TP wasteload. This will become increasingly important as flows increase, thus requiring lower and lower effluent phosphorous concentrations to meet the wasteload allocation.

Further, to begin to evaluate the benefits to off-setting potable water demand and improve public perception of reuse activities, the City should continue with their proposed Class C or B, reuse demonstration project on the WRF and Public Works building properties and areas adjacent to the WRF including the I-90 right of way.

5.8.6 Environmental

The recommended improvements related to the land application reuse system have more potential environmental concerns versus improvements located within the current City WRF property. These improvements have potential impacts as follows:

- Land Use – The land application reuse system will require utility easements when crossing private property. It will also require coordination for use of public rights of way for portions of the project to obtain easements for pipelines pumping to the new land application areas if not contiguous to the current site.
- Cultural Resources – All projects will be crossing areas currently habited and may potentially be within areas of sensitive Cultural Resources. Further review and consultation of agencies will help identify if any Cultural Resources are expected as part of the project.
- Flora and Fauna – Impacts to Flora and Fauna will be short-term during construction, but are not expected to produce any long-term impacts. Reuse activities will likely produce either a seasonal crop such as Hay or Alfalfa, but could be utilized on forest crops such as the Hybrid Poplars currently utilized by the Hayden Area Regional Sewer Board Reuse site.
- Recreation and Open Space – Impacts to Recreation and Open Space will be short-term during construction, but are not expected to produce any long-term impacts.
- Agricultural Lands – Impacts to Agricultural lands will be short-term during construction and are not expected to produce any long-term impacts. Areas that are currently agricultural may be utilized for effluent storage lagoons to continue the use as agricultural areas.
- Air Quality – Impacts to Air Quality will be short-term during construction, but are not expected to produce any long-term impacts. Short-term impacts will be mitigated through Best Management Practices during construction to mitigate fugitive dust.

5.9 Biosolids Management

5.9.1 Review of Existing Facilities

The existing solids handling facilities were described and evaluated in TM 2. For convenience, the information is again briefly summarized.

Excess sludge (WAS) is wasted from the secondary clarifiers and pumped into two aerated sludge holding tanks where it is held until it is dewatered. The WAS is not digested (i.e., volatile solids reduction). This is

desirable from the standpoint of the biological phosphorus removal process, but it can result in odors problems if the dewatered sludge is stockpiled for even short periods.

The sludge is dewatered by two belt filter presses. The sludge is dewatered as soon as possible to minimize the release of phosphorus. Holding time before dewatering is typically less than three days.

The belt filter presses produce a sludge cake typically consisting of 14 to 15 percent solids. Dewatered sludge is stored under a canopy cover until it is picked up by the disposal contractor. The current disposal contractor operates a composting operation west of Spokane. The previous disposal contractor operated a land application site near Ritzville. The contractor stockpiled the sludge prior to land application. The procedure of stockpiling resulted in odor problems and the early termination of the disposal contract.

5.9.2 Design Criteria

The projected annual sludge production for the next 20-year design period is shown in **Table 5-30**. The projection was made by calculating the average solids generated per million gallons of influent for the period of 2009-2011 and assuming that 150 mg alum/l are added for phosphorus removal beginning in 2018. During 2009-2011, approximately 75 gpd of MgOH was added to the influent flow for pH control. It was assumed the use of MgOH was continued throughout the design period.

Table 5-30 – Projected Sludge Production

Year	Flow	Dry Solids Wasted	WAS Volume @ 10,000 mg/L	Dewatered Sludge [1]	Dewatered Sludge	Dewatered Sludge
	[mgd]	[dry lbs/day]	[gpd]	[wet lbs/day]	[wet tons/day]	[wet tons/yr]
2011	2.40	4,664	55,920	31,726	15.9	5,790
2012	2.54	4,936	59,182	33,577	16.8	6,128
2013	2.68	5,208	62,444	35,427	17.7	6,466
2014	2.82	5,480	65,706	37,278	18.6	6,803
2015	2.96	5,752	68,968	39,129	19.6	7,141
2016	3.10	6,024	72,230	40,979	20.5	7,479
2017	3.24	6,296	75,492	42,830	21.4	7,817
2018	3.38	8,120	97,358	55,236	27.6	10,080
2019	3.52	8,456	101,390	57,523	28.8	10,498
2020	3.66	8,792	105,423	59,811	29.9	10,916
2021	3.80	9,129	109,455	62,099	31.0	11,333
2022	3.94	9,465	113,488	64,387	32.2	11,751
2023	4.08	9,801	117,521	66,675	33.3	12,168
2024	4.22	10,138	121,553	68,963	34.5	12,586
2025	4.36	10,474	125,586	71,251	35.6	13,003
2026	4.50	10,810	129,618	73,538	36.8	13,421
2027	4.64	11,146	133,651	75,826	37.9	13,838
2028	4.78	11,483	137,683	78,114	39.1	14,256
2029	4.92	11,819	141,716	80,402	40.2	14,673
2030	5.06	12,155	145,748	82,690	41.3	15,091
2031	5.20	12,492	149,781	84,978	42.5	15,508

1 Assumes dewatered sludge cake of 14.7%

5.9.3 Biosolids Management Plan

5.9.3.1 Plan Introduction and Components Evaluated

Biosolids management is a broad term that covers all aspects of handling, treatment, and ultimate disposal. In this report, the management plan was divided into four components. Options for implementing each component were chosen and the life cycle cost of each option was developed. The options were then grouped together to make a complete Biosolids Management Plan. Several alternative plans were developed for comparison.

A set of evaluation criteria was developed to compare the alternative plans. Each criteria was given a weighting factor so that the more important criteria could be emphasized. Each plan was ranked based on the evaluation criteria and the weighting factor applied. Each plan was scored by summing the criteria rank times the weighting factor. The highest score indicates the preferred alternative.

The components and options evaluated were as described in **Table 5-31**:

Table 5-31 – Biosolids Management Plan Summary

Components of the Biosolids Management Plan	Component Option
Sludge Thickening	Gravity belt thickener
Sludge Holding or Digestion	No digestion (i.e., a holding tank) Aerobic Anaerobic
Sludge Dewatering	Belt filter press Centrifuge Screw press
Further Treatment	Alkali stabilization Heat drying Composting
Disposal and Reuse	Land Application – Picked up and distributed by a private contractor or distributed by the City to City-owned property

5.9.3.2 Sludge Thickening

The solids content of the WAS from the clarifiers is relatively dilute. Thickening is a procedure to increase the solids content of the sludge by removing some of the water fraction. The thickened sludge requires less tank volume and is generally easier to further process and dewater. For example, the average solids concentration of the WAS from the clarifiers is 10,400 mg/l. If it is thickened to a concentration of 25,000 mg/l, the volume is reduced by 2.4 times. As a consequence, the volume of holding tanks, digesters, and the hydraulic capacity dewatering equipment can be reduced.

Common methods of sludge thickening are gravity settling, floatation thickening, a rotary drum thickener, a centrifuge, and a gravity belt thickener. Gravity settling is accomplished in a tank similar to a clarifier. This

method was not evaluated because there is a potential for phosphorus to be released from the thickened sludge. In flotation thickening, dissolved air is introduced into the sludge under pressure. When the solution is de-pressurized, the dissolved air is released as very fine bubbles that float the sludge solids to the top where they are skimmed off. Since this process is aerobic, it is compatible with the BPR process. Rotary drums, centrifuges, and gravity belts are also aerobic and would be compatible with the BPR process.

Of these methods, the gravity belt thickener was considered because it is less expensive than a centrifuge, the operators are already familiar with similar types of equipment, the existing BDP belt filter press already has a gravity belt section that can be operated independently for thickening, and there is space available in the dewatering building that has an existing underdrain system.

The cost to install a 2.0 meter gravity belt thickener is estimated at $481,000.

5.9.3.3 Sludge Digestion

Digestion is a process that will further reduce the pathogens and volatile solids content of the waste sludge. Digested sludge is more stable. It dewaters better and is less likely to produce odors. However, sludge digestion is not necessary, depending on what method of sludge disposal is used or if a process to further treat the sludge is used. For example, composting is a process that further treats the sludge, making sludge digestion unnecessary. However, digestion before composting is often employed anyway because it makes the composting process easier to operate. Other disposal methods that would not require digestion are alkali stabilization, thermal drying, and incineration. Like composting, digestion (or partial digestion) is often employed with them because it reduces the potential for upsets and odors.

Holding Without Digestion:

Sludge holding prior to dewatering without digestion is the current practice. Digestion is not required because the sludge disposal is by a Contractor who then composts the sludge or land applies it in accordance with the Part 503 Biosolids Rule. It should be noted that the option of land application is available only if the sludge meets the pathogen reduction requirements of the Part 503 Rule. Meeting the requirement has not been a problem in the past, although some recent tests have come close.

Currently, the waste activated sludge is pumped to aerobic holding tanks where it is held until it is dewatered. Holding time in the tanks is typically less than 3 days, which is too short for any appreciable amount of volatile solids reduction to occur. The short holding time is desirable for the biological phosphorus removal process, but not from the standpoint of pathogen and vector attraction reduction, dewatering, and odor potential.

The dewatered sludge cake coming off the belt filter press averages 14 to 15 percent. This is anticipated to be the best possible performance from an undigested waste activated sludge. The volatile fraction of the dewatered sludge is typically 80 to 85 percent.

A holding tank must be aerated to prevent odors. It should be sized to provide time to maintain and repair the sludge dewatering equipment. The holding volume can be offset to some degree by having redundant sludge dewatering equipment. Post Falls has two belt filter presses. Holding tank volume to provide five days of holding time at design is recommended. Sludge thickening to reduce the required volume is recommended.

Table 5-32 – Holding Tank Design Criteria

Sludge Age	5 days
Maximum Temperature	23° C
Volatile Solids Reduction	20%
Feed Solids	12,492 lbs/d
Feed Solids Concentration	25,000 mg/l
Volatile Solids Fraction	78%
Oxygen Requirement	2.3 lbs O2/lb vs destroyed
Peak Oxygen Requirement	4,482 lbs O2/day

At the current average WAS concentration of 10,400 mg/l, the required tank volume would be 720,000 gallons. Having the WAS thickened to 2.5 percent reduces the required tank volume 300,000 gallons.

The existing No. 1 and No. 2 holding tanks are 100,000 and 220,000 gallon, making a total volume of 320,000 gallons. Therefore, the existing two holding tanks have adequate volume for five days of storage if the WAS is thickened to 2.5 percent.

At design, the aeration system in both tanks would be inadequate and require upgrading/replacement. The capital cost to replace the aeration system in the existing tanks is estimated at $ 617,000. The present worth cost to operate the aeration systems is estimated at $481,000. The total present worth cost is estimated at $1,098,000.

Aerobic Digestion:

The objectives of aerobic digestion are to stabilize the volatile solids, reduce the sludge volume, reduce odor potential, reduce pathogens, and the improvement of sludge dewaterability. Volatile solids must be reduced by 38 percent in order to meet vector attraction reduction requirements of the Part 503 Biosolids Rule without requiring the biosolids to be incorporated into the soil.

A well designed and operated aerobic digestion facility has the following advantages:

- Generally has lower capital cost than anaerobic digestion for facilities under 5 mgd (Process Design Manual: Sludge Treatment and Disposal, EPA 625/1-79-011)
- Is relatively simple to operate compared to anaerobic systems
- Does not generate nuisance odors
- Will produce a supernatant low in BOD_5, suspended solids, and ammonia nitrogen
- Reduces the amount of grease in the sludge
- Reduces the number of pathogens to a low level

Some disadvantages with the aerobic digestion process are:

- Usually produces a sludge with very poor mechanical dewatering characteristics
- Has a high power cost for supplying the oxygen
- Is significantly influenced by temperature (large tanks are required in cold temperatures)

Digestion will release phosphorus that had been removed by the biological phosphorus removal process. The amount of p-release is difficult to estimate; therefore, the impact on the BPR process is unknown. Some research has shown that it can be dependent on pH and dissolved oxygen concentration (*Phosphorus Release in Aerobic Sludge Digestion*, Water Environment Research, V 77, No. 5). The side stream from digester decant or sludge dewatering could be treated by adding a coagulant and using a plate settler to remove the solids.

Design criteria are listed in **Table 5-33**.

Table 5-33 – Aerobic Digester Design Criteria

Volatile Solids Reduction	38%
Minimum Temperature	10° C
Maximum Temperature	22° C
Sludge Age	40 days
Feed Suspended Solids	25,000 mg/l
Digested Suspended Solids	70% of the feed solids
Volatile Fraction of Digester Suspended Solids	0.80
Peak Oxygen Requirement	10,400 lbs O2/day

The tank volume required to provide 38 percent volatile solids reduction at the minimum design temperature is 1.2 Mgal. This assumes that the feed sludge to the aerobic digester is thickened to at least 2.5 percent. Concentrating the solids to greater than 3 percent is generally not practical because it becomes difficult to transfer enough oxygen.

Life cycle costs:

Capital Cost	$9,971,800
Electrical Cost	$1,275,000
Subtotal	$11,246,800
Disposal Cost	$4,730,000
Total Cost	**$15,976,800**

Anaerobic Digestion:

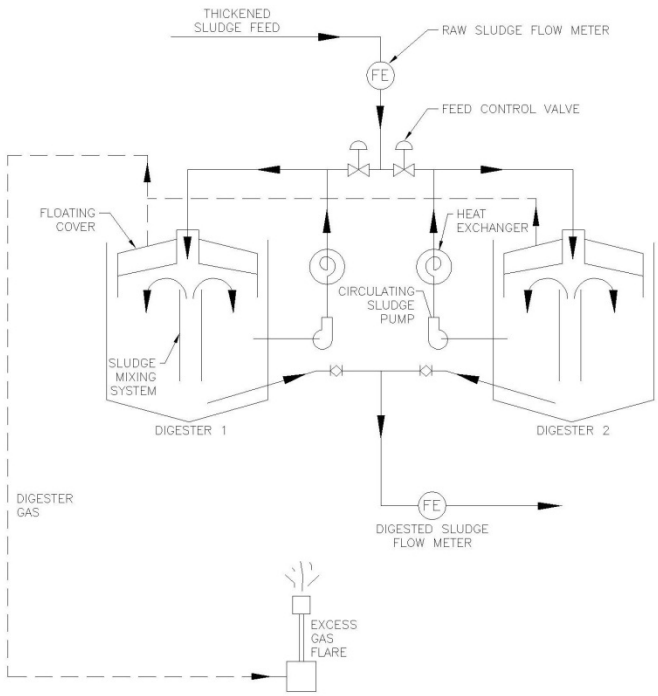
The objectives of anaerobic digestion are to stabilize the volatile solids, reduce the sludge volume, odor reduction, pathogen reduction, useful gas production, and the improvement of sludge dewaterability. Volatile solids are typically reduced by 60 to 75 percent, with final volatile matter contents of 40 to 50 percent. As the name implies, the process is performed in the absence of oxygen.

Anaerobic digestion will release phosphorus that had been removed by the biological phosphorus removal process. However, the release has also been reported to be substantially smaller than expected due to precipitation with metal salts present in the sludge. If the release has an adverse impact on the BPR process, the side stream from sludge dewatering can be treated by adding a coagulant and using a plate settler to remove the solids.

The two common process configurations are low-rate and high-rate processes. In the high-rate process, the solids loading rate is much greater (up to four times), the retention period is lower (one-half), mixing capacity

is greater and improved, and the sludge is heated to a typical operating temperature of 95° F. The high rate system is better suited for Post Falls. A schematic design of the process is shown in **Figure 5-13**.

Figure 5-13 – Anaerobic Digester Schematic



Thickening of the sludge feed is needed so that the design detention time can be maintained with smaller tanks.

Design parameters are listed in **Table 5-34**.

Table 5-34 – Anaerobic Digester Design Parameters

Feed Solids	12,492 lbs/day
Feed Solids Concentration	25,000 mg/l
Volatile Solids Fraction	78%
Operating Temperature	95° F (35° C)
Minimum Sludge Age	10 days
Mechanical Mixing	0.04 hp/1,000 gallons

The tank volume required to provide 10 days of solids retention time is approximately 600,000 gallons. Additional volume is needed to accommodate scum and gas storage. Two tanks are assumed with a diameter of 50 feet and wall height of 30 feet.

The major equipment components are the tanks, a cover, the sludge heating system, sludge mixing system, and gas storage system.

Life cycle costs:

Capital Cost	$6,629,600
Mixing Costs	$329,362
Subtotal	$6,958,962
Haul/Disposal Cost	$6,608,000
Total Cost	**$13,566,962**

Heating costs were assumed to be offset by the use of digester gas.

5.9.3.4 Sludge Dewatering

Sludge dewatering is a physical operation used to reduce the moisture content of the sludge for the following reasons:

- To reduce the cost of trucking the sludge to the ultimate disposal site.
- Dewatering is required if further treatment processes such as composting, alkaline stabilization, or heat drying are to be used.

There are several methods or techniques available for dewatering. Three methods commonly used, and the three methods evaluated here, are the belt filter press, the centrifuge, and the screw press.

Belt Filter Press:

A belt filter press (BFP) is a continuously fed device that presses the sludge between two porous belts, allowing the water to be removed. It is the predominant method of sludge dewatering in the United States and is the method currently used at the Post Falls treatment plant. A second larger BFP was installed in 2011.

The aerobic, undigested waste sludge at the Post Falls treatment plant does not dewater easily. The average total solids concentration achieved at Post Falls is 14 to 15 percent. This is typical for this type of sludge and aerobically digested sludge. Anaerobically digested sludge can typically be dewatered to 18 to 20 percent total solids.

The cost of a belt filter press, including the polymer system, feed pumps, dewatered sludge conveyor, and appurtenances, is approximately $1,097,000.

Centrifuge:

A centrifuge can be used to both thicken and dewater sludge by centrifugal force typically 50 to 300 times that of gravity. The solid bowl scroll centrifuge is the most widely used type. It rotates along a horizontal axis and operates in a continuous feed mode. It consists of a rotating bowl having a cylindrical, conical shape and an internal screw conveyor. Sludge is introduced into the rotating bowl and the solids concentrate on the periphery. The screw conveyor spinning at a slightly different speed moves the solids to the discharge end.

Centrifuges generally preform very well on anaerobically digested sludge. Cake solids up to 20 percent are a reasonable expectation. However, 14 to 155 percent is typical for sludge that has been aerobically digested or that has not been digested.

The cost of an Andritz D7L centrifuge, including the polymer system, feed pumps, dewatered sludge conveyor, and appurtenances, is approximately $2,127,000.

Screw Press:

The screw press operates by blending polymer into the sludge in a flocculation reactor. Flocculated sludge then flows into the screw press that includes a conical wedge wire screen basket and a slowly rotating screw driven by a VFD. The sludge is driven through the center of the screen basket by the screw. Water drains by gravity through the screen basket. The screw flights have brushes for continuous internal cleaning of the screen basket, and the outside of the screen basket is cleaned periodically with a water spray. The screw pushes dewatered sludge to the upper end of the basket where it is compressed against a pressure cone to maximize dewatering performance before being discharged.

A Huber Screw Press, ModelRoS3 Q 280 was pilot tested at the Hayden Area Regional Wastewater Treatment Facility in May 2011. The Hayden treatment process is similar to the process at Post Falls. They operate oxidation ditches, utilize an aerobic sludge holding tank, and dewater sludge with a belt filter press. The differences between the plants is Hayden does not have BPR, operates the oxidation ditches at a longer sludge age, and achieves some, although minimal, digestion in the sludge holding tank. The belt filter press is the same make and model as the number one BFP at Post Falls. The dewatered cake solids from the belt filter press is approximately 14 percent at each treatment plant.

The pilot results were cake solids that ranged between 17.2 and 21.4 percent. The polymer consumption ranged between 14.4 and 38 lbs/ton of dry solids, depending on the polymer used.

A screw press has a relatively slow feed rate. A full-scale screw press, the Model RoS 3/2, has a hydraulic capacity of approximately 54 gpm and a solids loading capacity of 270 lbs dry solids/hour at a feed concentration of 1 percent (typical unthickened concentration). At a 2.5 percent feed concentration, its capacity is 40 gpm and 500 lbs dry solids/hr.

To handle the design loading, sludge thickening would be recommended and multiple screw press units would be required. Assuming a 10-hour operating day, three screw presses would be required.

The cost of a Huber RoS3 screw press, including the polymer system, feed pumps, dewatered sludge conveyor, and appurtenances is approximately $1,823,000.

Evaluation of Emerging Technology for Enhanced Sludge Dewatering:

Dewatering waste aerobic sludge that has received little additional oxidation of the volatile solids presents a problem because the volatile solids have a high pore diameter and that reduces the permeability and dewaterability of the sludge. All conventional dewatering processes such as belt filter press centrifuge and screw press are limited to final cake solids of 13 to 18 percent. Post Falls' dewatered solids are typically 14.7 percent. Options for improving dewaterability, including aerobic digestion and anaerobic digestion discussed previously, are expensive and possibly release phosphorus back into the system.

Electro-kinetic (EK) dewatering is an emerging technology that enhances the dewatering process by applying an electric field to the sludge. Typically, 10 to 60 volts of direct current electricity is required. The process reportedly will produce 30 to 40 percent solids.

In February 2012, a pilot test of EK dewatering using 1,500 ml of waste activated sludge was conducted at the Post Falls WRF. The sludge was placed in a 6-inch porcelain funnel on top of a piece of belt filter press belt fabric. A 36 VDC charge was applied to the sludge for 15 minutes, then the water was drained by gravity through the belt fabric. Water drained more quickly from the EK dewatered sample than it did from an uncharged control sample; however, the final solids concentration of both samples was approximately the same.

In 2008, the Plum Island Water Pollution Control Plant (WRCP) piloted an ELCOTECH CINETIK™ 100 PILOT UNIT. When operating on a centrifuge dewatered 100 percent WAS feedstock with a dewatered cake concentration of 17 percent solids, the unit was able to dry the WAS to a solids content of 35 percent. Lifecycle cost estimates (capital and net present operating costs) indicated an economic payback period in excess of 15 years that was not sufficiently attractive to warrant further consideration.

The very limited amount of historic experience and lack of any full-scale installations led us to eliminate this technology from further consideration at this time.

5.9.3.5 Further Sludge Treatment and Final Disposal

Ultimately, sewage sludge is disposed of in one of the following ways:

1. Applied to the land as a soil conditioner
2. Placed in a surface disposal site for final disposal
3. Incinerated

Federal Regulation 40 CFR Part 503 ("the Part 503 rule") establishes the minimum national requirements for the management of solids generated during the process of treating municipal wastewater. In this section, the requirements of the Part 503 rule are first discussed, then further treatment and disposal options are discussed.

Requirements for Land Application

The Part 503 Biosolids rule requires that sewage sludge meet requirements in the following areas before it can be land applied:

1. Pollutant limits
2. Pathogen reduction
3. Vector attraction reduction

Pollutant Limits: All biosolids applied to the land must meet ceiling concentration limits for heavy metals and also either pollutant concentration limits or cumulative pollutant loading rate limits plus annual pollutant loading rate limits.

The ceiling concentration limits are the maximum allowable concentrations of the pollutant(s) in the biosolids applied to land. Biosolids with pollutant concentrations higher than the ceiling concentration limits may not be applied to land.

The pollutant concentration limits are lower concentration limits that when achieved, exempts the biosolids from the cumulative and annual loading rate limits as well as from some record keeping requirements.

Historically, biosolids from the Post Falls WRF have easily met the pollutant concentration limits. The maximum pollutant concentrations measured in the Post Falls biosolids are compared with the pollutant ceiling limits and concentration limits in **Table 5-35**.

Table 5-35 – Ceiling and Pollutant Concentration Limits for Land Applied Biosolids

	Post Falls Sludge [a] (mg/kg)	Part 503 Rule Limits	
		Ceiling Concentration (mg/kg)	Pollutant Concentration (mg/kg)
Arsenic	8	75	41
Cadmium	2	85	39
Chromium	20	3,000	1,200
Copper	172	4,300	1,500
Lead	12	840	300
Mercury	1.130	57	17
Nickel	14	420	420
Selenium	5	100	36
Zinc	587	7,500	2,800

[a] *Maximum concentrations from quarterly sampling for 4th quarter 2010 and 1st, 2nd and 3rd quarters of 2011*

Pathogen Reduction: Pathogens are disease-causing organisms such as bacteria, viruses, and parasites. The Part 503 Rule designates two levels of pathogen reduction. They are Class A and Class B. Biosolids meeting the Class A criteria can be distributed to the general public with some restrictions. Class B biosolids are treated to a lesser degree than Class A. Biosolids of this quality are restricted in how they can be land applied. Typically, Class B biosolids are applied to agricultural lands with restricted access to the public and use of the crops.

- **Class A Requirements** – At the time of use, disposal, or sale, Class A biosolids must meet the following density requirements:
  - A density of fecal coliform in the biosolids of less than 1,000 most probable number (MPN) per gram of total dry solids, or
  - A Salmonella sp. bacteria density of less than 3 MPN per four grams of total dry biosolids

  In addition, the biosolids must be treated using one of the six following alternatives:

  1. **Alternative 1–Thermally Treated Biosolids**: Biosolids must be subjected to one of four time/temperature regimes.
  2. **Alternative 2–Biosolids Treated in a High pH/High Temperature Process**: Biosolids must meet specific pH, temperature, and air-drying requirements.
  3. **Alternative 3–Biosolids Treated in Other Processes**: Demonstrate that the process can reduce enteric viruses and viable helminth ova. Maintain operating conditions used in the demonstration after pathogen reduction demonstration is completed.
  4. **Alternative 4–Biosolids Treated in Unknown Process**: Biosolids must be tested for pathogens–Salmonella sp. or fecal coliform bacteria, enteric viruses, and viable helminth ova–at the time the biosolids are used or disposed, or, in certain situations, prepared for use or disposal.

5. **Alternative 5–Biosolids Treated in a PRFP**: Biosolids must be treated in one of the Processes to Further Reduce Pathogens (PFRP):

    a. **Composting**–Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the biosolids is maintained at 55° C or higher for 3 days. Using the windrow composting method, the temperature of the biosolids is maintained at 55° C or higher for 15 days or longer. During the period when the compost is maintained at 55° C or higher, the windrow is turned a minimum of five times.

    b. **Heat Drying**–Biosolids are dried by direct or indirect contact with hot gases to reduce the moisture content of the biosolids to 10 percent or lower. Either the temperature of the biosolids particles exceeds 80° C or the wet bulb temperature of the gas in contact with the biosolids as the biosolids leave the dryer exceeds 80° C.

    c. **Heat Treatment**–Liquid biosolids are heated to a temperature of 180° C or higher for 30 minutes.

    d. **Thermophilic Aerobic Digestion**–Liquid biosolids are agitated with air or oxygen to maintain aerobic conditions, and the mean cell residence time of the biosolids is 10 days at 55° C to 60° C.

    e. **Beta Ray Irradiation**–Biosolids are irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

    f. **Gamma Ray Irradiation**–Biosolids are irradiated with gamma rays from certain isotopes such as Cobalt 60 and Cesium 137 at room temperature (ca. 20° C).

    g. **Pasteurization**–The temperature of the biosolids is maintained at 70° C or higher for 30 minutes or longer.

6. **Alternative 6–Biosolids Treated in a Process Equivalent to a PFRP**: Biosolids must be treated in a process equivalent to one of the PFRPs, as determined by the permitting authority.

- **Class B Requirements –** The Part 503 Biosolids Rule provides the following three alternatives for meeting the Class B requirements:

    1. **Alternative 1–The Monitoring of Indicator Organisms**: Test for fecal coliform density as an indicator for all pathogens. The geometric mean of seven samples shall be less than 2 million MPNs per gram per total solids or less than 2 million CFUs per gram of total solids at the time of use or disposal.

    2. **Alternative 2–Biosolids Treated in a PSRP**: Biosolids must be treated in one of the Processes to Significantly Reduce Pathogens (PSRP):

        a. **Aerobic Digestion**–Biosolids are agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20° C and 60 days at 15° C.

        b. **Air Drying**–Biosolids are dried on sand beds or on paved or unpaved basins. The biosolids dry for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above 0° C.

c. **Anaerobic Digestion**–Biosolids are treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35° C to 55° C and 60 days at 20° C.

d. **Composting**–Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the biosolids is raised to 40° C or higher and maintained for 5 days. For 4 hours during the 5-day period, the temperature in the compost pile exceeds 55° C.

e. **Lime Stabilization–**Sufficient lime is added to the biosolids to raise the pH of the biosolids to 12 after 2 hours of contact.

3. **Alternative 3–Biosolids Treated in a Process Equivalent to a PSRP**: Biosolids must be treated in a process equivalent to one of the PSRPs, as determined by the permitting authority.

Vector Attraction Reduction: The pathogens in biosolids pose a disease risk when they are brought into contact with humans or other susceptible hosts, plants, or animals. Vectors, including flies, mosquitoes, fleas, and birds, can transmit pathogens physically to humans and other hosts through contact or biologically by playing a specific role in the life cycle of the pathogen. Reducing the attractiveness of biosolids to vectors reduces the potential for transmitting diseases from pathogens in biosolids. The Part 503 Rule contains the following 11 options for demonstrating reduced vector attraction:

1. **Option 1**: Meet 38 percent reduction in volatile solids content.
2. **Option 2**: Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit.
3. **Option 3**: Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit.
4. **Option 4**: Meet a specific oxygen uptake rate for aerobically digested biosolids.
5. **Option 5**: Use aerobic processes at greater than 40° C for 14 days or longer.
6. **Option 6**: Alkali addition under specified conditions.
7. **Option 7**: Dry biosolids with no unstabilized solids to at least 75 percent solids.
8. **Option 8**: Dry biosolids with unstabilized solids to at least 90 percent solids.
9. **Option 9**: Inject biosolids beneath the soil surface.
10. **Option 10**: Incorporate biosolids into the soil within 6 hours of application to or placement on the land.
11. **Option 11**: Cover biosolids placed on a surface disposal site with soil or other material at the end of each operating day. (Note: For surface disposal only.)

Requirements for Surface Disposal

Surface disposal is the placement of biosolids on an area of land for final disposal. Surface disposal sites include monofills, impoundment lagoons, dedicated disposal sites, and dedicated beneficial use sites.

Monofills are landfills where only biosolids are disposed. Monofills include trenches and area fills. In trenches, biosolids are placed in an excavated area that can be a wide, shallow trench or a narrow, deep

trench. In area fills, biosolids are placed on the original ground surface in mounds, layers, or diked containments. With area fills, excavation is not required (as it is with trenches) because biosolids are not placed below the ground surface. Area fills are often used when shallow bedrock or groundwater is present.

Impoundment Lagoons are disposal sites where biosolids with a high water content are placed in an open, excavated area. If lagoons are used for treatment, they are not considered surface disposal sites.

Dedicated Disposal Sites receive repeated applications of biosolids for the sole purpose of final disposal. Such sites are often located at publicly-owned treatment works (POTW) sites.

Dedicated Beneficial Use Sites are surface disposal sites where biosolids are placed on the land at higher rates or with higher pollutant concentrations than are allowed when biosolids are land applied for farming or reclamation. Such sites might receive repeated applications of biosolids. In contrast to dedicated disposal sites, dedicated beneficial use sites are used to grow crops for beneficial purposes. For such sites, the permitting authority will issue a permit that specifies appropriate management practices that ensure the protection of public health and the environment from any reasonably anticipated adverse effects of certain pollutants that may be present in biosolids if crops are grown or animals are grazed.

Surface disposal was deemed not worthy of further consideration because of the difficulties obtaining a permit for a landfill/monofill or impoundment lagoon over the Rathdrum Prairie Aquifer.

Requirements for Incineration

Incineration is the firing at high temperatures in an enclosed device. Incineration systems generally consist of an incinerator (furnace) and one or more air pollution control devices. The most common types of incinerators are multiple hearth, fluidized bed reactors, and electric furnaces. Auxiliary fuel such as natural gas is often used to enhance burning of the solids. Non-hazardous incinerator ash generated during the incineration of biosolids is not covered by the Part 503 Rule when it is disposed of. It must be disposed of according to the solid waste disposal regulations.

The Part 503 Rule covers requirements for biosolids incineration, including pollutant limits for seven metals, limits for total hydrocarbons, and frequently of monitoring requirements.

Contracting for Hauling and Disposal Services

This option is currently used by the City. The City pays a Contractor to pick up, haul away, and dispose of the sludge for $65 per wet ton.

This option makes the following assumptions:

- The sludge provided to the Contractor meets the concentration limits for pollutants as required by the Part 503 Rule.
- The sludge meets the Class B requirement for pathogen reduction.
- The sludge would <u>not</u> meet the requirements for vector attraction reduction at the treatment plant (this is the current situation). It would be the Contractor's responsibility to meet the vector attraction reduction requirements by one of the methods listed in the Part 503 Rule (e.g., incorporation, composting, drying, alkali addition, etc.).

For this alternative to be successful, the Contractor must recognize the potential for odors and have a plan and operation to minimize or treat them. The previous Contractor utilized by Post Falls could not successfully manage the odors. Their operation was suspended by the State, and Post Falls was left in a difficult situation, having no alternative option for sludge disposal.

Since the cost of disposal is based on a wet ton, this option is sensitive to the performance of the sludge dewatering. The present worth cost of this option for the next 20 years is $12,439,000.

Cost estimate assumptions:

- Dewatered sludge cake is 14.7% solids
- Disposal cost escalates at 3% per year
- Interest rate is 3%

On-Site Alkaline Stabilization

Alkaline stabilization is the process of mixing alkaline material, usually lime, with the sewage sludge to raise the pH to a point that is unfavorable for the growth of pathogens. The method is listed in the Part 503 Rule as an approved alternative for meeting Class B and Class A Pathogen requirements.

Generally, alkaline stabilization meets the Class B requirements when the pH of the mixture of wastewater solids and alkaline material is at 12 or above after two hours of contact. Class A requirements can be achieved when the pH of the mixture is maintained at or above 12 for at least 72 hours, with a temperature of 52°C maintained for at least 12 hours during this time.

Alkaline stabilization has several advantages, including the following:

- The ability to produce either Class B or Class A biosolids. The incremental cost to go from a Class B to Class A is relatively small.
- Consistency with the EPA's national beneficial reuse policy.
- Has a long-established history.
- Relatively simple to operate and can be easily started and stopped.
- Small land area required.

The disadvantages of the process are as follows:

- The process does not reduce organic matter. Other sludge stabilizing methods such as aerobic or anaerobic digestion involve the destruction of the volatile fraction of wastewater sludge, and therefore reduce the amount of sludge required for disposal. Alkaline stabilization will actually increase the amount of dry sludge solids because of the addition of lime. The volume of material to be managed and moved off site can be increased by 15 to 40 percent in comparison with a digestion process. This increased volume results in higher transportation costs when material is moved off site.
- There is a potential for odor generation both at the processing and end use site.
- There is a potential for dust production.

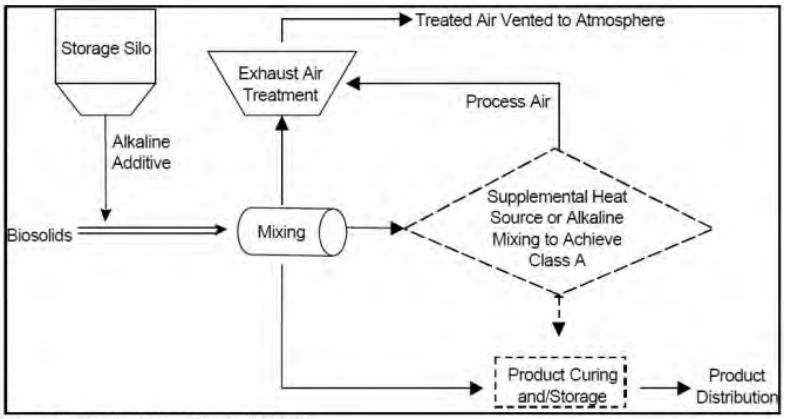
- There is a potential for pathogen regrowth if the pH drops below 9.5 while the material is stored prior to use.
- Lower nutrient value than biosolids produced from some other processes. The nitrogen content in the final product is lower because during processing, nitrogen is converted to ammonia, which is lost to the atmosphere through volatilization. In addition, plant available phosphorous can be reduced through the formation of calcium phosphate.

The major equipment required includes the following:

- Wastewater solids feed/conveyance mechanism
- Lime storage (silo; 1,000 or 50 pound bags; etc.)
- Lime transfer conveyor
- Mixer
- Air emission control equipment to minimize odors and dust

Figure 5-14 presents a typical flow diagram for alkaline stabilization.

Figure 5-14 – Typical Flow Diagram for Alkaline Stabilization



Source: Parsons Engineering Science, Inc., 1999.

An equipment proposal based on producing Class A biosolids was requested from Schwing Bioset (**Appendix 5-H**). In this scenario, the sludge would be treated at the treatment plant site. Once treated, the City would still need to dispose of the biosolids.

The estimated total life cycle costs of this option are as follows:

Capital Cost	$2,926,640
O&M Costs	$5,331,000
Pre-Heating Cost	$284,000
Subtotal	$8,541,640
Disposal Costs	$7,835,000
Total Cost	**$16,376,640**

Cost estimate assumptions:

- Dewatered sludge cake is 14.7% solids
- Disposal cost escalates at 3% per year
- Interest rate is 3%
- Electrical cost is $ 0.08/kWhr
- Total solids of treated biosolids is 29%
- Cost to dispose of the treated biosolids is $35/wet ton

Heat Drying

Heat drying is simply the evaporation of water from sewage sludge. It must be preceded by a dewatering process, and in the end the final product must be disposed. It requires material handling and storage equipment, heat generation and transfer equipment, air handling and air pollution control equipment.

Heat drying is listed in the Part 503 Rule as an approved process to meet Class A pathogen reduction requirements and the vector attraction reduction requirements. Class A pathogen reduction requirements are met when the moisture content of the biosolids is reduced to 10 percent or lower and the temperature of the biosolids particles exceeds 80° C or the wet bulb temperature of the gas in contact with the biosolids as the biosolids leave the dryer exceeds 80° C. The vector attraction reduction requirements are met when biosolids (with unstabilized solids) are dried to at least 90 percent solids.

There are both advantages and disadvantages to using heat drying to stabilize wastewater solids. Advantages include the following:

- Produces a Class A biosolid product, which has less regulatory requirements.
- May have commercial value as fertilizer, fertilizer supplement, or soil conditioner.
- Requires a relatively small footprint compared with other stabilization processes such as composting, alkaline stabilization, and air drying/long-term storage.
- Greatly reduces the volume of material that needs to be transported. The typical heat-dried product is at least 90 percent solids compared to 15 percent solids commonly produced by a belt filter press. This can be particularly advantageous if the dried biosolids are transported to be disposed.

Disadvantages include the following:

- Significant capital investment.
- Significant energy requirement. Heat-drying systems can require 1,400–1,700 BTUs per pound of water evaporated. This makes heat drying less energy efficient per pound of final material than other beneficial reuse methods such as composting (Sapienza, F., and T. Bauer. 2005. Thermal Drying of Wastewater Solids. Presented at WEFTEC 2005, Washington, DC.).
- Complex equipment.
- Safety concerns include explosive potential of the dust and potential for fires.

An equipment proposal was requested from therma-Flite (**Appendix 5-H**). In this scenario, the sludge would be dried at the treatment plant site. Once treated, the City would still need to dispose of the biosolids.

The total life cycle costs are as follows:

Capital Cost	$7,403,200
Electrical Cost	$266,026
NG Cost	$2,508,259
Pre-Heating Cost	$108,166
Subtotal	$10,285,651
Disposal Costs	$1,296,000
Total Cost	**$11,581,651**

Cost estimate assumptions:

- Dewatered sludge cake is 14.7% solids
- Disposal cost escalates at 3% per year
- Interest rate is 3%
- Electrical cost is $0.08/kWhr
- Natural gas cost is $0.67/therm
- Total solids of treated biosolids is 90%
- Cost to dispose of the treated biosolids is $35/wet ton

Onsite Composting

In this option, the City would own and operate a compost facility. Composting in this area is being used by the City of Coeur d'Alene, the City of Cheney, EKO Compost, and Barr-Tech.

The composting process uses biological activity to aerobically stabilize sludge. The Class A pathogen requirements and vector attraction reduction requirements are both met if specified time and temperature requirements are met. Composting can be done in large containers, in aerated static piles, or in windrows.

Some of the challenges are odors, dust, truck traffic, and a sufficient supply of affordable bulking agent. An additional concern would be whether there is sufficient demand to support another local program (i.e., being able to sell it versus giving it away).

From an operational standpoint, it is desirable to have the compost facility at the treatment plant. Land requirements are key considerations. There must be sufficient area to accommodate bulking agent storage, mixing, composting piles, curing piles, screening, storage, etc. For comparison, Coeur d'Alene has a 17-acre site for their compost operation that will eventually serve a plant flow of 12 mgd. The Coeur d'Alene site is adequate but not generous.

A 20-acre site is recommended for Post Falls. The existing treatment plant would not be large enough when considering future expansions, so an offsite location is needed.

A proposal was requested from Engineered Compost Systems (**Appendix 5-H**). The cost estimate includes the land for a facility and disposal of the biosolids. The cost is especially sensitive to the cost of bulking agent and disposal cost.

The total life cycle cost is as follows:

Capital Cost	$7,270,500
Haul Cost to Site	$2,952,414
Bulking Agent	$19,454,754
Power Cost	$219,575
Subtotal	$29,897,243
Disposal Costs	$18,253,000
Total Cost	**$48,150,243**

Cost estimate assumptions:

- Sludge must be trucked from the treatment plant to a compost site
- Dewatered sludge cake is 14.7% solids
- Bulking agent ratio 3.9:1
- Cost of bulking agent $22/CY
- Electrical cost is $0.08/kWhr
- Costs escalates at 3% per year
- Interest rate is 3%
- Ratio of finished compost to initial wet sludge is 2.3 tons to 1 ton
- Cost to dispose of the treated biosolids is $35/wet ton

5.9.4 Development of Alternatives

Biosolids management plan alternatives were developed to meet each of the treatment process requirements. A summary of the unit processes for each alternative is shown in **Table 5-36**. Subsequent sections discuss each alternative and the associated process interaction in further detail.

Table 5-36 – Biosolids Management Plan Alternatives

	Sludge Thickening	Digestion			Dewatering			Further Treatment			
	Gravity Belt Thickener	None (holding tank)	Aerobic	Anaerobic	Belt Filter Press	Centrifuge	Screw Press	Alkali Stabilization	Heat Drying	Composting	Disposal and Reuse
Alternative 1	X	X			X						X
Alternative 2	X		X		X						X
Alternative 3	X				X			X			X
Alternative 4	X		X		X				X		X
Alternative 5	X				X					X	X
Alternative 6	X			X	X						X

Alternative 1

This alternative is considered the base line alternative because it very similar to the current practice.

- Thickening the sludge with a gravity belt thickener reduces the sludge volume enough that the existing two sludge storage tanks can be continued to be used.
- At the design load and higher sludge concentration, the existing aeration systems would not be adequate and must be replaced.
- The existing Andritz belt filter press is approaching its design life. The new GBT would be installed in its place and a replacement belt filter press installed adjacent to the BDP belt filter press.
- The dewatered sludge would be hauled away and disposed of by a contractor.
- This alternative will not produce a Class B biosolids at the treatment plant. The potential for odors is higher than other alternatives.

Alternative 2

- A gravity belt thickener would be used to reduce the volume of the waste sludge.
- Aerobic digestion would be used to reduce the volatile solids to 38 percent and create a Class B biosolids.
- A new belt filter press is included to replace the aging Andritz belt filter press.
- This alternative will produce a Class B biosolids at the treatment plant. The volatile solids content of the sludge is reduced to less than 38 percent, so the potential for odors is significantly reduced.
- The dewatered sludge must still be disposed. It was assumed that the aerobic digestion resulted in better dewatering (16 percent total solids) and the disposal cost would be less ($35/wet ton).

Alternative 3

- A gravity belt thickener would be used to reduce the volume of the waste sludge.
- A new belt filter press is included to replace the aging Andritz belt filter press.
- The dewatered sludge would be further treated by alkaline treatment to produce a Class A biosolids.
- The biosolids must still be disposed. It was assumed that the disposal cost would be less since the biosolids are treated to Class A.

Alternative 4

- A gravity belt thickener would be used to reduce the volume of the waste sludge.
- A new belt filter press is included to replace the aging Andritz belt filter press.
- The dewatered sludge would be further treated by heat drying to produce a Class A biosolids.
- The biosolids must still be disposed. It was assumed that the disposal cost would be less since the biosolids are treated to Class A.

The aerobic digestion component of this alternative is not required. The heat drying process can still produce a Class A biosolids. It is included in the alternative because it reduces the odor potential and results in a Class

B biosolid. Meeting Class B biosolids requirements at the treatment plant leaves many more disposal options open than if it does not.

Alternative 5

- A gravity belt thickener would be used to reduce the volume of the waste sludge.
- A new belt filter press is included to replace the aging Andritz belt filter press.
- The dewatered sludge would be further treated by composting to produce a Class A biosolids.
- The biosolids must still be disposed. It was assumed that the disposal cost would be less since the biosolids are treated to Class A.

Alternative 6

- A gravity belt thickener would be used to reduce the volume of the waste sludge.
- Anaerobic digestion would be used to further stabilize the sludge and create a Class B biosolids.
- A new belt filter press would replace the aging Andritz belt filter press.
- The dewatered sludge must still be disposed. It was assumed that the disposal cost would be the same as contracted and hauling costs used in Alternative 1.

5.9.4.1 Development of Evaluation Criteria

A short list of criteria that a good Biosolids Management Plan should address was developed by the City and the project engineers. This list intended to identify the factors critical to the various stakeholder group have in the overall evaluation. The list of evaluation criteria are as follows:

- "Control of own destiny". Not reliant on one solution without a backup option.
- Lifecycle Cost.
- Odors and impact to surrounding neighbors.
- Ability to provide a long-term solution.
- Compatible with the biological nutrient removal process used at the treatment plant.

Control of Destiny:

To control your own destiny means to be independent and not reliant on one solution–to have backup options. The less restriction put on the biosolids, the more disposal options the City will have. Therefore, the alternatives that produce a Class A sludge received a higher ranking than those that would meet Class B at the treatment plant. Alternatives that require incorporation into the soil in order to meet Class B received the lowest ranking.

Cost:

A life cycle cost that included estimates of capital costs and annual operation costs was used. Alternatives were ranked in order, with the least expensive receiving the highest ranking. The cost of each alternative was normalized by dividing the cost of the minimum-cost alternative by the cost of the alternative and multiplying by 5. The purpose is to normalize the costs so the relative difference between each cost is considered in proportion.

Odors and Impact to Surrounding Neighbors:

As discussed elsewhere in this evaluation, a "good neighbor" policy should be maintained with respect to odors at the WRF. Options with higher odor generation potential while biosolids are on-site, or during their off-site treatment were given a lower rank relative to less odorous solutions.

Long-Term Viability:

This criteria includes several factors that must be weighed in the alternatives screenings process. Alternatives that require a high capital investment must provide uninterrupted, reliable service for many years to pay back the initial costs. Furthermore, the process must be capable of continuing to be acceptable from a regulatory and public acceptance standpoint through the life of the disposal or utilization plan.

Compatibility with Biological Nutrient Removal:

The sludge treatment at Post Falls must be compatible with biological nutrient removal (BNR). The BNR process produces a waste sludge that is higher in phosphorus than waste sludge from a standard secondary activated sludge system. The phosphorus in BNR sludge is bound within the cells of the microorganisms composing the sludge solids. The microorganisms can release this phosphorus from the solids back to the liquid portion of the sludge if the waste sludge is not handled properly. If this happens and the liquid is then returned as a sidestream to the wastewater treatment process, phosphorus removal is compromised. For this reason, processes that result in a phosphorus-containing sidestream being returned to the wastewater will not be considered.

5.9.4.2 Scoring of Alternatives

A method of ranking and scoring the evaluation criteria was developed so that the alternatives could be compared. Each of the evaluation criteria was given a weighting from 1 to 5 so that criteria that are deemed to be more important could be emphasized.

Except for costs, the alternatives were ranked for each criteria on a scale of 1 to 10, with 10 being the highest ranking. The rank assigned to each alternative is based on the opinion of the evaluator. Evaluations were made by City personnel and J-U-B.

Ranking of cost was made by dividing the cost of the minimum alternative by the cost of the alternative and multiplying by 5. The purpose is to normalize the costs so the difference between each cost is considered.

	Sludge Thickening	Digection			Dewatering				Processes to further Stabilize			Final disposal	Total	Normalized Cost Rank
	Gravity Belt Thickener	Holding tank (no digestion)	Aerobic digestion	Anaerobic Digestion	Belt Filter Press	Screw Press	Centrifuge	Electro-Kinetic enhancement	Alkali Stabilization	Heat Drying	Composting	Contracted Disposal	Total	
Alternative 1 Current Operation	$ 473,580	$ 1,160,000			$ 1,097,000							$ 12,440,000	$ 15,170,580	4.0
Alternative 2 Aerobic Digestion	$ 473,580		$ 11,240,000		$ 1,097,000							$ 4,730,000	$ 17,540,580	3.4
Alternative 3 Lime Stabilization	$ 473,580		$ 11,240,000		$ 1,097,000				$ 8,542,000			$ 7,830,000	$ 29,182,580	2.1
Alternative 4 Heat Drying	$ 473,580		$ 11,240,000		$ 1,097,000					$ 10,290,000		$ 1,300,000	$ 24,400,580	2.5
Alternative 5 Composting	$ 473,580				$ 1,097,000						$ 28,816,000	$ 18,253,000	$ 48,639,580	1.2
Alternative 6 Anaerobic Digestion	$ 473,580			$ 6,960,000	$ 1,097,000							$ 3,560,000	$ 12,090,580	5.0

A score for each alternative was determined by multiplying the weighting factor times the rank for each criteria and summing the results.

The ranking worksheet is shown on Figure 5-15.

Figure 5-15 – Ranking Worksheet

Biosolids Management Alternatives: Ranking Worksheet

Name:

Date:

Instructions:

This ranking and scoring method is intended to help you scrutinize each alternative against the criteria that were considered important by the group. Sometimes this analytical method of ranking can produce a different result than your "gut feeling" because it lets you emphasize criteria that are more important to you.

If you do not wish to use this method you can simply rank each alternative by writing 1 through 6 above each alternative. Use 1 = worst to 6 = best.

Instructions:
1. Assign a weighting factor to each criteria. The weighting factor lets you assign more weight to a criteria that you consider to be more important.
Each criteria starts with a weighting factor of 1.0. You can go up or down from 1.0.
If you want to emphasize the importance of the criteria, increase the weighting factor.
A weighting factor of 1.1 means that you consider that criteria to be 10% more important than a criteria with a weight of 1.0
A weighting factor of 2.0 means that you consider that criteria to be twice as important than a criteria with a weight of 1.0
Weighting factors less than 1.0 decrease the importance of that criteria.
If a criteria has no influence on your selection of an alternative, you can give it a weighting factor of 0.0

2. Rank each alternative from 1 to 10: 1 = worst, 5 = average, 10 = best.
Alternatives can have the same rank if you consider them equal.

3. The cost of each alternative has been ranked for you. The cost ranking has been normalized so that the relative difference is considered.

Criteria	Weighting Factor	Alternative 1 Current Operation	Alternative 2 Aerobic Digestion	Alternative 3 Lime Stabilization	Alternative4 Heat Drying	Alternative 5 Composting	Alternative 6 Anaerobic Digestion
Does this alternative allow us to control our own destiny?							
Cost		4.1	3.4	2.1	2.5	1.3 (most expensive)	5.0 (least expensive)
Odors and impacts to surrounding neighbors							
Ability to provide a long term solution							
Compatibility with BNR process currently operated at the treatment plant							
Ease with which the ultimate product can be disposed							

5.9.5 Regional Joint Digestion Evaluation

In the spring of 2012 during development of this plan the City of Post Falls and HARSB representatives began discussion of the potential option of developing a regional anaerobic treatment and biosolids handling facility. The initial discussion was based on the realization that the capital cost for either facility may potentially be reduced if they were to combine the biosolids treatment to one location. An evaluation was developed and is included in **Appendix 5-J**. The alternative, although similar to "Alternative 6 – Anaerobic Digestion" discussed previously, would potentially have additional unit processes and systems. The evaluation looked at the costs for a facility located at either the Post Falls WRF or the HARSB WWTP. A summary of the cost evaluation is shown in **Table 5-37**.

Table 5-37 – Regional Biosolids Evaluation Costs

	Total Regional System Capital Costs	O&M Costs	Total Lifecycle Costs
Facility Located at HARSB (PF Trucks to HARSB)	*$16.81M*	*$18.31M*	*$35.1M*
Facility Located at Post Falls (HARSB Trucks to PF)	*$13.9M*	*$13.9M*	*$27.8M*
Combined (Post Falls and HARSB) Treating individually at their own facilities [a]	*$23.15*	*$10.8*	*$33.95*

[a] *Based on 2012 HARSB and Post Falls Facility Plan Biosolids Anaerobic Digestion Costs.*

Based on the evaluation and as each entity continues to update and modify their biosolids management strategies, the Joint Digestion alternative (located at the Post Falls WRF) should be considered a viable option with potential capital and lifecycle cost savings. Additional considerations would still need to be evaluated and are discussed in detail in the Joint Digestion Evaluation included in **Appendix 5-J**.

5.9.6 Conclusions

Biosolids treatment alternatives were evaluated based on multiple criteria by the planning team with Anaerobic and Aerobic Digestion ranking the highest, followed by continued use of current practices. The ranking of alternatives based on the scoring system used to evaluate the alternative is as follows:

1 – Alternative 6 - Anaerobic Digestion

2 – Alternative 2 - Aerobic Digestion

3 – Alternative 1 - Current Operation

4 – Alternative 4 - Heat Drying
Alternative 5 - Composting

5 – Alternative 3 - Lime Stabilization

5.9.6.1 Final Recommendation

Ultimately a phased approach was developed to allow for evaluation of technologies to verify suitability and sizing criteria with other plant process changes and to allow flexibility in the timing and implementation of changes to the biosolids handling process.

Phase 1 – Continue with Barr Tech 3rd party disposal via composting (5-year contract approximately 2012-2017).

Phase 2 – Update results from biosolids alternatives evaluated during this study against continued use of Barr Tech or other currently available third party alternatives. These alternatives should be evaluated with and without additional alum sludge from tertiary phosphorus removal processes and to determine the effect of phosphorus release from pressate back to the system following full biosolids digestion. Update and evaluate data and select biosolids process for full-scale implementation.

Phase 3 – Implement design and construction of selected biosolids process or continued use of third party disposal. Based on current process operations, additional holding tank capacity, and dewatering improvements will be necessary near the end of the 20-year planning period. For the purpose of budgeting for capital and O&M costs, Aerobic digestion has been assumed, however the final selected alternative will need to be determined at the time of implementation.

5.9.7 Environmental

The primary environmental concerns with the recommended improvements are related to energy (fuel for solids trucking). Each alternative has varying levels of costs related to the level of dewatering and ultimately volume of solids that has to be trucked. At the current fuel prices, the recommend alternative is the least cost.

Additionally, one of the non-monetary concerns is the reliance on contracted disposal of biosolids. As the City moves toward a formal digestion treatment option, additional environmental issues may arise, including air quality related to methane produced from anaerobic digestion (typically flared to mitigate) and odors. These will need to be addressed as they are encountered.

5.10 Energy, Electrical and Controls

Definitions

AF ..... Circuit Breaker Ampere Frame Rating

AT ..... Circuit Breaker Ampere Trip Rating

KVA..... Kilowatt Ampere

KW..... Kilowatt

KWH ..... Kilowatt Hour

PLC ..... Programmable Logic Controller

Electrical System Capacity

The currently installed system is capable of supporting the plant's electrical load requirements through 5.0 MGD (~1300KVA). The electrical distribution system is designed to accommodate the peak loads of the planned capacity phases of the water reclamation facility through 9.7 MGD (~2450KVA) with the addition of conductors installed in spare conduit series "F-1101" as well as utility transformer upgrades.

Distribution Switchgear Capacity
The Main Distribution Power Panelboard (MDP1) located in Utility Building Number 2 has spare capacity and circuit breakers available to meet the requirements of 5.0 MGD and 9.7MGD. There is space reserved in the Utility Building 2 electrical room for an additional motor control center (MCC-H) to accommodate Ditch No. 6 and associated basins (5.0 MGD). Expansion to 9.7 MGD (Ditches No. 7 and 8) will require additional electrical room space located elsewhere in the facility preferably close to the proposed load additions.

Ductbank System
The electrical power, controls, instrumentation, and communication conductors are distributed throughout the plant in a network of underground electrical ductbanks. The existing ductbank network extends east of Ditch 6 to vaults SV-006 and PV-006 with adequate spare conduits to support the 9.7 MGD expansion needs.

Standby Power Source Capacity
There are two diesel driven stand-by generators (one 500KW and one 800KW) installed north of Utility Building 2 with provisions for adding a third 800KW unit. The 500KW unit feeds the stand-by side of the plant's main switch gear via a 800AT/1200AF circuit breaker and the 800KW unit feeds the stand-by side of the plant's main switch gear via a 1200AT/1600AF circuit breaker. The installed generators operate in parallel and are interconnected with the plant's electrical distribution system via a 3,000 ampere tie breaker. The automatic operation of the generators, paralleling system, and load transfer is controlled by a PLC based Caterpillar/Allen Bradley paralleling switchgear control system. With the addition of the third (800KW) generator the facility will be able to operate without load shedding through the 9.7 MGD expansion.

Natural Gas System Capacity
Preliminary investigation of the NG system indicated that capacity is available in the Seltice Way main and that the line feeding the plant has some available additional capacity but may require upgrade depending on expected usage. As the system requirements are further refined and as demands on the Avista system change, the capacity of the lines along Seltice Way and feeding the WRF will need to be re-evaluated.

Control, Data Acquisition, and Monitoring
The plant currently uses multiple Allen Bradley CompactLogix and MicroLogix PLCs connected via a plant-wide fiber optic network (Ethernet) to monitor and control the process equipment. The PLCs are located in the Administration Building, Utility Building Number 1, Utility Building Number 2, the Dewatering Building, the Disinfection Area, the Utility Water Building, and the Headworks Building.

The PLC in Utility Building Number 2 (LCP-UB2) currently has designated spare I/O to accommodate the addition of Ditch 6 and associated basin equipment (5 MGD). Expansion beyond 5.0 MGD will require one or more additional Local Control Panels and associated PLC hardware. The expansion of the PLC and SCADA is not limited in any significant way through all possible facility expansions on the current property.

Waste Stream Energy Recovery
The Post Falls facility has an average influent temperature of 14.4° C and an average effluent temperature of 13.9° C. This represents a significant energy source that is reliable and consistent, which could be used for facility heating and cooling.

Potential areas which would benefit from heat recovery include the:

- Headworks Building
- Administration Laboratory Building
- Utility Buildings No. 1 and 2

While wastewater contains a significant amount of usable energy, it also contains elements that will foul conventional heat recovery systems. Several manufactures provide preliminary heat extraction equipment such as the Huber heat exchanger RoWin which are resistive to corrosion and have integral cleaning systems. The energy from the wastewater heat exchanger is then transferred to a standard heat pump arrangement to provide heat during winter months and cooling in the summer.

At current flows, the energy extraction potential could reduce the required electrical heating energy of the Headworks and Administration Buildings by as much as 75 percent (~60-70kW), which represents an annual energy savings of approximately $10,000.

Depending on the extent of heat extraction from the waste stream, the temperature drop would be between 0° and 2° C. This would require further analysis to determine the overall impact on the biological treatment systems.

Photo-Voltaic Power Generation
The Post Falls facility has substantial surface area available for photo voltaic panel placement, either apart from the process area or integrated into the process structures. On a peak solar day, an acre of solar panels could produce up to 75 percent of the Post Falls WRF instantaneous energy demand (approximately 420 KW). The estimated annual energy production of an acre of solar panels in Post Falls is approximately 10 percent of the facility's electrical energy consumption (~496,234 kWh). The annual energy production accounts for less than peak solar days and hours of inadequate production light (darkness). The energy would be delivered to the WRF via a net metering agreement with Avista Utilities.

The installation of photo voltaic systems has been successful in other western facilities including Boulder Colorado and Gresham Washington. The installation, ownership and operation of the facilities are generally provided by a private party in partnership with the municipality. The municipalities receive electrical energy at a contracted rate less than is available from their local utility for all generated electricity, while the private party maintains the system and receives a profit from energy production and benefits from available energy incentives and tax credits. This form of installation would require no capital or maintenance investment by the City; however, a significant effort is involved in contacting and negotiating with interested providers, and the required space (acreage) would need to be committed for the life of the project.

5.11 Administration and Ancillary Support Systems

5.11.1 Introduction

The major administration and support systems in the Post Falls WRF include the following systems:

- Odor Control
- Utility Water Pump Station
- Maintenance Shop Spaces
- Operations and Control Building (SCADA, laboratory, and staff offices)

As was discussed in TM 2, each of these systems is an integral component in the overall plant operation. As these systems represent a much smaller capital investment individually relative to the overall treatment processes, they can be overlooked. However, to plan for an organized expansion of the WRF the interaction

of each of these systems with the overall plant must be addressed. The necessary improvements are discussed below.

5.11.2 Required Improvements

Odor Control – Odor control requires the collection and treatment of process odors to minimize complaints from the public. Containment requires covering process basins, equipment, and channels that emit odors. Collection is performed by ventilating the contained spaces and routing the foul (odorous) air to a treatment system. Treatment can be performed by a variety of commonly used methods from carbon adsorption, compost biofilters to chemical scrubbing.

Previous investigations at the WRF have shown that the primary odor generation areas are at the influent channels and headworks (grit and screening) facilities. Following this review, the City has installed an odor control system targeting these areas. This system includes a Vapex odor control system (chemical addition to reduce sulfides) combined with a carbon air scrubber for the headworks area.

Additionally, Splitter Box S1 and the dewatered solids storage area have been identified as odor generators. During the spring of 2012, plant staff installed a Vapix unit at S1 to help mitigate odors being generated. Regarding the solids holding area, improvements to reduce the handling of biosolids and odor generation will be considered. These improvements would enclose the loading area, add a shuttle loader to distribute solids along the length of the truck, and provide space to have one truck being loaded on the scales with a second staged for transport.

Future Odor Control and Design Criteria – The Idaho Department of Environmental Quality has established ruled regarding odor control at wastewater treatment plants. IDAPA 58.0101.776.01 defines the requirements. The definition applies no numerical limits on specific odor generating compounds and applies subjective criteria for perception of odor containing air pollutants. Methods exist for measuring concentrations of various odor-generating compounds; however, plant odors are a mixture of constituents and depend heavily on environmental conditions, including plant processes, temperature, and wind patterns and individual perception. The plant have and should continue to take a pro-active approach to monitor, log, and record complaints that are received, which will help to identify specific processes and activities that generate odor complaints.

As discussed previously, odor control consists of three parts:

- Containment
- Collection and Transmission
- Treatment

In general, individual processes lend themselves to specific types of containment. For example, headworks areas typically use covered channels to reduce the volume of foul air to be processed and heat loss; or can treat the entire building interior atmosphere. Primary clarifiers utilize fixed covers that still allow personnel to access the clarifier mechanism, but the volume of air to be treated increases significantly. Alternatively, systems such as the “Salsness” filter discussed previously, have individual “hoods” as part of the equipment the help contain the odors to a very small area limited to the equipment footprint. Because of these varying conditions, the individual containment and collection systems should be developed during design to allow proper selection of non-corrodible materials and configurations to minimize cost of odor control balanced with ease or process maintenance.

Several options exist for odor control treatment at individual unit processes. A generalized summary of the various types of odor treatment include:

- Compost Biofilters – Utilizes organic compost in static piles to biologically treat foul air. The City of Coeur d'Alene has been successfully using compost generated from their solids treatment process for their odor control biofilter media.
- Carbon absorption - Various types of carbon media exist for specific applications and typically can remove 95 percent or higher concentrations of hydrogen sulfide. Currently used at the Post Falls WRF headworks.
- Chemical Scrubbers - Treat foul air by facilitating the transfer of odorous compounds from the gas phase to the liquid phase where chemical oxidation of the compounds occur.
- Bioscrubbers – Utilize a biological reactor similar to a chemical scrubber to contact the foul air with a biological mixed liquor.

Because of these varying conditions and odor generating compounds present at individual unit processes, the treatment systems specific to each process area should be developed during design to allow proper identification of the odorous compounds that will be generated and selection of the treatment process with the highest likelihood of success, balanced with the cost of construction operation and maintenance of the odor control system.

Future plant wide odor control has not been addressed specifically in this plan. Rather, potential future unit processes requiring odor control have been addressed individually and preliminary costs have been allocated with the associated areas. Specifically, new or modified headworks facilities, influent flow equalization, and any primary treatment processes would require odor control.

Utility Water Pump Station – The utility water pump station was upgraded in 2011 to provide increased capacity required to operate the new BDP belt filter press wash water system. The system currently has capacity to operate in–plant reuse systems, including the headworks and biological basin spray bars, belt filter press, and irrigation (when belt press is not in operation). As the plant grows and expands beyond the current configuration, additional reuse water will be required in excess of the current capacity. The space for the current system cannot easily be expanded. Therefore, as part of the next upgrades (to 5.0 mgd) a new system should be constructed to supply the current plant capacity and expandable to support the 1 mgd plant expansion increments and any new processes. Coarse screening should also be provided (500 micron), but it is anticipated that screening would only be required to remove large particulates as the new system would be downstream of any tertiary filtration facilities.

For the purpose of preparing budgetary cost opinions, it has been assumed that a new a new pumping facility will be constructed to provide utility water to the WRF. It may be possible to eliminate or combine the Utility Water Pump Station with future Class A Reuse pumping. Utilizing common pump station may allow for capital cost savings.

Maintenance Shop Spaces – The WRF currently has several areas where maintenance on plant equipment occurs. Primarily this work occurs in the ground floor level of UB-2. This building also houses the majority of the current plant electrical switch-gear and therefore is a logical area to expand the electrical systems. As the plant expands, and electrical panels begin to take up this space, plans for a new maintenance shop should be made. Several options for the location exist, including:

- Relocation of the “drinking water division” to new facilities off-site and utilizing the “water building” located in the southwest corner of the site as a common maintenance building.
- Construction of a new maintenance building as part of any new tertiary filtration facilities.
- Partition, enclose, and re-purpose a portion of the sludge storage building as a maintenance facility.

Final selection of the location of the maintenance facilities should be made and reviewed in conjunction with the expansion and addition of other plant processes. For the purpose of preparing budgetary cost opinions, it has been assumed that a new building will be constructed. However, alternatives that would use or modify existing structures may provide cost savings.

Operations and Control Building (SCADA, Laboratory, and Offices) - As discussed in TM 2, the plant operations and control building is in need of refurbishment and re-organization. The current building is not large enough to house all of the necessary facilities. Further, the addition tertiary processes will increase laboratory and maintenance staff requirements. Planning of the facility should have the following priorities:

- Segregate “dirty” work areas from “clean” work areas
- Improve laboratory hygiene and security (restricted access)
- Provide a primary SCADA control workstation
- Provide locker space
- Provide conference room and individual office spaces
- Increase plant records storage space
- Provide adequate common lunch/break room area

As with many of the other plant facilities the location for the Operations and Control Building will need to be made in conjunction with the expansion and addition of other plant processes. Relocating or re-purposing one building may free up space for another facility. Because of this, several options for the location of the future control building. A preliminary review of the layout options include:

- Relocation of the “drinking water division” to new facilities off-site and remodel the “water building” to house the Control Building Facilities (this eliminates this building to be used as a maintenance building).
- If the headworks is relocated, a new two-story Control Building could be constructed in its place. Preliminary layout would have daylight basement at lower plant level for lab and plant operations staff control room. The upper level would house the break-room, offices, and conference rooms.
- Construction of a new control building atop the existing Secondary Clarifiers No. 1 and No. 2, utilizing the clarifiers as basement storage space, and constructing a new larger replacement clarifier (required to meet redundancy requirements).
- Remodel and expansion of the current Operations and Control Building for the purpose of SCADA and laboratory only. Construct new WRF offices to the northwest of the WRF property, segregating the WRF facility from areas that are accessible to the public.

For the purpose of preparing budgetary cost opinions, it has been assumed that a new building will be constructed beyond the 20-year planning period and the existing building remodeled. However, alternatives that would use or modify existing structures may provide cost savings. The final position and configuration of

the new lab should be selected in conjunction with the equalization and headworks configurations. The selection of the preferred layout and configuration will be discussed in TM 6.

Staffing – As with other technical disciplines, maintaining adequate resources to develop, train, and retain competent and skilled operations staff is critical. The current facility is very complex, and operations and maintenance staff training levels are constantly being evaluated. As new, more stringent treatment requirements and process improvements are implemented, it will become even more important that additional training and personnel be implemented.

5.11.3 Costs

Table 5-38 presents a preliminary opinion of probable capital costs for construction and expansion of the ancillary support facilities. Detailed cost breakdowns are included in **Appendix 5-I**.

Table 5-38 – Ancillary Support Systems

Item	Description	Capital Cost (Present Worth)
1	Utility Water Pump Station (300 gpm firm capacity)	$743,400
2	Maintenance Shop (50' x 100')	$757,400
3	Operations and Control Building (remodel)	$662,500

5.11.4 Recommendations

Many of the plant support systems will not require significant improvements over the 20-year period. The primary projects and the recommended plan include:

Electrical Service and Standby Power - The currently installed system is capable of supporting the plant's electrical load requirements through 5.0 MGD (~1300KVA). Additional systems including filtration will likely require additional improvements beyond the current secondary treatment expansion.

***SCADA* -** The PLC in Utility Building Number 2 (LCP-UB2) currently has designated spare I/O to accommodate the addition of Ditch 6 and associated basin equipment (5 MGD). Additional systems including filtration will likely require additional improvements beyond the current secondary treatment expansion.

Hydropower – Based on the cost-revenue analysis, hydropower generation is not economically feasible at this time.

Photo Voltaic Power - PV Power has a high likelihood or providing significant benefit to off-setting plant power consumption. As PV cells continue to reduce in capital cost, the system cost-revenue analysis continues to improve. It is recommended that further analysis be performed to determine the feasibility of implementing a full scale system.

Waste Stream Heat Recovery - Waste stream heat recovery is likely to provide significant benefit to offsetting power for building heating at the plant. Impacts to biological process operation and detailed cost-revenue analysis would need to be performed to determine the applicability to a full scale implementation.

Odor Control
Odor control should continue to be developed and maintained in the primary odor generating areas including the headworks, biosolids holding and future influent equalization. As discussed in TM No. 5, the City should consider and evaluate the need for odor control on new and expansion of existing unit processes as necessary.

Utility Water Pump Station
The Utility Water Pump Station is adequate to maintain plant processes through approximately 4.0 mgd average daily flow. If significant Class B or C irrigation water is to be used by the plant for landscape irrigation, modifications to the Utility water pump station will be required sooner to increase capacity and should be coordinated with expected long-term expansion of the plant UV system and Reuse pump stations.

Maintenance Shop
The City should pursue developing a maintenance shop dedicated to facility equipment maintenance and repairs. As shown in the proposed future layout, the proposed future shop location should be situated to provide a central location for maintenance of equipment at the WRF.

Laboratory Building, Offices and SCADA
The preferred alternative is to remodel and expand of the current Operations and Control Building for the purpose of SCADA and laboratory only. A new WRF office will be constructed (beyond the 20-year planning period) to the northwest of the WRF property in subsequent phases, segregating the WRF facility from areas that are accessible to the public.

5.11.5 Environmental

There are no identifiable environmental items of concern related to the ancillary support systems. Although odor control is discussed in this section, overall concerns with odor control are addressed with each individual unit process discussion elsewhere.

References

J-U-B ENGINEERS, Inc.; South Fork Sewer District Page WWTP Metals Removal Pilot Study; 2004

Appendices

Appendix 5-A - Preliminary Treatment Alternatives Cost Opinions
Appendix 5-B - Primary Treatment Alternatives Cost Opinions
Appendix 5-C - Secondary BNR Treatment Alternatives Cost Opinions
Appendix 5-D - Tertiary Treatment Technical Memorandum No. 8
Appendix 5-E - Disinfection Alternatives Cost Opinions
Appendix 5-F - Outfall Alternatives Cost Opinions
Appendix 5-G - Reuse Alternatives Cost Opinions
Appendix 5-H - Biosolids Management Alternatives Cost Opinions, Barr-Tech Biosolids Disposal Contract
Appendix 5-I - Administration and Ancillary Support Systems Cost Opinions
Appendix 5-J - Joint Digestion Evaluation

Appendix 5-A

Preliminary Treatment Alternatives Cost Opinions

See enclosed DVD for appendix information

Appendix 5-B

Primary Treatment Alternatives
Cost Opinions

See enclosed DVD for appendix information

Appendix 5-C

Secondary BNR Treatment Alternatives Cost Opinions

See enclosed DVD for appendix information

Appendix 5-D

Tertiary Treatment
Technical Memorandum No. 8

See enclosed DVD for appendix information

Appendix 5-E

Disinfection Alternatives
Cost Opinions

See enclosed DVD for appendix information

Appendix 5-F

Outfall Alternatives
Cost Opinions

See enclosed DVD for appendix information

Appendix 5-G

Reuse Alternatives
Cost Opinions

See enclosed DVD for appendix information

Appendix 5-H

Biosolids Management Alternatives Cost Opinions

Barr-Tech Biosolids Disposal Contract

See enclosed DVD for appendix information

Appendix 5-I

Administration and Ancillary Support Systems Cost Opinions

See enclosed DVD for appendix information

Appendix 5-J

Joint Digestion Evaluation

See enclosed DVD for appendix information

J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Alternatives Review and Selection

Final

June 2013

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TM 6 – Alternatives Review and Selection

6.1 Wastewater Treatment and Disposal Alternatives

6.1.1 Introduction of Alternatives

The following sections summarize all of the primary improvement alternatives considered for the City of Post Falls WRF and disposal system. A summary of the major alternatives are as follows:

- Alternative 1: No action alternative
- Alternative 2: Additional treatment with year round river discharge (continuation of current practices with partial seasonal reuse to 3.2 mgd on existing land)
- Alternative 3: Additional treatment for seasonal river discharge combined with full seasonal reuse (during growing season to 5.2 mgd; additional land required)
- Alternative 4: Modifications to existing system for full seasonal reuse to 5.2 mgd (growing season) and non-growing season winter storage

Each of these alternatives will be discussed in more detail below as well as the potential environmental impacts, advantages, and disadvantages. Necessary improvements to the WRF facility are similar for Alternatives 2 and 3. Potential site layout for the necessary 20-year WWTP improvements is shown in **Figure 6-1**. Additionally, a potential build-out site plan (to 17.8 mgd) is shown in **Figure 6-2** in consideration of the 20-year improvements.

6.1.2 Alternative 1: No Action Alternative

For this alternative, The City would not implement any improvements to the wastewater treatment facilities. This option is not recommended due to the following:

- The City of Post Falls will likely be unable to meet upcoming effluent discharge standards. The non-compliance situation will likely continue in the future unless improvements are implemented. This will likely result in fines and/or other penalties imposed by regulatory agencies.
- Effluent quality from the facility will most likely continue to worsen in the future as the treatment facilities become overloaded.
- Future residential and commercial growth may be restricted through a building moratorium unless the improvements are implemented. This may result in a loss of business and reduced property values and revenues.

6.1.2.1 Alternative 1 – Environmental Review

For this alternative, the primary environmental impacts are associated with the inability to treat wastewater and meet effluent requirements for discharge to the river. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

Figure 6-1 – 20-Year Potential Improvements Site Plan (5.2 MGD ADF Capacity)

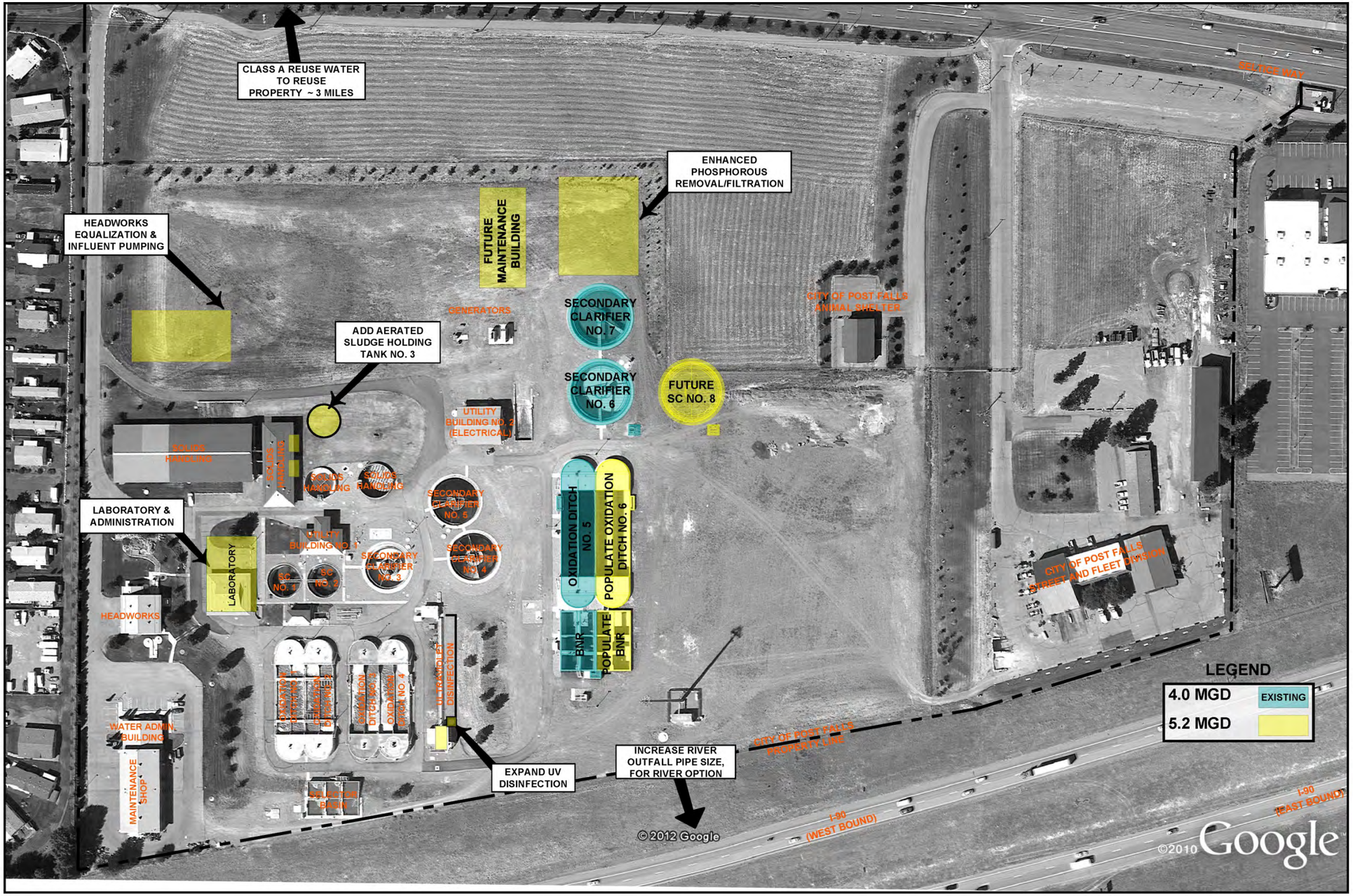
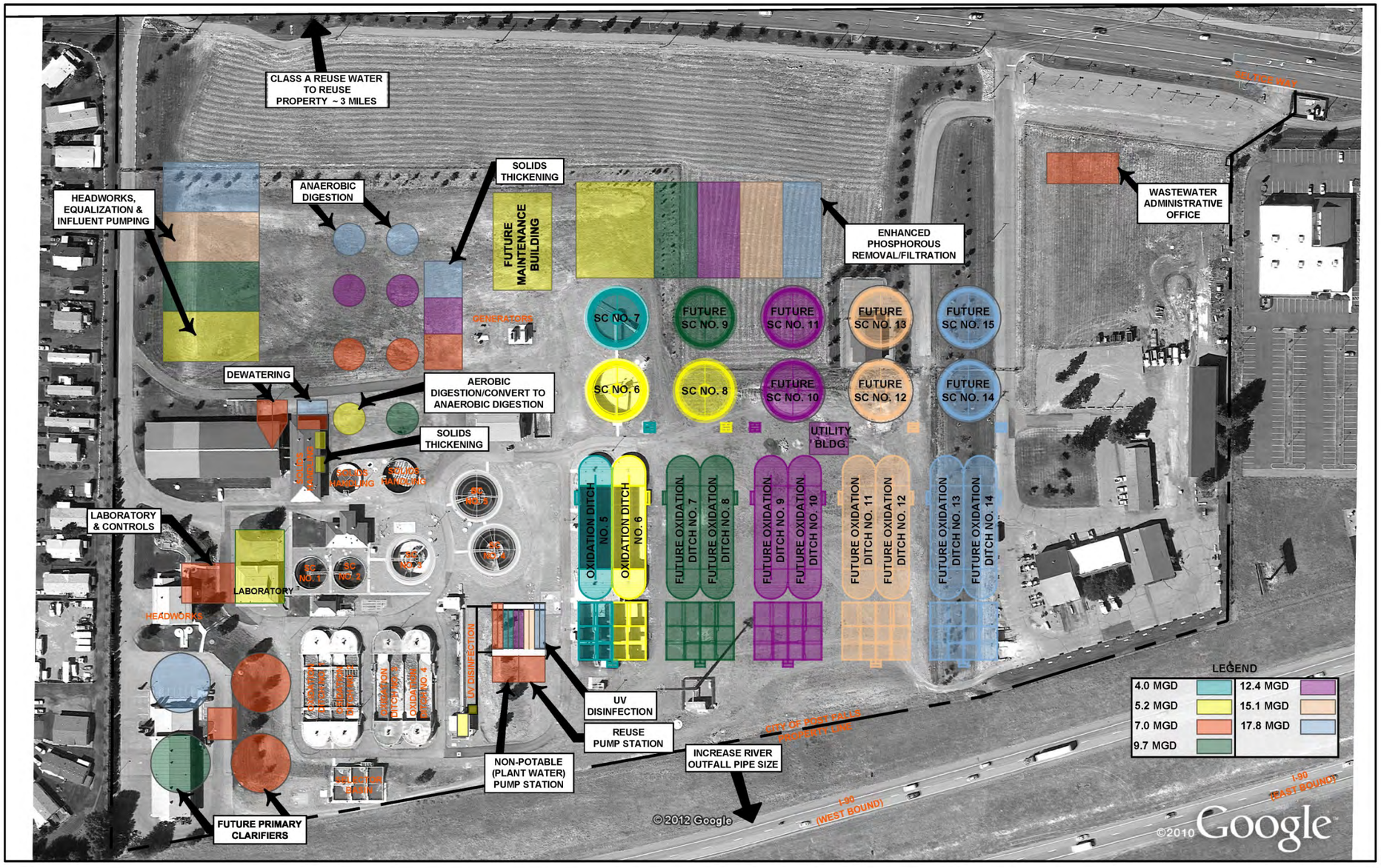


Figure 6-2 – Potential Build-Out Site Plan (17.8 MGD ADF Capacity)



- Impacts to Population, Economic, and Social Profile: no ability to expand the system or allow growth within the system (long-term impact)
- Impacts to Wetlands and Water Quality: significant water quality issues associated with the inability to treat wastewater due to overload of existing treatment facilities (short- and long-term impact)
- Impacts to Public Health: water quality concerns with respect to inability to meet upcoming discharge requirements to river (short- and long-term impact)

6.1.3 Alternative 2: Additional treatment for seasonal river discharge combined with partial seasonal reuse (during growing season to 3.2 mgd)

Under this option, the City would upgrade the existing WRF system targeting year-round discharge to the Spokane River. For this alternative, the existing treatment system would expand their secondary BNR Facilities, combined with some form of effluent filtration. The following are recommended improvements under this alternative:

- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving adding mechanical equipment to OD 6, additional Secondary Clarifier No. 8.
- Effluent Filtration: Provide coagulation/settling and filtration to meet increased river discharge effluent requirements.
- Disinfection System: Increase reliability of existing UV disinfection system.
- Outfall: Increase capacity of river outfall pipeline.
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Reuse Site: The system will need improved with pipelines and irrigation equipment on existing land (including Rathdrum property or equivalent).
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist a new building, with multiple irrigation pumps with a combined capacity of 5000 gpm (average daily flow of 3.2 mgd); piping, fittings, controls, and flow meters for distribution to the reuse site irrigation system during the growing season.
- Miscellaneous Improvements: Additional improvements required for this alternative include:
    - Site fencing around the storage lagoon and land application site to keep wildlife, debris, and unauthorized personnel from entering the site.
    - Extension of power to the new storage lagoon site for irrigation pump station.

- Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
- Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
- Wheel line, drip, or center pivot irrigation system for the new land application site.
- A gravel access road to the new storage lagoon and/or land application site.

- Toxic Substances:
  - It is crucial for the Idaho dischargers including the City of Post Falls to stay actively involved in working with IDEQ to address the issue of lead, cadmium, and zinc concentrations in the Spokane River. This Facility Plan currently anticipates that the water quality standards for the Spokane River can be addressed through coordination and negotiation with IDEQ (likely a TMDL process). The objective of that effort is to show that City of Post Falls discharges materially improve metals water quality due to their inherent hardness characteristics and thereby avoid an expensive quaternary (fourth level) process that would appear to provide no demonstrateable benefit.
  - As discussed in TM #4, concentrations of polychlorinated biphenyls (PCBs), dioxins, and polybrominated diphenyl ethers (PBDE) are also being considered for TMDLs by the State of Washington and/or the Spokane Tribe of Indians. Pilot studies at the City of Spokane and a literature review indicate that these compounds are reduced by 95 percent or higher across full tertiary treatment facilities similar to those proposed by this Facility Plan. It is unclear if and/or what other measures may be required to achieve Idaho or downstream water quality standards.
  - These questions regarding metals and trace refractory organics should be addressed as part of any proposed pilot testing by the City of Post Falls and on-going coordination with IDEQ, EPA, and the State of Washington.

Advantages of Alternative 2 are:

- Reduced cost (no capital or O&M) for land application system

Disadvantages of Alternative 2 are:

- Risk of inability to meet expected and future river discharge effluent requirements (reduced buffer on meeting waste load allocation)
- No buffer for long term offset of TP wasteload allocation

6.1.3.1 Alternative 2 – Environmental Review

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades and pipeline improvements and ability to meet effluent requirements for discharge to the river. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Climate and Physical Aspects (Topography, Geology, and Soils): Excavation for treatment facilities and pipeline (short-term and minor long-term impact)
- Impacts to Population, Economic, and Social Profile: Potential risk as the system grows and thus could be unable to meet river discharge requirements year-round (potential long-term impact)
- Impacts to Wetlands and Water Quality: Potential risk as the system grows and thus could be unable to consistently treat wastewater to meet water quality requirements and standards (potential long-term impact)
- Impacts to Cultural Resources: Potential impact if cultural resources are discovered or identified in pipeline corridors (potential short- and long-term impact)
- Impacts to Flora and Fauna: Temporary impacts associated with site disturbance, which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Air Quality: Temporary impacts associated with construction emissions, which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: Increased energy consumption with the upgrade of treatment facilities (long-term impact)
- Impacts to Public Health: *Positive*, improved ability to meet effluent requirements for discharge to the river (long-term impact)

6.1.4 Alternative 3: Additional treatment for seasonal river discharge combined with full seasonal reuse (during growing season to 5.2 mgd)

For this alternative, the existing treatment system would be utilized for treatment of the wastewater combined with the same in-plant improvements identified for Alternative 2. In addition to these improvements, the system would add reuse activities would be expanded to match the average daily flow conditions for the 20-year period beginning with the currently owned property.

During the non-growing season, treated effluent will continue to be discharged to the Spokane River. During the growing season, treated effluent would then be pumped to new storage lagoons where it would be held until it could be applied through a slow-rate land application site for irrigation of a crop. The following are recommended improvements under this alternative:

- Preliminary Treatment: same as Alternative 2
- Biological Treatment: same as Alternative 2
- Effluent Filtration: same as Alternative 2
- Disinfection System: same as Alternative 2 with expansion for increased disinfection requirements for Reuse.
- Outfall: same as Alternative 2
- Laboratory/SCADA: same as Alternative 2
- Solids Handling: same as Alternative 2

- Storage Lagoon: 7-day storage would be added as a buffer to process upset, and for equalization of flows for irrigation. The Spokane River would be retained for non-growing season or non-compliance reuse disposal of reclaimed water.
- Reuse Site: The system will need improved with pipelines and irrigation equipment. Additional land will be required to provide the necessary irrigated acreage. An additional 582 acres will be required for 5.2 mgd ADF.
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist a new building, with multiple irrigation pumps with a combined capacity of 5500 gpm (peak day equalized flow of 7.7 mgd); piping, fittings, controls, and flow meters for distribution to the reuse site irrigation system.
- Miscellaneous Improvements: Additional improvements required for this alternative include:
    - Site fencing around the storage lagoon and land application site to keep wildlife, debris and unauthorized personnel from entering the site.
    - Extension of power to the new storage lagoon site for, irrigation pump station.
    - Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
    - Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
    - Wheel line, drip or center pivot irrigation system for the new land application site.
    - A gravel access road to the new storage lagoon and/or land application site.

Advantages of Alternative 3 are:

- Addition of land application reuse system reduces risk and provides flexibility to meet expected and future river discharge effluent requirements.
- Beneficial reuse of reclaimed effluent
- Alternative disposal point
- Land application reduces the total phosphorus load being sent to the river. Reducing the total phosphorus (TP) load allows for higher concentration TP effluent to be sent to the river while meeting the waste load allocation. This allows for reduced chemical treatment costs for removing TP.
- Allows for offset to the TP waste load allocation beyond the current permitting planning at 5.0 mgd and 50 ppb TP.

Disadvantages of Alternative 3 are:

- Capital cost of reuse system
- Additional O&M and regulatory compliance issues
- Increased concern (public perception) of expanding reuse activities over the Rathdrum Prairie Aquifer.

6.1.4.1 Alternative 3 – Environmental Review

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades, expanded reuse and pipeline improvements and potential land re-purposing for expanded reuse. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Climate and Physical Aspects (Topography, Geology, and Soils): excavation for treatment facilities, expanded reuse and pipeline (short-term and minor long-term impact)
- Impacts to Land Use: expansion of reuse will potentially re-purpose the existing land identified for reuse expansion (potential long-term impact)
- Impacts to Cultural Resources: potential impact if cultural resources are discovered or identified in pipeline corridors (potential short- and long-term impact)
- Impacts to Flora and Fauna: temporary impacts associated with site disturbance which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Air Quality: temporary impacts associated with construction emissions which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: increased energy consumption with the upgrade of treatment and reuse facilities (long-term impact)
- Impacts to Public Health: *positive*, improved ability to meet effluent requirements for discharge to the river (long-term impact)

6.1.5 Alternative 4: Modifications to existing treatment system for full seasonal reuse (growing season to 5.2 mgd) and non-growing season winter storage (emergency river discharge)

For this alternative, the existing treatment system would be utilized for treatment of the wastewater combined with the same in-plant improvements identified for Alternative 2. In addition to these improvements, the reuse activities would be expanded as necessary for year round reuse and winter storage. The existing river discharge would be retained for off-spec water alternative disposal point.

The following are recommended improvements under this alternative:

- Preliminary Treatment: Same as Alternative 2
- Biological Treatment: Same as Alternative 2
- Effluent Filtration: Same as Alternative 2, with reduced chemical usage and reduced capital investment (increased hydraulic loading rates on filters)
- Disinfection System: same as Alternative 2 with expansion for increased disinfection requirements for Reuse.
- Outfall: expanded and retained for emergency discharge.

- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems.
- Toxic Substances: No river discharge requires no new improvements to meet recycled water requirements.
- Storage Lagoon: 7-day storage would be added as a buffer to process upset, and for equalization of flows for irrigation. The Spokane River would be retained for non-growing season or non-compliance reuse disposal of reclaimed water.
- Reuse Site: The system will need improved with pipelines and irrigation equipment. Additional land will be required to provide the necessary irrigated acreage. An additional 2298 acres will be required for 5.2 mgd ADF.
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist a new building, with multiple irrigation pumps with a combined capacity of 11000 gpm (average daily flow of 5.2 mgd); piping, fittings, controls, and flow meters for distribution to the reuse site irrigation system during the growing season.
- Miscellaneous Improvements: Additional improvements required for this alternative include:
    - Site fencing around the storage lagoon and land application site to keep wildlife, debris, and unauthorized personnel from entering the site.
    - Extension of power to the new storage lagoon site for irrigation pump station.
    - Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
    - Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
    - Wheel line, drip, or center pivot irrigation system for the new land application site.
    - A gravel access road to the new storage lagoon and/or land application site.

Advantages of Alternative 4 are:

- Addition of land application reuse system eliminates risk of meeting future river discharge effluent requirements.
- Beneficial reuse of reclaimed effluent
- Alternative disposal point
- Mitigates TP waste load allocation issue related to river discharge
- Allows for offset to the TP waste load allocation beyond the current permitting planning at 5.0 mgd and 50 ppb TP

Disadvantages of Alternative 4 are:

- Capital cost of reuse system
- Additional O&M and regulatory compliance issues related to reuse
- Increased concern (public perception) of expanding reuse activities over the Rathdrum Prairie Aquifer
- May eventually lose ability to discharge to river
- Potential future unknown regulatory concerns with reuse

6.1.5.1 Alternative 4 – Environmental Review

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades, expanded reuse and pipeline improvements and potential land re-purposing for expanded reuse. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Climate and Physical Aspects (Topography, Geology, and Soils): excavation for treatment facilities, expanded reuse and pipeline (short-term and minor long-term impact)
- Impacts to Land Use: expansion of reuse will potentially re-purpose the existing land identified for reuse expansion (potential long-term impact)
- Impacts to Cultural Resources: potential impact if cultural resources are discovered or identified in pipeline corridors (potential short- and long-term impact)
- Impacts to Flora and Fauna: temporary impacts associated with site disturbance which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Air Quality: temporary impacts associated with construction emissions which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: increased energy consumption with the upgrade of treatment and reuse facilities (long-term impact)
- Impacts to Public Health: *positive* eliminate requirements for discharge to the river (long-term impact)

6.2 Environmental Review and Comparison of Alternatives

A summary of the potential environmental concerns related to the project alternatives are as follows in **Table 6-1**.

Table 6-1 – Screening **Level Environmental Concerns**

Environmental Criteria	No Improvements (Alternative 1)	(Alternative 2) Additional treatment with year round river discharge (continuation of current practices) and seasonal reuse on existing land	(Alternative 3) Additional treatment for seasonal river discharge combined with 100% seasonal reuse (during growing season)	(Alternative 4) Modifications to existing treatment system for full seasonal reuse (growing season) and non-growing season winter storage (emergency river discharge)
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)	Yes – excavation for treatment facilities, expanded reuse and pipeline (Short-Term and Minor Long-Term Impact)	Yes – excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes - No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes - potential risk as system grows and inability to meet river discharge requirements year-round (Potential Long-Term Impact)	Yes – lower potential risk as system grows and inability to meet discharge requirements year-round (Potential Long-Term Impact	Yes - potential risk as system grows and inability to meet reuse requirements year-round (Potential Long-Term Impact)
Land Use	No Impact	No Impact	Yes - expanded reuse will potentially re-purpose land identified for Reuse expansion (Potential Long-Term Impact)	Yes - expanded reuse will potentially re-purpose land currently utilized for other purposes (Potential Long-Term Impact)
Floodplain Development	No Impact	No Impact	No Impact	No Impact
Wetlands and Water Quality	Yes - significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes - moderate risk as system grows to consistently treat wastewater to meet river water quality requirements (Long-Term Impact)	Yes – POSITIVE, reduced risk as system grows to consistently treat wastewater to meet river water quality requirements (Long-Term Impact)	Yes – POSITIVE, significantly reduced risk to meet river water quality requirements (Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)
Flora and Fauna	No Impact	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact (no change to land classification)	Yes – POSITIVE expanded reuse may increase agricultural lands (Potential Long-Term Impact)	Yes- POSITIVE expanded reuse may increase agricultural lands (Potential Long-Term Impact)
Air Quality	No Impact	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	Yes – increased energy consumption with facility upgrades (Long-Term Impact)	Yes – increased energy consumption with facility upgrades (Long-Term Impact)	Yes – increased energy consumption with facility upgrades (Long-Term Impact)
Public Health	Yes - water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, eliminate requirements to meet discharge requirements to river (Long-Term Impact)
Alternative Preliminary Cost Opinion (Total 2012 Present Worth Capital + O&M)	---	$78,500,000	$83,600,000	$164,100,000

6.3 Identified Project Alternatives and Potential Costs

A summary of the potential costs of each alternative is presented in **Table 6-2**. Detailed breakouts of project costs are shown in **Appendix 6-A**.

Table 6-2 – Opinion of Probable Costs

Alternative	Present Worth Capital Costs (2012$)	Present Worth O&M Costs (2012$)	Present Worth Capital + O&M Costs (2012$)
Alternative 1 - No Action	---	---	---
Alternative 2 – Additional treatment with year round river discharge (continuation of current practices and partial seasonal reuse to 3.2 mgd)	$67,600,000	$10,900,000	$78,500,000
Alternative 3 - Additional treatment for seasonal river discharge combined with full seasonal reuse (during growing season to 5.2 mgd)	$77,700,000	$5,900,000	$83,600,000
Alternative 4 - Modifications to existing treatment system for full seasonal reuse (growing season) and non-growing season winter storage (emergency river discharge)	$159,700,000	$4,400,000	$164,100,000

6.4 Preferred Alternative

A Public Review Draft Facility Plan was submitted to IDEQ and presented for public comment. The draft presented all alternatives, and Alternative No. 3 recommended by J-U-B and City staff. The recommendation was developed from regulatory considerations reviewed in TM No. 4 and the development of treatment alternatives presented in TM No. 5. A wide range of alternatives were considered during the development of this plan for meeting the City's wastewater treatment and disposal requirements. The recommended alternative provides a flexible, long-term management tool for the City, while identifying phased implementation program to meet capacity and treatment requirements for the next 20 years.

Based on J-U-B's recommendation and input from City staff, and consideration and review of public input the recommended plan, Alternative No. 3 was selected by the City council. This alternative meets the long-term treatment needs and provides planning for potential future regulatory changes.

6.5 Selected Alternative Detailed Phasing and Costs

Alternative 3 includes several phases of improvements necessary to meet compliance schedule milestone dates dictated by the NPDES Permit and 401 Water Quality Certification. These improvements have been organized by proposed date of implementation such that projects are scheduled, constructed, and commissioned in advance of compliance schedule milestones. Further, the financial plan discussed in TM 7 utilizes the improvement schedule to identify necessary changes to user rates and fees necessary to fund and implement the proposed improvements.

Phasing (year of implementation) for the preferred Alternative No. 3 projects are shown in **Appendix 6-A**. The timeline for these projects should be reviewed and updated based on final NPDES Permit and 401 Water Quality Certification compliance schedule conditions that have yet to be finalized. Additionally, some of the proposed phasing is not based on the compliance schedule but are based on anticipated system growth rates developed and adopted in this plan. These growth rates should also be reviewed annually to determine if projects should be advanced in the phasing plan (will need to happen quicker) or if they should be delayed.

Last, as will be discussed in the financial plan, project costs in **Appendix 6-A** are shown in 2012 dollars. The financial plan presented in TM 7 updates project budgets to current (year of construction) dollars based on historic and projected cost escalation factors, including the Engineering News Record Construction Cost Index (CCI). Those adjusted project budgets should be used at the time of construction for setting project budgeting.

Appendices

Appendix 6-A - Detailed Project Costs

Appendix 6-A

Detailed Project Costs

See enclosed DVD for appendix information

J·U·B ENGINEERS, INC.

City of Post Falls WRF Facility Plan

Financial Plan

Final

June 2013

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Appendix 7-A – FCS Financial Model

Tables

Table 7-1 – Rate Analysis Summary (Alternative No. 3) 7-1

TM 7 – Financial Plan

Prior to selection of the preferred alternative by the City Council and as a means to more fully understand the potential impact to their constituents, the City authorized J-U-B's subconsultant (FCS Group) to complete a basic preliminary draft analysis on the recommended Alternative No. 3. The intent of the analysis was to put the financial elements of alternative selection into perspective so that better review decisions could be made but without the expense of completing a full financial plan for every alternative. Alternative No. 2 has a similar treatment approach with less expensive reuse expenditures; therefore, its economic impact would be less than Alternative No. 3. Alternative No. 4 requires similar treatment improvements but relies exclusively on permanently removing discharge from the Spokane River and relying solely on reuse property for wastewater disposal. The cost for additional land to provide storage and disposal is high, making this alternative the highest cost option over time compared to Alternative No. 3. Ultimately, upon consideration of factors, including environmental concerns, public comments, and costs, Alternative No. 3 was selected by the Council, and the Financial Plan was updated.

Critical important financial analysis parameters and assumptions developed and used by FCS are listed in **Appendix 7-A**.

This financial approach tends to utilize relatively conservative assumptions for future projections in order to provide reliable system funding. This approach currently projects the annual average rate increase of 9.46 percent for the average City customer to fully fund Alternative No. 3, including construction, operations, maintenance, and full-funded depreciation reserves. **Table 7-1** shows how these rate increases would apply during projected years when bonding would be required.

Table 7-1 – Rate Analysis Summary (Alternative No. 3)

	2013	2018 [a]	2023 [b]
Cumulative Increase from 2012 (%)	2.50%	72.40%	131.42%
Total Monthly Rate (Avg User)	$29.51	$49.63 [a]	$68.35 [b]

[a] *NPDES Permit compliance schedule driven project borrowing completed in 2017.*

[b] *Growth/capacity driven project borrowing completed in 2021.*

While the projected annual rate increases for the entire planning period average 5.45 percent, **Table 7-1** shows that the first five years require the majority of the funding increases. The preliminary financial model indicates 14.5 percent rate increases in FY 2014 and 2015; 10 and 9 percent in FY 2016 and 2017 respectively with 7 percent increases through 2022. The overall average over the first ten years of the plan is 8.49 percent annual increase (year over year) to meet regulatory and replacement requirements.

New capacity will be funded by users requiring that capacity through capitalization fees. The financial model indicates that the City could decrease capitalization fees from the current $4659 per SU to no more than $4,563 per SU to have new users fully participate in funding their share of Alternative No. 3 capacity. If the City decides to substantially change capitalization fees, those changes should be reflected in the financial model and may tend to impact rates needed for interim funding. Capitalization fees for the treatment portion were calculated for the City of Rathdrum. The financial model indicates this fee could be increased from $3,036 to $4,021 per SU.

Additionally, the financial model anticipates a WWTP expansion between 2029 and 2033 with major collection system expansion project in 2033, as these planned facilities reach 85 percent of their available capacity. As such, funds are being allocated in the financial model but these projects aren't shown specifically as line-items in the capital improvement program.

It is important to note that the financial model is a representation of anticipated revenue and need for capital, operations, maintenance, and replacement funding. As such, the model should be updated regularly and periodically when factors such as significant capital project costs, financing terms, etc. become available.

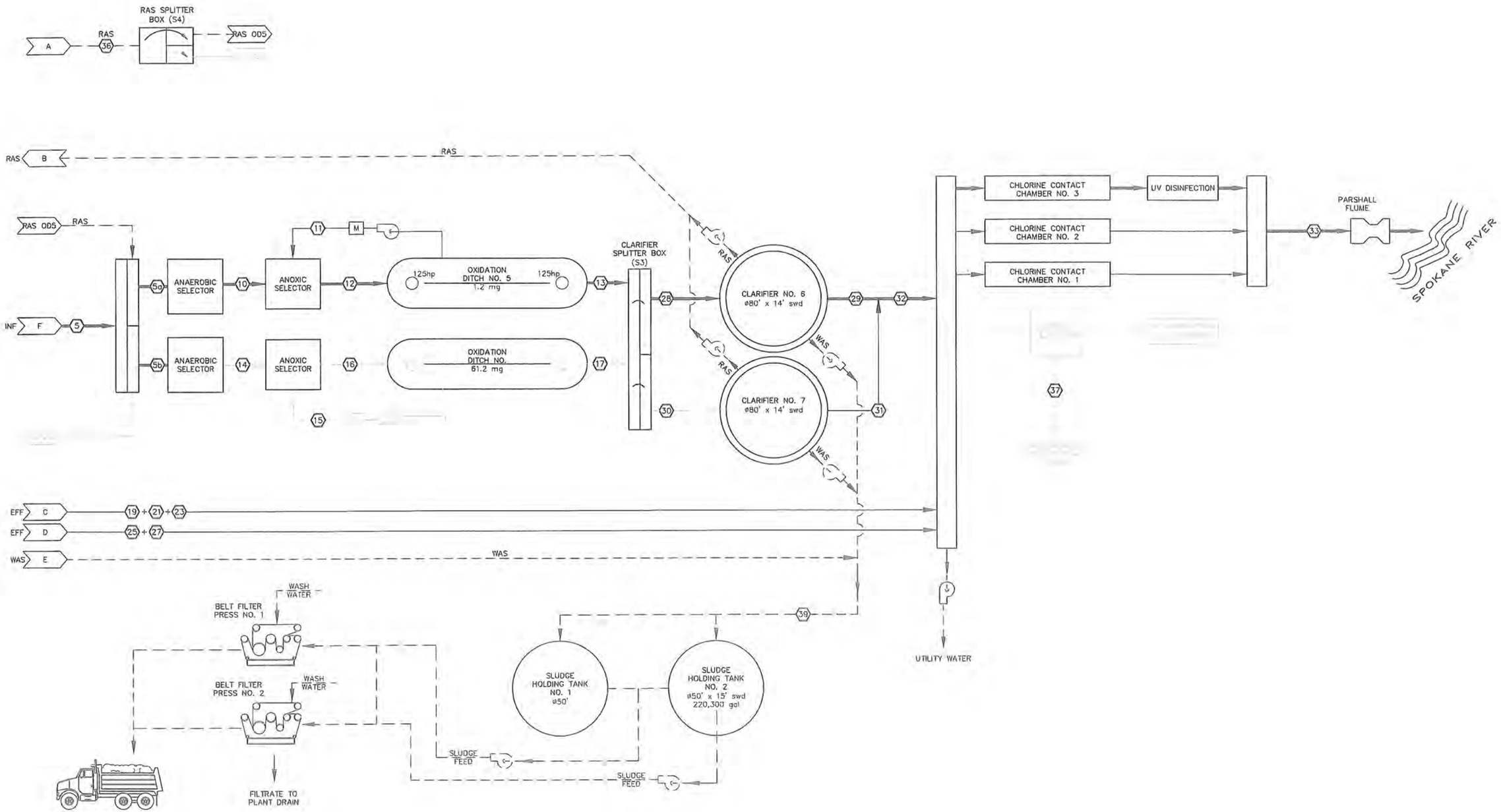
Appendices

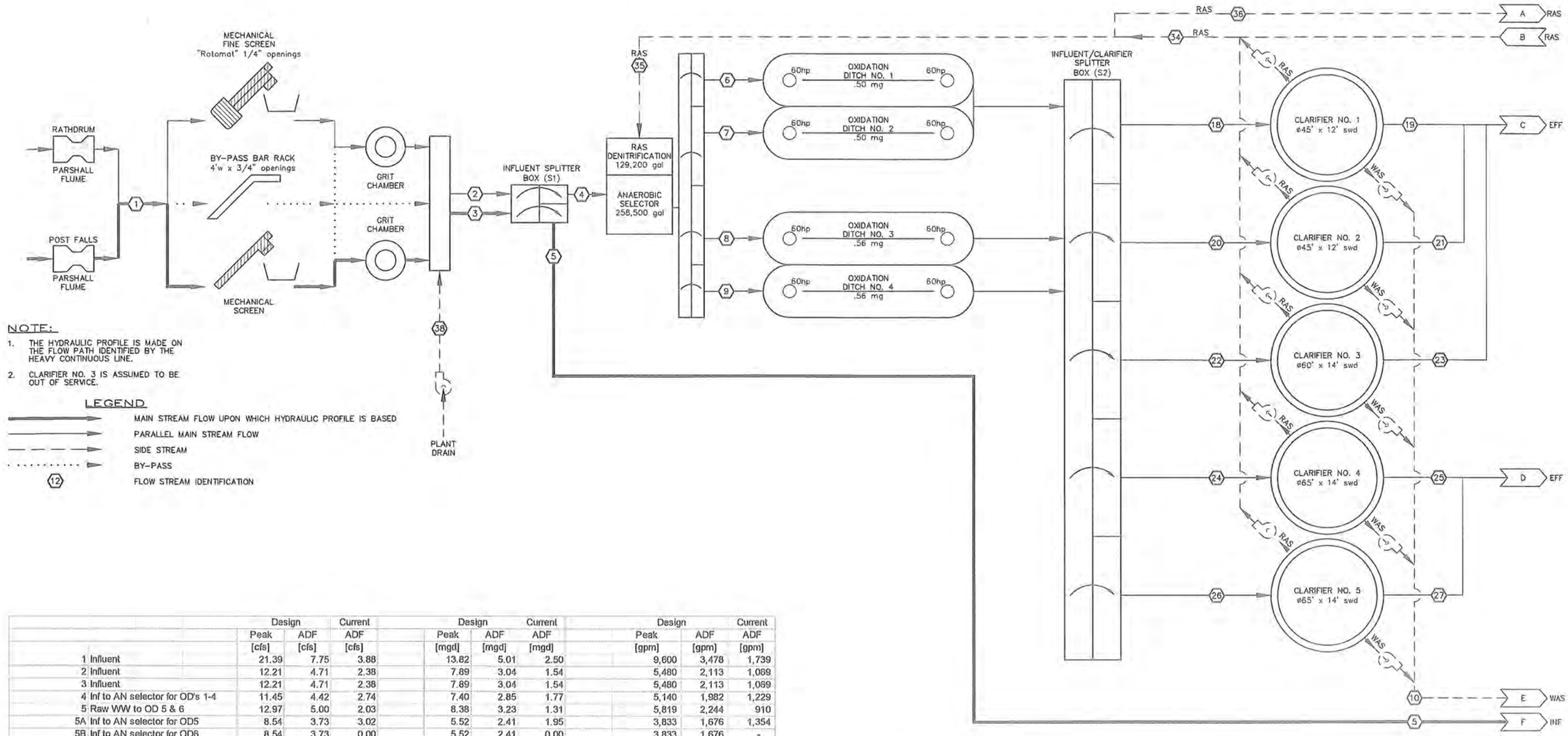
Appendix 7-A – FCS Financial Model

Appendix 7-A

FCS Financial Model

See enclosed DVD for appendix information


RAS SPLITTER BOX (S4)
A
RAS
36
RAS ODS
RAS B
RAS
RAS ODS
RAS
INF F
5
5a
5b
ANAEROBIC SELECTOR
ANAEROBIC SELECTOR
10
14
ANOXIC SELECTOR
ANOXIC SELECTOR
11
M
12
16
15
125hp
OXIDATION DITCH NO. 5
1.2 mg
125hp
OXIDATION DITCH NO.
61.2 mg
13
17
CLARIFIER SPLITTER BOX (S3)
28
30
RAS
RAS
CLARIFIER NO. 6
ø80' x 14' swd
CLARIFIER NO. 7
ø80' x 14' swd
WAS
WAS
29
32
31
37
CHLORINE CONTACT CHAMBER NO. 3
CHLORINE CONTACT CHAMBER NO. 2
CHLORINE CONTACT CHAMBER NO. 1
UV DISINFECTION
PARSHALL FLUME
33
SPOKANE RIVER
EFF C
19 + 21 + 23
EFF D
25 + 27
WAS E
WAS
39
UTILITY WATER
WASH WATER
BELT FILTER PRESS NO. 1
WASH WATER
BELT FILTER PRESS NO. 2
FILTRATE TO PLANT DRAIN
SLUDGE HOLDING TANK NO. 1
ø50'
SLUDGE HOLDING TANK NO. 2
ø50' x 15' swd
220,300 gal
SLUDGE FEED
SLUDGE FEED



NOTE:

1. THE HYDRAULIC PROFILE IS MADE ON THE FLOW PATH IDENTIFIED BY THE HEAVY CONTINUOUS LINE.
2. CLARIFIER NO. 3 IS ASSUMED TO BE OUT OF SERVICE.

LEGEND

- MAIN STREAM FLOW UPON WHICH HYDRAULIC PROFILE IS BASED
- PARALLEL MAIN STREAM FLOW
- SIDE STREAM
- BY-PASS
- (12) FLOW STREAM IDENTIFICATION

		Design		Current	Design		Current	Design		Current
		Peak	ADF	ADF	Peak	ADF	ADF	Peak	ADF	ADF
		[cfs]	[cfs]	[cfs]	[mgd]	[mgd]	[mgd]	[gpm]	[gpm]	[gpm]
1	Influent	21.39	7.75	3.88	13.82	5.01	2.50	9,600	3,478	1,739
2	Influent	12.21	4.71	2.38	7.89	3.04	1.54	5,480	2,113	1,069
3	Influent	12.21	4.71	2.38	7.89	3.04	1.54	5,480	2,113	1,069
4	Inf to AN selector for OD's 1-4	11.45	4.42	2.74	7.40	2.85	1.77	5,140	1,982	1,229
5	Raw WW to OD 5 & 6	12.97	5.00	2.03	8.38	3.23	1.31	5,819	2,244	910
5A	Inf to AN selector for OD5	8.54	3.73	3.02	5.52	2.41	1.95	3,833	1,676	1,354
5B	Inf to AN selector for OD6	8.54	3.73	0.00	5.52	2.41	0.00	3,833	1,676	-
6	OD1 inf	3.56	1.56	0.00	2.30	1.01	0.00	1,597	698	-
7	OD2 inf	3.56	1.56	1.26	2.30	1.01	0.81	1,597	698	564
8	OD3 inf	3.99	1.74	1.41	2.58	1.13	0.91	1,789	782	632
9	OD4 inf	3.99	1.74	1.41	2.58	1.13	0.91	1,789	782	632
10	Inf to AO selector for OD5	8.54	3.73	3.02	5.52	2.41	1.95	3,833	1,676	1,354
11	AO recycle	8.23	2.06	1.65	5.32	1.33	1.07	3,694	923	740
12	OD5 Inf	16.77	5.79	4.67	10.84	3.74	3.02	7,527	2,599	2,094
13	OD5 outlet	8.54	3.73	3.02	5.52	2.41	1.95	3,833	1,676	1,354
14	Inf to AO selector for OD6	8.54	3.73	0.00	5.52	2.41	0.00	3,833	1,676	-
15	AO recycle	8.23	2.06	0.00	5.32	1.33	0.00	3,694	923	-
16	OD6 Inf	16.77	5.79	0.00	10.84	3.74	0.00	7,527	2,599	-
17	OD6 outlet	8.54	3.73	0.00	5.52	2.41	0.00	3,833	1,676	-
18	SC1 inf	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
19	SC1 eff	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
20	SC2 inf	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
21	SC2 eff	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
22	SC3 inf	4.51	1.97	1.22	2.91	1.27	0.79	2,023	885	546
23	SC3 eff	3.42	1.32	0.82	2.21	0.85	0.53	1,536	592	367
24	SC4 inf	5.29	2.31	1.43	3.42	1.49	0.92	2,374	1,038	641
25	SC4 eff	4.02	1.55	0.96	2.60	1.00	0.62	1,802	695	431
26	SC5 inf	5.29	2.31	1.43	3.42	1.49	0.92	2,374	1,038	641
27	SC5 eff	4.02	1.55	0.96	2.60	1.00	0.62	1,802	695	431
28	SC6 inf	8.54	3.73	3.02	5.52	2.41	1.95	3,833	1,676	1,354
29	SC6 eff	6.48	2.50	2.03	4.19	1.62	1.31	2,910	1,122	910
30	SC7 inf	8.54	3.73	0.00	5.52	2.41	0.00	3,833	1,676	-
31	SC7 eff	6.48	2.50	0.00	4.19	1.62	0.00	2,910	1,122	-
32	SC6 and SC7 eff	12.97	5.00	2.03	8.38	3.23	1.31	5,819	2,244	910
33	Final Treated Effluent	21.39	7.75	3.88	13.82	5.01	2.50	9,600	3,478	1,739
34	Total RAS	7.75	4.65	2.33	5.01	3.01	1.50	3,478	2,087	1,043
35	RAS to AN selector for OD's 1-4	3.63	2.18	1.34	2.35	1.41	0.86	1,631	979	599
36	RAS to AN selector for OD's 5-6	4.12	2.47	0.99	2.66	1.60	0.64	1,847	1,108	444
37	Effluent filter backwash	2.14	0.78	0.00	1.38	0.50	0.00	960	348	-
38	Plant Drain	3.03	1.67	0.89	1.96	1.08	0.58	1,359	747	399
39	Total WAS	0.20	0.20	0.20	0.13	0.13	0.13	90	90	90

INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITY OF POST FALLS AND THE CITY OF RATHDRUM FOR THE TREATMENT AND DISCHARGE OF WASTEWATER

This Agreement is entered into this 9TH day of JANUARY, 1996, by and between the CITY OF POST FALLS, a municipal corporation of the State of Idaho, hereinafter referred to as "POST FALLS" and the CITY OF RATHDRUM, a municipal corporation of the State of Idaho, hereinafter referred to as "RATHDRUM";

It is hereby agreed as follows:

WHEREAS the City of Post Falls, Idaho owns and operates a sewage treatment plant commonly known as the Post Falls Sewage Treatment Plant located in Post Falls, Idaho which is authorized by law to receive, treat, and discharge municipal wastewater pursuant to permits issued by the United States and the State of Idaho; and

WHEREAS the City of Rathdrum has contracted for sewage treatment plant capacity for the purpose of treating wastewater and sewage discharged from its sewage collection system; and

WHEREAS the City of Post Falls has committed to providing treatment of municipal wastewater generated in Rathdrum consistent with the capabilities of the Post Falls Sewage Treatment Plant and the needs of both cities; and

WHEREAS the City of Post Falls and the City of Rathdrum believe that there are mutual benefits to be derived by cooperating through this intergovernmental agreement whereby POST FALLS agrees to process municipal wastewater from RATHDRUM in reasonable quantity; and

WHEREAS among those benefits to be derived are an economy of scale in the cost of operation of the Post Falls Sewage Treatment Plant resulting in a potential cost savings to users presently serviced by the City of Post Falls and the Rathdrum wastewater collection system; and further the tangible and intangible benefits of the protection of the Rathdrum aquifer and the quality of the environment in the Post Falls and Rathdrum communities; and

WHEREAS the relationship which has developed by virtue of the shared use of the Post Falls Sewage Treatment Plant enables Rathdrum to use the services of said facility for the treatment of wastewater in the most economic, efficient and environmentally prudent manner at the time of entering into this Agreement; and

WHEREAS the parties and each desire to renew their written agreement to provide for the treatment of wastewater from the Rathdrum wastewater collection system at the Post Falls Sewage Treatment Plant on a fair and equitable basis, including providing for the present and future changes of circumstance considering the potential for expansion of the Post Falls Sewage Treatment Plant, the consideration of wastewater treatment alternatives for Rathdrum, and the ongoing costs of operation, maintenance and repair of the existing and future facilities owned or operated by either city; and

WHEREAS Idaho Code permits cities to enter into contracts with one another to perform public responsibilities in a cooperative manner; and

WHEREAS the parties have negotiated in good faith the terms and conditions of this Agreement which would enable the parties to accomplish this purpose for the duration of the joint working relationship which governs the treatment of wastewater originating in the respective communities; and

WHEREAS the City of Post Falls and the City of Rathdrum have determined that this Agreement and the expenditures and obligations set forth herein are ordinary and necessary to provide for the general health, safety and welfare of their respective cities; and

I. CONTRACT FOR AVAILABLE WASTEWATER TREATMENT CAPACITY

POST FALLS agrees to make available on a continuing basis to RATHDRUM and RATHDRUM agrees to pay consideration to POST FALLS, pursuant to the terms of this Agreement, sewage treatment services at the Post Falls Sewage Treatment Plant in amounts determined pursuant to this Agreement. Said treatment service will be provided to Rathdrum in accordance with the capabilities of the Post Falls sewage treatment facilities and the needs of the City of Post Falls consistent with the terms of this Agreement.

II. ALLOCATION OF AND PAYMENT FOR WASTEWATER TREATMENT

A primary purpose of this Agreement is to establish the methods by which wastewater treatment capacity in the Post Falls Sewage Treatment Plant is allocated between POST FALLS and RATHDRUM, and how financial obligations are met as the capacity and demands placed upon the sewage treatment plant change over time. The original agreement between the parties dated shall serve as a guideline for the future relationship between the parties to the extent not superseded by this Agreement. The parties recognize that future allocation of treatment capacity between them will depend in part upon circumstances unknown at the time of entering into this Agreement. They promise to exercise good faith in dealings with one another to resolve future differences recognizing that neither party will benefit in the long run by trying to gain an advantage over the other. The parties agree that at the time of entering into this modified agreement their respective prepaid capital obligations have been paid up on a current basis and

that Rathdrum currently owes Post Falls no additional prepaid capital funds beyond those already paid, a full accounting having been made prior to execution of this Agreement.

POST FALLS shall establish a rate for wastewater treatment, inclusive of operational and capital maintenance costs necessary to maintain the POST FALLS wastewater treatment facility in sound operating condition and operating in compliance with regulatory standards. RATHDRUM'S use of the POST FALLS treatment facility shall be treated as a single user for purposes of calculating maintenance and operational charges. RATHDRUM shall pay monthly maintenance and operational charges on the same basis as system users in POST FALLS, deducting therefrom the portion of any service charge which is attributable to operation and capital maintenance of the POST FALLS wastewater collection system. The rate to be paid by RATHDRUM may vary from year to year but will never be less than the actual rate being paid by Post Falls users of the treatment works.

III. NEW USER FEES AND DEPOSIT OF PAYMENT FOR ADDITIONAL CAPACITY

A. Subject to the terms and conditions herein set forth, POST FALLS agrees to make available to RATHDRUM additional capacity for new users of the Rathdrum wastewater collection system pursuant to provisions of Article XVI. of this Agreement. A new user shall be defined as a user which has not been previously connected to the Rathdrum wastewater collection system.

B. The capitalization fee charged to new users shall be determined at the time of request for connection of the new user. Except in unique circumstances, which shall be discussed face-to-face between representatives of the respective cities, the time of request for connection of a new user shall be at the time that a building, setting or other construction permit is requested by

a new user. The treatment capitalization fee charged to new Rathdrum users shall be equal to the amount charged to new Post Falls users for treatment plant capacity. At the time the new user is issued a building, setting or other construction permit, the fee shall be collected by the City of Rathdrum and remitted to the City of Post Falls where it will be assigned to the wastewater treatment capital account. Remittance shall be made on a monthly basis and shall be accompanied by an accounting of the basis of the remittance.

C. In the event that POST FALLS determines that there is no additional capacity to accommodate new or expanded uses, the procedures set forth in Article XVI shall be invoked.

D. All capitalization fees paid by RATHDRUM to POST FALLS for additional, expanded or new users shall be allocated to a dedicated fund, the sole purpose of which shall be to fund capital improvements to the Post Falls Wastewater Treatment Facilities, exclusive of collection system components. Nothing in this Agreement is intended to preclude or limit Rathdrum's ability to charge capitalization fees to fund its collection system or other wastewater treatment facilities.

E. All moneys committed to said dedicated fund shall be used exclusively for the use of POST FALLS in providing additional capacity, capital renovation, or improving treatment efficiency or efficacy to aid a new process, reduce operating costs, or comply with new regulations at the existing sewage treatment plant. RATHDRUM and POST FALLS hereby agree that all moneys maintained in said fund may be expended by POST FALLS from said fund for the purposes set forth herein. POST FALLS agrees to provide an annual and five- year capital budget for Wastewater Treatment Facilities to RATHDRUM no later than June 1 of every year that this Agreement is in effect. POST FALLS further agrees to meet with and discuss with

RATHDRUM said budgetary plans prior to adoption of its annual budget. The decision of Post Falls shall be final in such matters. RATHDRUM agrees to charge and remit the same Wastewater Treatment capitalization fee which is charged by the City of Post Falls provided that at least 30 days' notice is given of any changes to said fee.

F. The decision to expand, alter, or modify the sewage treatment plant capacity and/or methods of treatment, including the timing of construction, the letting of contracts and similar aspects of ownership shall be in the sole determination of POST FALLS, which shall at all times pertinent hereto remain the sole owner and operator of the Post Falls Sewage Treatment Plant, subject to the right to use said plant by RATHDRUM, consistent with the terms of this Agreement. POST FALLS further agrees that its determination as to whether or not to expand the Post Falls Sewage Treatment Plant or to modify the methods of treatment shall be based upon documented, sound fiscal, technical and legal considerations, and that POST FALLS shall not arbitrarily refuse to expand the Plant, nor will it change the treatment process without sound scientific or operational bases. If emergency needs must be met, Post Falls may borrow funds as necessary and adjust rates to Rathdrum proportionate to those charged to all system users.

G. Post Falls agrees to annually provide copies of its five (5)-year capital improvement plan for the wastewater treatment system to Rathdrum when such plan is presented to the City of Post Falls, but in any event, at least three (3) months prior to the adoption of the Cities' annual budgets. Rathdrum shall be entitled to review and comment to the City of Post Falls concerning any and all aspects of the wastewater treatment system capital needs. Such comments will be considered in formulating the annual and five (5)-year capital budgets for the system.

H. Unless prior agreement is to the contrary, any expansion of the capacity of the existing facility shall be without specific allocation to the use of either party except as provided in Article XVI.

IV. OWNERSHIP OF THE POST FALLS SEWAGE TREATMENT PLANT

POST FALLS shall at all times now and in the future continue to own and operate the Post Falls Sewage Treatment Plant. Nothing in this Agreement shall be deemed to convey to RATHDRUM or to any other party an ownership interest in any portion of said physical facility or the right to operate said facility, subject, however, to Rathdrum's to use capacity in the plant pursuant to this Agreement. The specific intent of this Agreement is to accommodate the provision of a service by POST FALLS to RATHDRUM as limited and defined by the terms of this Agreement. The operation of the Post Falls Sewage Treatment Plan and any expansion or additions thereto, now or in the future, shall be the sole responsibility of POST FALLS, except to the extent POST FALLS shall be obligated to provide service to RATHDRUM, and RATHDRUM be required to share in the costs of the operation, maintenance, replacement and expansion of the plant as specifically set forth in this Agreement.

V. CONSTRUCTION AND MAINTENANCE OF INTERTIE

A. RATHDRUM shall remain solely responsible for the design, financing, construction, maintenance, repair, and operation of its publicly owned wastewater collection, conveyance and processing facilities necessary to deliver wastewater to the Post Falls Sewage Treatment Plant, except as herein specifically provided. RATHDRUM's obligations shall include any and all collectors, interceptors, transmission pipelines, pumps, lift stations, and any other conceivable

appurtenances thereto, necessary to transmit wastewater to the sewage treatment plant owned by POST FALLS or to the designated point of connection.

B. As additional consideration for the agreement of POST FALLS to treat sewage transmitted by RATHDRUM to the Post Falls Sewage Treatment Plant, RATHDRUM shall provide to Post Falls for review and reasonable approval by POST FALLS the design of equalization basins, metering, monitoring controls, and other incidental facilities anticipated to be constructed by RATHDRUM which are necessary to integrate Rathdrum flows into the Post Falls Sewage Treatment Plant in a manner which best enables effective treatment of the waste stream. Such designs shall be in compliance with the "10 State" Recommended Standards for Wastewater Facilities. POST FALLS may make additional reasonable requirements as may be necessary in the operation of such facilities owned by RATHDRUM to ensure safe, efficient, and proper treatment of flows from RATHDRUM. RATHDRUM shall obtain the specific prior approval from POST FALLS of any plans which would affect operation, capacity, or maintenance of the POST FALLS Wastewater Treatment Plant. Both cities recognize that equalization of flows is a factor to be considered in the design of new capacity and that each city bears a responsibility to cooperate respecting the equalization potential to be realized through collection system design and implementation.

C. Nothing contained in the Agreement, herein or otherwise, permitting POST FALLS to approve the design of specific RATHDRUM facilities which impact the Post Falls Sewage Treatment Plant shall be deemed to create any liability by POST FALLS to RATHDRUM or any other party for the design, construction or operation of such facilities owned by RATHDRUM. RATHDRUM shall at all times now and in the future be deemed to be solely and ultimately

responsible for the safe and efficient design and operation of such facilities owned by RATHDRUM to the exclusion of any liability by POST FALLS. The approval by POST FALLS shall be limited to those matters of design and operation that relate exclusively to the efficient operation of the POST FALLS wastewater treatment plant.

D. RATHDRUM shall at all times own any and all facilities constructed by them, including the transmission lines, lift stations, pumps, collectors, interceptors, and any conceivable appurtenance thereto constructed by RATHDRUM up to the point of connection with the Post Falls Sewage Treatment Plant.

E. Nothing in this Agreement shall limit the ability of the parties to enter into future written amendments hereto which would provide for joint use of the intertie for transmission of treated wastewater or for other shared undertakings. It is the intent of the parties hereto that future opportunities for cooperation between the two entities may present themselves which will warrant addition to or modification of this agreement. It is the intent of the parties to cooperate and consider reciprocal use of facilities owned by either for furthering the purposes of this agreement. Such cooperative and joint use shall be in accordance with primary needs of the owning party, affording benefits to both parties when capacity and system design allow. Specific allocation of reciprocal benefit from capital improvements to the wastewater treatment and collection systems of each party may be accomplished by amendment of this Agreement at any time.

VI. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMITS

A. Rathdrum and Post Falls acknowledge and agree that it is in their mutual interest to maintain National Pollutant Discharge Elimination System (NPDES) permits and other approvals

to enable the operation and future expansion of the Post Falls Treatment Plant for the purpose of making capacity available for wastewater treatment by both cities and for improving the quality of water discharged therefrom.

B. Rathdrum agrees that it shall at all times exercise its best good faith in assisting Post Falls to acquire and maintain permits for wastewater treatment plant expansion and operation, including NPDES permits for capacity greater than presently exists at the Post Falls Wastewater Treatment Plan.

C. It is the intent of the parties during the term of this Agreement, that both cities will have a continual interest in obtaining permission to expand capacity or enhance operation of the existing wastewater treatment plant, and that any such permits shall inure to the benefit of the City of Post Falls as owner of the wastewater treatment plant.

VII. ALLOCATION OF COSTS OF OPERATION AND MAINTENANCE

A. RATHDRUM agrees to pay to POST FALLS on a monthly basis a monthly user charge representing a proportionate share of costs incurred by POST FALLS in the operation of the Post Falls Wastewater Treatment Plant. Said amounts payable by RATHDRUM to POST FALLS shall continue for each month that wastewater is actually discharged from the Rathdrum wastewater collection system to the Post Falls Wastewater Treatment Plant, except as provided in Article XXIII. The operations and maintenance rate charged to RATHDRUM shall be the same as a single commercial customer in POST FALLS, less the rate component for collection system operation. Additional rate considerations shall be established which recognize the actual additional costs of operation occasioned by delivery of wastewater at times or in quantities which conflict with peak flows within Post Falls. A variation in daily flow of more than 15% (plus or

minus) of the monthly average flow for the month in which the flow occurs shall be considered a conflict with plant operation and shall be subject to a 10% rate surcharge for the amount pumped on any day which varies more than 15%.

B. The monthly service charges payable by RATHDRUM to POST FALLS shall be paid within forty-five (45) days of the date upon which they were billed. Billings shall be tendered after meter readings for the preceding month have been calculated and appropriate adjustments have been compiled based upon operations during the preceding month.

C. In order to compute flow for the purpose of applying the rate formula, RATHDRUM shall at its expense install and maintain an influent meter at a location agreed upon by the parties. Said meter shall register both the amount of wastewater pumped and the timing thereof. Both parties shall have access to this meter at all reasonable times and calibration tests shall be performed thereon as either party deems necessary. If POST FALLS believes there is just cause for a test of calibration of the meter, it shall state its reasons, and upon showing just cause, said test or calibration shall be performed at the expense of RATHDRUM. If POST FALLS desires to check calibration of such meter it may do so at any time, at its own expense, without a showing of just cause. Any such meter shall be certified accurate by a mutually agreed upon test facility at least once a year. In the case of failure of the meter, flows will be estimated using the average daily flow for the past 30 days. If the meter remains out of service for more than ten days, and RATHDRUM is not making a reasonable effort to restore metering, a surcharge of 10% will be added to the estimated flows.

VIII. REPLACEMENT FUNDS/UNANTICIPATED EXPENDITURES

A. POST FALLS shall establish a capital replacement fund as a part of its annual and five-year wastewater treatment plant budget. All moneys placed in this fund in proportionate amounts by each party shall be set aside and used exclusively for major repairs and replacement of equipment at the Post Falls Sewage Treatment Plant. Capital Maintenance funds shall not be used for expansion of facility capacity or for any other purpose. POST FALLS shall identify a capital maintenance rate which shall be a component of its monthly maintenance and operations charge to be set aside in the capital maintenance fund for the purposes set forth herein. Rates shall reflect this component.

B. It is anticipated that from time to time there may occur unbudgeted necessary and reasonable expenses as a result of operation of law, act of God, governmental mandate or any other unbudgeted consequence of circumstance that may result from the operation of a wastewater treatment plant. Such occurrences may result in the need to improve, modify, or replace existing equipment or facilities, to make changes to the physical plant necessary to accommodate the change in circumstances, or cause changes in the cost of operation of the plant not reasonably anticipated in the annual budget. In the event that such expenses exceed the amount maintained in the capital replacement fund or operating fund, POST FALLS shall notify RATHDRUM in writing of the anticipated cost and its intention to adjust monthly rates, impose a temporary surcharge, or undertake other measures that may affect customers discharging into the treatment facility. All customers will be equitably affected by such changes.

IX. INTEREST AND LATE CHARGES

A. RATHDRUM agrees that any amounts due and payable under the terms of this Agreement shall be paid on or before the date due. Where not otherwise specifically set forth, any funds due and payable by RATHDRUM to POST FALLS shall be due and payable within forty-five (45) days of the date upon which such authorized costs are billed to RATHDRUM. This provision shall not permit the delay in payment of any amount for which a specific time has been established, but shall operate only in the event that no specific time has been set forth for such payment.

B. In the event that RATHDRUM shall fail to pay any amount due to POST FALLS on or before the date and time due and payable, POST FALLS shall be entitled to receive the principal due plus the statutory rate of interest thereupon as provided by Idaho law. Should any legal action be deemed necessary to seek the collection of said amounts, POST FALLS shall be entitled to be reimbursed for its actual attorney's fees and costs of litigation, if any.

X. PRE-TREATMENT AND RESTRICTION OF DISCHARGE

A. The parties agree that in the interest of complying with applicable Federal, State or local laws and regulations, as well as in the interest of maintaining the environmental quality of the RATHDRUM-POST FALLS communities and the efficiency of the wastewater treatment plant, it is necessary now and in the future to establish reasonable requirements for the pre-treatment of wastewater disposed at the Post Falls Sewage Treatment Plant, and further to restrict the introduction of certain types of waste and discharges which may be harmful to the operation of the Post Falls Sewage Treatment Plant or to the environment. For the purpose of this Section, pretreatment requirements shall apply to each separate wastewater generator discharging into the

RATHDRUM collection system. The discharge from the RATHDRUM force main into the Post Falls Wastewater Treatment Plant will not be considered as a single point of discharge. Individual wastewater generators in each community must meet the intent of applicable laws and regulations and will not be permitted to dilute their discharge, combine their discharge with another generator, or in any other way circumvent the limitations for a point discharge. In that regard, the parties agree as follows:

1. RATHDRUM shall at all times now and in the future abide by all applicable Federal, State and local laws and regulations pertaining to the discharge of effluents or wastewater to be treated in a publicly owned treatment works.

2. RATHDRUM shall establish by ordinance and enforce any and all requirements for pre-treatment of wastewater consistent with any pre-treatment required by POST FALLS. RATHDRUM shall accomplish this end by retaining staff or independent contractor with qualifications to conduct such analysis. If desired POST FALLS will provide technical support for such efforts on a cost reimbursement basis. POST FALLS is authorized to spot-check industrial discharges into the RATHDRUM collection system at any time. RATHDRUM shall supply all test results and monitoring data to POST FALLS on a regular basis.

3. RATHDRUM shall restrict and preclude the introduction and discharge of certain types of wastewater, toxins, wastes and undesirable chemicals and effluent in the same manner and to the same degree as they are restricted and limited by POST FALLS as applied to its own users or as otherwise required of POST FALLS by state and Federal regulators. RATHDRUM shall make a part of its wastewater collection system use

ordinance any such restrictions on the introduction of any such toxins, undesirable wastes, wastewater or chemicals in the same manner as does POST FALLS and shall commit the necessary resources to enforce said requirements. RATHDRUM agrees that if it is negligent in this regard, it shall compensate POST FALLS for any expenses, including fines, penalties, extraordinary labor or disposal costs, or other related charges which POST FALLS incurs as a consequence of RATHDRUM's inadequate performance of its duties.

D. At no time shall RATHDRUM permit stormwater inflow to enter its wastewater collection system. RATHDRUM agrees to compensate POST FALLS for costs incurred, including fines, penalties, extraordinary labor costs, or other related charges which are the result of any RATHDRUM-based uncontrolled stormwater inflow or infiltration into the POST FALLS Wastewater Treatment Facility.

XI. ENFORCEMENT/INSPECTIONS

A. RATHDRUM shall at all times during the term of this Agreement enforce each and every restriction, limitation or requirement regarding discharge of wastewater which is made a part of this Agreement or contained in its ordinances or other applicable resolutions, regulations or the like. This shall include any existing or future mandates by any Federal, State or local regulatory agency which may occur from time to time.

B. In order to ensure compliance, POST FALLS shall have the right to make reasonable inspections and inquiries concerning the Rathdrum wastewater collection system, including the intertie and all appurtenances thereto and the operating practices associated therewith, upon reasonable notice and at reasonable times, no less frequently than once per year. RATHDRUM

shall at all times cooperate with authorized agents of POST FALLS in permitting such inspections and answering inquiries concerning the wastewater collection system and the discharge of wastewater.

C. In the event that RATHDRUM shall fail to discharge its duties under the terms of this Agreement, which shall include the enforcement of its own ordinances or its responsibilities as defined herein, POST FALLS shall notify RATHDRUM in writing of any such breach. RATHDRUM shall within ten (10) days of the date of mailing of such written notice respond in writing providing adequate assurances and proof that the breach of any such duty or obligation has been cured. In the event that RATHDRUM fails to diligently undertake cure of any breach within said ten (10) day period, then in that event, POST FALLS may wherever possible, and acting in good faith in all respects, undertake to remedy any such defect or breach by RATHDRUM, which may include the repair or modification of the wastewater collection system, and charge to RATHDRUM all reasonable expenses incurred in doing so. In the event of a bona fide emergency, which shall be defined as any state of affairs which immediately affects the quality of the environment, or the safe and healthful operation of the wastewater treatment plant, as may be determined by any public agency or political subdivision mandated with the protection of the environment or protection of the public health (including the City of Post Falls), POST FALLS may bypass its contractual obligation to provide written notice and orally notify RATHDRUM of the emergency. In the event that RATHDRUM then fails to immediately cure the defect or remedy the situation, POST FALLS may do so without further notice. POST FALLS shall similarly be entitled to reimbursement for actual expenses incurred in taking such necessary emergency action.

D. Nothing in this Agreement shall be construed as placing upon POST FALLS an obligation to cure or remedy any such defect or breach, which duties shall solely belong to RATHDRUM as it pertains to the operation of its wastewater collection system and the intertie. The purpose of this provision is merely to provide POST FALLS with the opportunity to do so if, in its sole discretion, it deems it advisable in the event of any default or breach by RATHDRUM.

XII. REMEDY FOR DEFAULT AND BREACH

In the event that either party breaches any material term or provisions of this Agreement, the non-defaulting party shall cause to be delivered in writing to the other, a notice stating said breach or default and demanding that the same be cured within thirty (30) days from the date of mailing of said notice. In the event that such default or breach is not cured within that period of time, the non-defaulting party may petition for legal relief in the Courts of the First Judicial District of the state of Idaho. The non-defaulting party may request any such equitable or legal relief as it deems appropriate under the circumstances, which may include specific performance of this Agreement on such terms as the Court may impose.

XIII. LIABILITY INSURANCE AND INDEMNIFICATION

A. POST FALLS assumes responsibility for the safe and efficient operation of its wastewater treatment plant. To the extent that POST FALLS deems necessary, it shall obtain such policies of liability insurance as may be appropriate to cover such losses as may arise from accident, injury or damage to property. The cost for acquiring such insurance shall be deemed to be a ordinary cost of operation and shall be made part of the costs proportioned between the parties as provided for by this Agreement.

B. At all times RATHDRUM shall assume the obligation for the safe operation of its wastewater collection system and the intertie which provides for the discharge of wastewater to the Post Falls wastewater treatment plant. RATHDRUM shall at all times maintain a policy of liability insurance for any injury to person or damage to property arising out of the operation of said wastewater system or intertie, but not including pollution insurance. Said policy of liability insurance shall be in the minimum amounts of $500,000.00 per occurrence and $500,000.00 aggregate for any such claims for damage which may occur, or in any event such amounts not less than the statutory maximum dollar amount permitted to be assessed as damages against a political subdivision of the State of Idaho. RATHDRUM agrees to name as an additional insured on any such policy, the City of Post Falls as it relates to the operation of the intertie and the discharge of wastewater to the sewage treatment plant located in Post Falls and operated by POST FALLS.

C. RATHDRUM further agrees that as consideration for this Agreement, RATHDRUM agrees to indemnify and hold harmless POST FALLS from any and all claims of any kind, character or nature arising out of the operation of the Rathdrum Wastewater Collection System or the intertie which provides for the discharge of wastewater to the Post Falls wastewater treatment plant. This provision for indemnification shall include, in addition to any actual damages which may be claimed or result, reimbursement for reasonable attorney's fees and the costs of defense incurred by the City of Post Falls.

XIV. DAMAGE TO SYSTEM

In the event that the wastewater treatment plant or any component thereof is damaged by any party to this Agreement or by any third party on account of or arising out of the failure, malfunction, or negligent maintenance or design of any component of the wastewater system operated by either party, or by the failure of either party to properly adopt or enforce the regulations and restrictions made a part of this Agreement, and which said damage is traceable to a specific component of the system or to the failure of either party to perform, such damage shall be the exclusive responsibility of the party charged with such maintenance or operation of their system, or the enforcement of the rules and regulations made a part of this Agreement. Each party agrees to indemnify and hold harmless the other party from all costs for repair, claims and liabilities, or any other costs, including reasonable attorney's fees which may be incurred as a result of such damage arising from such failures, malfunctions, negligence, maintenance or operation, or the breach of that parties duties to restrict and limit the discharge of certain types of waste and wastewater.

B. For example, if damages are traceable to a portion of the Rathdrum wastewater collection and transmission pipes, or are attributable to a RATHDRUM user provided service under the terms of this Agreement, RATHDRUM shall be solely responsible for the costs of repairing any such damage and POST FALLS shall not be required to contribute. In the event that damage is not traceable to any specific user the costs shall be borne by both parties predicated on the formula for the distribution of costs previously set forth. Both parties agree to cooperate and use utmost diligence and good faith in their efforts determine the cause of damage arising out of operation of the wastewater collection and treatment facilities which are the subject of this agreement.

XV. ALLOCATION OF FUTURE USE AND SERVICE

A. The parties acknowledge and agree that the present wastewater treatment plant is sufficient to service the discharge of wastewater for both users at the present time. Wastewater service shall be provided to both parties and their respective residents and users in accordance with the allocation principles established pursuant to this Agreement, subject to payment of such user and new capacity fees as may be required.

B. Both parties expressly agree that wastewater collection service provided by either party under the terms of this Agreement shall not be provided outside their respective corporate limits, now existing, or as subsequently modified, except to serve the needs of a political subdivision of the state. In extraordinary circumstances which pose significant consequences to the environment, the parties agree to consult one another concerning the temporary authorization of extraterritorial service. The decision to conditionally allow extraterritorial service shall be the exclusive prerogative of POST FALLS. Requests for extraterritorial service from either party shall assume a lower priority than potential obligations within the corporate limits of either municipality. Should POST FALLS approve extraterritorial service it will provide written documentation substantiating a technical, legal, or economic justification for granting such approval.

C. Under no circumstances shall RATHDRUM extend the service provided under the terms of this Agreement to any other municipality or political subdivision without the express written approval of POST FALLS. POST FALLS may deny the extensions of service to any other municipality or political subdivision, public utility, district or private user association or corporation, at its sole discretion and without stating a reason.

XVI. CAPACITY ALLOCATION PROCEDURES

A. The parties acknowledge that during the course of performance since its inception, the relationship established between the parties has been affected by growth and change within the respective communities. The parties agree that a fixed allocation for the duration of the Agreement is not practical, and that the issues of capacity allocation need to be adjusted on an ongoing basis as circumstances dictate. In order to accomplish such adjustment, and to maintain a constructive working relationship, the parties must communicate annually, or more frequently as the need arises, about capacity allocation.

B. Toward that end, the POST FALLS will prepare an annual capacity analysis to be presented to the respective parties by March 31 of each year. Such analysis shall report capacities of the treatment works, flows from each of the jurisdictions, and, after consultation with RATHDRUM, trends which can be expected to shape treatment demands in the respective cities in the year or years to come. The firm treatment capacity established by the POST FALLS for purposes of this analysis shall be that which can be sustained through a major component failure and unscheduled operational interruptions of duration in excess of 24 hours or more, not the ultimate capacity of all system components if all are functioning at peak efficiency.

C. The report which addresses capacity analysis shall establish a base system actual use allocation which relies upon flow and wastestream analysis. Such analysis shall form the baseline for discussion of future capacity allocation. The parties will begin with current flows as their base flow allocation. The treatment capacity at the time of making this Agreement is calculated to be 1.5 MGD. Current Rathdrum flow is .25 MGD. Current Post Falls flow is 1.25 MGD. There is no current unallocated capacity, pending completion of construction which will begin in early

1996. When the contemplated construction is complete, the capacity of the Plant is projected to be 3.1 MGD. The first 75% of wastewater treatment capacity will be allocated on an 80/20 (Post Falls/Rathdrum) basis. The remaining 25% of capacity will be reserved for allocation on request by either of the parties at the time a proposed use is presented. It is the intent of the parties to this Agreement that consultation between the parties will be carried out before unallocated capacity is completely committed. Except in extraordinary circumstances, it is the intent of the parties that at least 25% of the identified unallocated capacity (25% of 25%) remain available for specific allocation after such consultation. The capacity allocation shall be accomplished annually by letter addendum to this Agreement approved by the respective city councils of the contracting cities. Absent a letter agreement allocating new capacity, the parties shall be limited to the formula for allocation set forth above after certification by POST FALLS that new capacity is available for allocation. It is the duty of each party to participate in good faith in negotiations concerning capacity allocation. The provisional allocation established by this Agreement recognizes that two (2) construction projects are contemplated which will affect treatment capacity. Changes in capacity will be recognized only after capacity-related projects are completed and fully functional. In the event the parties fail to agree pursuant to this section, the remaining 25% of the unallocated treatment capacity shall be split on the 80%/20% split provided for herein.

D. Calculation of demand for treatment capacity shall be based upon projected treatment facility use using agreed upon relevant factors for prospective users. Residential land uses shall be calculated on the basis of 165 GPD per dwelling unit. Commercial and industrial uses shall be based upon an analysis of the quality and quantity of wastewater generated by the activity in

question. Capacity commitments are binding upon the parties when a construction permit is issued or when other firm commitment is made which evidences the need to assign treatment plant capacity. Each party is separately responsible for treatment capacity representations made by its officials. No commitment, third-party or otherwise, in excess of the limits established by this Agreement shall be binding on the other party. The projected demand of commercial or industrial users shall be calculated using the quantity of projected water consumption or wastewater generated and after being adjusted for projected levels of suspended solids, BOD, COD, or other components that exceed those contained in normal domestic sewage as defined in Post Falls Municipal Code or State or Federal Standards. The projected number of ER's will be determined by dividing the adjusted quantity by 165 GPD.

E. The parties agree that whenever unallocated capacity is less than 25% of total operating capacity, they will meet and confer regarding expansion of treatment capacity. The decision to expand treatment capacity shall remain solely the province of POST FALLS, but in arriving at such decision POST FALLS will weigh considerations advanced by RATHDRUM.

F. If at any time RATHDRUM has effectively reached the limits of the treatment capacity available to it by virtue of this agreement, two options shall be available to obtain additional capacity. At any time RATHDRUM believes its capacity needs cannot be met from the allocation made by this Agreement, it shall provide notice to POST FALLS that additional capacity will be needed. Said notice must state when additional capacity will be needed and how much will be required. The two options presented are reallocation of existing capacity and construction of new capacity.

Upon receipt of such notice POST FALLS shall notify Rathdrum within sixty (60) days whether POST FALLS will make available part of its allocation to RATHDRUM, either on a fixed basis or temporarily, as appropriate. Any such additional allocation may be accomplished by an ancillary agreement which serves as an amendment to this Agreement. The terms and conditions of any such ancillary capacity allocation agreement shall incorporate the remaining terms and conditions of this Agreement except as express modification is necessary.

If POST FALLS declines to make additional existing capacity available to RATHDRUM upon such request, RATHDRUM may request expansion of the existing plant or processes to provide the capacity which RATHDRUM needs. Upon prepayment of the estimated engineering analysis costs, POST FALLS shall promptly proceed to propose methods of expansion or modification of the existing wastewater treatment plant to accommodate RATHDRUM'S needs. In consultation with RATHDRUM, POST FALLS will select a method of expanding capacity which best fits with the process and capacities employed by the existing system. RATHDRUM will be responsible for funding the costs of expansion and will be entitled thereby to the capacity created by such expansion. POST FALLS shall be entitled to purchase up to 20% of said additional capacity by paying the capitalization fees derived from the costs of the expansion. Addition of capacity by this method shall not alter the actual ownership of the treatment plant facilities which shall remain exclusively with POST FALLS, but RATHDRUM shall be entitled to rights respecting such added capacity comparable to those of POST FALLS for existing capacity provided in accord with this Agreement.

XVII. CONNECTION TO INTERTIE

A. A portion of the transmission main (intertie) from RATHDRUM to POST FALLS passes through the Post Falls wastewater collection service area. POST FALLS shall not permit the connection of any user to this transmission main, absent the express written approval from RATHDRUM. RATHDRUM agrees that it shall not withhold approval for direct connection to the intertie unless there is provided written documentation of a technical, legal or economic justification for the withholding of such approval.

B. In the event that POST FALLS requests and RATHDRUM approves such a connection to the transmission main, POST FALLS agrees to pay a one time connection fee and a monthly rate to cover any increased operating costs incurred by Rathdrum to RATHDRUM for the utilization of the transmission main. POST FALLS shall be responsible for all costs of connection. In the event either city notifies the other that the capacity of the intertie is being adversely affected by the lack of flow equalization of wastewater discharged by the two cities, the cities shall cooperatively initiate a program of flow equalization to maximize capacity. In the event equalization facilities are required to be installed for equalization of flows into and through the intertie as a consequence of Post Falls use, POST FALLS shall be responsible for the reasonable costs thereof. POST FALL further agrees to provide a flow meter at all points of intertie. POST FALLS shall be deemed to own and assume the responsibility and liability for the construction of any connecting interceptors, collectors, transmission pipelines or appurtenances. The parties shall agree upon a reasonable usage fee for use of the intertie at the time such use is requested.

XVIII. MAINTENANCE AND INSPECTION OF RECORDS

A. RATHDRUM and POST FALLS agree to maintain accurate records relating to their duties and responsibilities under the terms of this Agreement. For instance, POST FALLS shall maintain accurate records concerning the operation of the wastewater treatment plant and the costs associated with said operation. RATHDRUM shall likewise maintain accurate records of the discharge of its wastewater and the operation of its wastewater collection system.

B. Both parties agree that the records maintained by each shall be deemed public records and shall be made available for inspection at any and all reasonable times. Where either party deems that the necessity of keeping a record of certain information is necessary to implementation of this Agreement, the other party agrees to do so and to make such records available for inspection.

XIX. NONASSIGNMENT

A. RATHDRUM specifically acknowledges that as part of the consideration for this Agreement, RATHDRUM has agreed that it shall not assign to any other person, party, entity, or political subdivision, its rights and obligations under the terms of this Agreement. RATHDRUM specifically acknowledges that POST FALLS would not have entered into this Agreement if the rights and obligations of RATHDRUM were to be assignable. Part of the consideration which has been made by POST FALLS in extending service under the terms of this Agreement is its past working relationship with RATHDRUM, and its recognition that the other party of this Agreement shall at all times be a political subdivision regulated in accordance with the laws of the State of Idaho. RATHDRUM specifically agrees that it shall not at any time now or in the future assign all or any part of its rights and obligations under the terms and conditions of this

Agreement to any other party, entity, person or political subdivision without the express written approval of POST FALLS. RATHDRUM further agrees that any such assignment shall operate to terminate this Agreement.

XX. ATTORNEY'S FEES AND ALTERNATIVE DISPUTE RESOLUTION.

In the event of any dispute over the terms and conditions of this Agreement which may result in legal and judicial action, the parties agree that the prevailing party in any such lawsuit shall be entitled to be reimbursed for all reasonable attorney's fees and costs of prosecution incurred by said prevailing party, and that said reimbursement for reasonable attorney's fees and costs shall be in addition to any other relief granted.

Any dispute or disagreement concerning the terms, conditions, or performance of this Agreement shall first be submitted to a face-to-face meeting of the respective parties acting through their Mayor, City Administrator, or other authorized delegate of the Mayor. With promptness appropriate for the nature of the disagreement, but in no case any longer than thirty (30) from the date of first written notice of disagreement filed by either party, the respective representatives of the city shall meet and confer to attempt to resolve such differences. If such differences cannot be resolved through face-to-face communication, either party may, after at least one face-to-face meeting, call for the appointment of a mediator to assist the parties in reconciling their differences. The parties shall endeavor to agree upon and share the cost of a mediator or, if unable to do so, they shall call upon the Administrative District Judge of the First Judicial District to appoint a mediator, whose costs, up to five thousand dollars ($5,000) per party, are to be borne equally by the parties. The parties shall promptly address their assertions to the mediator who shall deliver a written recommendation within ten (10) days of receipt of such

information. Only after the completion of the mediation process can either party initiate legal action to declare or assert rights accorded by this agreement.

XXI. INTEGRATED AGREEMENT

This Agreement constitutes all of the agreement and the entire agreement of the parties relating to the providing of wastewater treatment services by POST FALLS to RATHDRUM. The parties acknowledge and agree that any oral agreements made between the parties which are not made a part of this writing shall not be binding nor construed to be a part of the agreement. The parties further agree that any amendment or modification of this Agreement between the parties shall be in writing and signed by the parties.

XXII. SEVERABILITY

This Contract is to be governed by and construed according to the laws of the State of Idaho. If it should appear that any of the contract terms contained in this Agreement are in conflict with any rule of law or statutory provision of the State of Idaho, then the terms of the contract which may conflict with the law of the State of Idaho shall be deemed inoperative and null and void in so far as they may be in conflict with such law, and shall be deemed modified to conform to such rule of law.

XXIII. DURATION AND TERMINATION OF THIS AGREEMENT

A. The term of this Agreement shall commence on execution and be perpetual until there is mutual agreement to terminate or as otherwise provided by this Agreement. Specific performance shall be the remedy of preference for non-compliance recognizing that treatment of the wastewater from the City of Rathdrum is not something which can be terminated at every disagreement. Upon termination, POST FALLS shall no longer be obligated to accept from

RATHDRUM wastewater discharge for treatment at the Post Falls Wastewater Treatment Plant. Reductions in flow as a result of diversion may be followed by a subsequent increase or regeneration such that capital capacity paid for by Rathdrum users may be fully utilized.

B. It is anticipated that the termination of this agreement may create difficulties for either or both cities in making the transition required in severing this relationship. Therefore it is agreed that POST FALLS will not terminate this Agreement unilaterally unless it shows an utter failure of performance by RATHDRUM and seeks a declaratory judgment to that effect in a court of competent jurisdiction authorizing recision of this Agreement.

C. During the negotiation of this Agreement the parties have discussed the possibility of separating wastewater treatment operations at some future time. Should RATHDRUM desire to employ a different wastewater treatment alternative than use of the Post Falls Wastewater Treatment Plant, it shall give notice to POST FALLS of its intent to do so as soon as possible. Except in extraordinary circumstances and with mutual agreement of the parties, such notice shall be given at least 24 months prior to actual withdrawal or significant reduction of wastewater flows. At such time as RATHDRUM notifies POST FALLS of its intent to withdraw or divert wastewater flow from the Post Falls Wastewater Treatment Plant, or to materially reduce the flow of wastewater thereto, the parties agree to meet as soon as practicable and as often as necessary to negotiate the terms and conditions by which such change will be governed.

XXIV. NOTICES

All notices required or provided for under the terms of this Agreement shall be in writing and must be served on the other party either personally or by certified mail, return receipt

requested. Any such notice mailed shall be mailed to the business address in each respective City which shall be deemed to be the address commonly used by City Hall for the purpose of receiving correspondence through the United States mail. Notices sent by certified mail shall be deemed served when deposited in the United States mail, postage prepaid, as evidenced by the receipt for mailing.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their proper officers on this 9 day of January, 1916.

CITY OF RATHDRUM

Tawnda Bromley, Mayor

ATTEST:

Judy Hollenbeck, City Clerk

CITY OF POST FALLS

James Hammond, Mayor

ATTEST:

Christene Pappas, City Clerk

FIRST AMENDMENT TO
INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITY OF POST FALLS AND THE CITY OF RATHDRUM FOR THE TREATMENT AND DISCHARGE OF WASTEWATER DATED JANUARY 9, 1996

This First Amendment to Intergovernmental Agreement modifies that certain agreement entered into on January 9, 1996, by and between the CITY OF POST FALLS, a municipal corporation of the state of Idaho, hereinafter referred to as "POST FALLS", and CITY OF RATHDRUM, a municipal corporation of the State of Idaho, hereinafter referred to as "RATHDRUM," a copy of which is attached hereto as Exhibit "A".

In consideration of the mutual promises and covenants contained herein, the parties hereby agree that the above-referenced contract is modified as follows:

1. Section V, Paragraph A, shall be amended to read as follows:

RATHDRUM shall remain solely responsible for the design, financing, construction, maintenance, repair, and operation of its publicly owned wastewater collection, conveyance and processing facilities necessary to deliver wastewater to the Post Falls Sewage Treatment Plant, except as herein specifically provided. RATHDRUM's obligations shall include any and all collectors, interceptors, transmission pipelines, pumps, lift stations, and any other conceivable appurtenances thereto, necessary to transmit wastewater to the sewage treatment plant owned by POST FALLS or to the designated point of connection. The designated point of connection shall be the physical point at which the RATHDRUM flow meter connects to the headworks of the POST FALLS sewage treatment plant.

POST FALLS agrees to grant to RATHDRUM an easement for that portion of the RATHDRUM conveyance system that is prior to the physical point at which the RATHDRUM flow meter connects to the headworks and which is located on property owned by POST FALLS.

2. Section V, Paragraph B, shall be amended to read as follows:

B. As additional consideration for the agreement of POST FALLS to treat sewage transmitted by RATHDRUM to the Post Falls Sewage treatment Plant, RATHDRUM shall provide to POST FALLS for review and reasonable approval by POST FALLS the design of equalization basin, metering, monitoring controls, and other incidental facilities anticipated to be constructed by RATHDRUM which are necessary to integrate Rathdrum flows into the Post Falls Sewage Treatment Plant in a manner which best enables effective treatment of the waste stream. Such design shall be in compliance with the Idaho Department of Environmental Quality Rules set out in IDAPA 58.01.16 and any subsequent amendments thereto. POST FALLS may make additional reasonable requirements as may be necessary in the operation of such facilities owned by RATHDRUM to ensure safe, efficient, and proper treatment of flows from RATHDRUM. RATHDRUM shall obtain the specific prior approval from POST FALLS of any plans which would affect operation, capacity, or maintenance of the Post Falls Wastewater Treatment Plant. Both cities recognize that equalization of flows is a factor to be considered in the design of new capacity and that each city bears a responsibility to cooperate respecting the equalization potential to be realized through collection system design and implementation.

3. Section VI is amended to add Paragraphs D and E to read as follows:

D. POST FALLS and RATHDRUM recognize that there may be a need in the future for the parties to develop a wastewater reclamation and reuse program under the Idaho Department of Environmental Quality Rules set out in IDAPA 58.01.17 in order to reduce the amount of reclaimed water discharged into the Spokane River. Both POST FALLS and RATHDRUM have acquired property

for the purpose of future reuse irrigation and agree to make that land available for reuse activities and appurtenant facilities, including but not limited to storage ponds, pump stations, mechanical buildings, monitoring wells, cultivation, planting, and harvesting operations, at such time it becomes necessary to implement the reuse program in order to assure adequate treatment and discharge capacity and compliance with treatment and discharge regulations imposed on the Post Falls Wastewater Treatment System by either state or federal regulatory agencies. Each party will be responsible to make available land for reuse in an amount that is proportionate to that party's portion of the wastewater flow into the Post Falls Wastewater Treatment Plant. The proportionate amount shall be based on equivalent units of reuse capacity. Setbacks required by regulatory authorities that make the land unusable for reuse shall not count toward a either party's proportionate share. If either party has a surplus of land that is suitable for reuse, the other party may lease that surplus to fulfill the leasing party's obligation to provide land for reuse. In the event that the amount of land required for reuse is greater than the amount of suitable land owned by both parties, POST FALLS and RATHDRUM agree that each will pursue the acquisition of additional suitable land for reuse to fulfill their responsibility to provide their proportionate share of suitable land, or negotiate a different methodology for acquiring land. Priority shall be given to acquiring suitable land that is adjacent to or easily accessed and serviced from the existing land owned by both parties.

Installation and maintenance of the transmission lines to carry the effluent to a reuse site shall be the responsibility of POST FALLS, regardless of which party owns the real property on which the reuse will occur.

Installation and maintenance of the distribution system on the site shall be the responsibility of the entity that owns the property, unless agreed to otherwise by both parties in writing.

E. POST FALLS and RATHDRUM acknowledge that their respective facilities are subject to the requirements of the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES), and state and local environmental health regulations, in addition to any environmental permits that they may hold, and shall accordingly respond and accept responsibility to conditions or incidents involving their respective facilities.

4. Section XVI, Paragraph C is replaced with the following language:

C. The report which addresses capacity analysis shall establish a base system of actual use which relies upon flow and waste stream analysis. Such analysis shall form the baseline for discussion of future capacity allocation and expansion of capacity. It is intended that the allocation of capacity will not exceed 80% of the wastewater treatment capacity without discussion regarding a plan for future creation of capacity. When the wastewater treatment capacity reaches 80% of the facility capacity, POST FALLS will send written notice to RATHDRUM that such capacity has been reached. At that time, POST FALLS will either enter into an agreement for the design of treatment expansion, or meet with Rathdrum to determine the need for additional capacity. Neither party shall be entitled to use the 20% remaining capacity until such time as POST FALLS has entered into an agreement for the design of treatment expansion or POST FALLS and RATHDRUM have met to discuss the future capacity needs of each entity and determined that no expansion of the capacity is needed. Both parties shall

participate in good faith in discussions regarding their future needs for capacity, the costs of any capacity expansion and the allocation of the remaining capacity.

5.. Section XVI, Paragraph F is replaced with the following language:

F. If at any time RATHDRUM believes its capacity needs cannot be met by what is remaining in the unused portion of the 80% of the capacity of the allocation made by this Agreement in Section XVI, Paragraph C of the Agreement as amended herein, RATHDRUM shall provide written notice to POST FALLS that additional capacity will be needed. Said notice must state when additional capacity will be needed and how much will be required.

Upon receipt of such notice, POST FALLS shall either notify RATHDRUM within sixty (60) days whether POST FALLS will make available part of the twenty percent (20%) of existing reserve capacity. If POST FALLS declines to make available additional existing capacity upon such notice, RATHDRUM may request expansion of the existing plant or processes to provide the capacity which RATHDRUM needs. Upon prepayment of the estimated engineering analysis costs by RATHDRUM, POST FALLS shall promptly process to propose methods of expansion or modification of the existing wastewater treatment plant to accommodate RATHDRUM'S needs. In consultation with RATHDRUM, POST FALLS will select a method of expanding capacity which best fits with the process and capacities employed by the existing system. RATHDRUM shall be responsible for funding the costs of such expansion or modification. The expansion or modifications shall be subject to any such expansion or modification complying with the NPDES permit issued by EPA. In the event that such proposed expansion or modification shall cause the system to no longer be in

compliance with the current EPA permit, POST FALLS may decline to expand or modify the existing system.

If the system capacity is expanded at the request of RATHDRUM, and paid for by RATHDRUM, RATHDRUM shall be entitled to use the capacity created by such expansion funded by them. POST FALLS shall be entitled to purchase up to 20% of said additional capacity by paying the capitalization fee derived from the costs of the expansion. Addition of capacity by this method shall not alter the actual ownership of the treatment plant facilities, which shall remain exclusively with POST FALLS, but RATHDRUM shall be entitled to rights respecting such added capacity comparable to those of POST FALLS for existing capacity provided in accord with this Agreement.

Notwithstanding the limitations on the use of the remaining 20% capacity set forth in Section XVI, Paragraph C, if the system capacity is expanded at the expense of RATHDRUM, pending the completion of the expansion RATHDRUM shall be entitled to use up to 50% of the remaining 20 % capacity while the expansion is being constructed.

6.. That Section XVI shall have added as paragraph G the following language:

G. In the event that RATHDRUM elects to construct its own wastewater treatment facility and to no longer discharge Rathdrum wastewater into the Post Falls Wastewater Treatment System, POST FALLS and RATHDRUM agree that any portion of the Post Falls Wastewater System that was constructed by RATHDRUM pursuant to Section XVI (F) or any part of the system constructed by POST FALLS for which RATHDRUM has paid capitalization fees will be considered as fully depreciated and RATHDRUM will not be entitled to any

reimbursement from POST FALLS, unless the parties mutually agree that it is beneficial to POST FALLS for RATHDRUM to no longer discharge to the POST FALLS wastewater system, at which time the parties will negotiate the dollar amount of value to POST FALLS of the removal of RATHDRUM from the treatment system.

7. That Section XVI, shall have added as paragraph H the following language:

H. The parties agree that as the NPDES permit is being renewed with EPA, POST FALLS will provide notice to RATHDRUM in writing within twenty (20) day's following receipt of notice from EPA of the renewal process, or any other notices regarding the renewal, and shall provide an opportunity for RATHDRUM to meet with POST FALLS to discuss technology available to meet the permit requirements and to also participate in any discussions regarding the permit renewal.

8. That Section XVIII shall be amended to add paragraph C, D and E to read as follows.

C. RATHDRUM agrees to maintain a record of all users, both Industrial Users and residential users, and to provide to POST FALLS on an annual basis during the term of this agreement a list of all Significant Industrial Users and Minor Industrial Users, as defined by the Post Falls Pretreatment Ordinance. The first report will be due within thirty (30) days of execution of this First Amendment and all subsequent reports will be due on or before the first day of October of each year. The report shall include the type of business, what pretreatment has been required by RATHDRUM, and the number of Equivalent Residences assessed to each new Industrial User.

D. For the purposes of this Agreement, an Equivalent Residence shall be 5000 gallons per month..

E. RATHDRUM shall update the Rathdrum Pretreatment Ordinance to bring it into conformance with the POST FALLS Pretreatment Ordinance adopted by the Post Falls City Council and any amendments thereto.

9. That Section XVIII shall be amended to add paragraph D to read as follows:

D. RATHDRUM shall employ, either a staff member or an independent contractor, no later than December 1, 2010, a licensed wastewater operator in accordance with Department of Environmental Quality Wastewater Rules, and provide the necessary equipment and supplies to perform any required operation, maintenance and sampling of RATHDRUM's facilities. Prior to that date, POST FALLS agrees to perform pretreatment program sampling for RATHDRUM at the actual labor and travel costs. The charges for the sampling will be added to the monthly invoice provided to RATHDRUM.

10. That Section XVIII shall be amended to add paragraph E to read as follows:

E. RATHDRUM agrees to provide to POST FALLS on an annual basis copies of the RATHDRUM annual and five (5)-year capital improvement plans for the RATHDRUM wastewater collection and transmission system. The first of such plans shall be due provided to POST FALLS no later than thirty (30) days following the execution of this First Amendment by both parties, and each subsequent year no later than June 1. POST FALLS shall be entitled to review and comment to RATHDRUM concerning any and all aspects of the wastewater

system capital needs. Such comments will be considered in formulating the annual and five (5)-year capital budgets for the RATHDRUM system.

11. This First Amendment is effective as of the 20th day of May, 2009.

12. This First Amendment incorporates and includes all of the changes agreed by and between the parties and supersedes and replaces any oral discussions, representations, or stipulations previously entered into by the parties.

13. All other provisions of the above-described **INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITY OF POST FALLS AND THE CITY OF RATHDRUM FOR THE TREATMENT AND DISCHARGE OF WASTEWATER DATED JANUARY 9, 1996** shall remain in full force and effect and shall not in any way be modified, changed, altered, or amended by this contract modification.

CITY OF POST FALLS

Mayor Clay Larkin

Clay Larkin, Mayor
Date: 5-20-2009

CITY OF RATHDRUM

Vic Holmes

Vic Holmes, Mayor
Date: 5/15/09

ATTEST:

Carol Fairhurst

Carol Fairhurst, City Clerk

Melissa Taylor

Melissa Taylor, City Clerk

J-U-B ENGINEERS, Inc.
Engineers•Surveyors •Planners
7825 Meadowlark Way
Coeur d'Alene, ID 83815
(208) 762-8787
Fax: (208) 762-9797

Date: March 11, 2010

To: City of Post Falls: Terry Werner, Public Services Director; Michael Neher, Environmental Coordinator

From: Paul Klatt, P.E.

Subject: Post Falls' Phosphorus, $CBOD_5$ and Ammonia Waste Load Allocation Needs for Future Population

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Per your request, I have reviewed the population projections and flow trends from the public sources cited herein in order to evaluate the City of Post Falls' need for total phosphorus waste load allocation (WLA) for the next 20 years. From this data, I believe that the City is justified in requesting an increase from the 1.50 pounds per day (ppd) that is currently assumed in Portland State University's Final Scenarios Report (PSU, 2010) and referenced in the Washington Department of Ecology's February 2010 Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (TMDL - WDOE, 2010). The analysis supports Post Falls receiving a 3.19 ppd WLA based on a seasonal average with daily phosphorus testing.

Post Falls engaged J.P. Stravens in 2007 to look very carefully at where their boundaries and obligations will take them for the next 20 years. Stravens determined that Post Falls' Area of City Impact (ACI) will grow from 33,860 to 69,732 people by 2028 (Stravens, 2007).

The City of Rathdrum also discharges 100% of their wastewater to the Post Falls Water Reclamation Facility (WRF). Rathdrum believes that it is reasonable and prudent to include the March 2009 growth numbers projected by the Kootenai Metropolitan Planning Organization (KMPO, 2009) for planning their municipal boundaries and service obligations out to 2030. Rathdrum would grow from 7,173 to 14,118 people during that time. The results show that, even at less than 3.5% annual population growth (which is well below historical rates for the last 20 years) the combined city service areas will have 83,850 people by 2030.

All of the recent planning documents utilize a wastewater flow generation rate of 73 gallons per capita per day (gpcd) for both Rathdrum and Post Falls, including the 2009 Rathdrum Prairie Wastewater Master Plan (JUB, 2009). It is important to realize that these flow generation values DO NOT include the wastewater generated each day by commercial, industrial and municipal land uses. Rather than utilizing different commercial/industrial flow planning values for your communities, it is reasonable and prudent to employ the same additive factor of 25% of residential flow that Spokane County utilized to account for those land uses in their 2007 Facility Plan (Spokane County, 2007).

Cumulatively, the population and flow factors will create a 2030 flow rate for the Post Fall WRF of 7.65 mgd (83,850 people x 73 gpcd x 1.25). The 2010 TMDL accounted for only 5.0 mgd because that is the capacity of the current expansion that the City submitted - believing that all other entities were using a similar approach.

It is important to note that Post Falls is NOT allowing any increase in its flow projection to account for infiltration and inflow (I/I). While you can document conditions which create I/I, Post Falls' sewer system has been constructed in the last 25 years and you have never considered significant I/I to be a legitimate condition in modern construction, operation or maintenance of a sewer collection system. This is an important distinction since all total phosphorus allocations in the TMDL are based on projected flow rates rather than whether their origin is groundwater or stormwater as compared to wastewater.

As acknowledged by Appendix L as well as numerous comments to the TMDL, Post Falls and other municipal entities along the Spokane River have supported and/or performed significant research, pilot testing and application of the best phosphorus treatment technology available in the world. The conclusion is that a seasonal average or median value of 50 ug/L total phosphorus is an appropriate technologically achievable limit. Therefore, Post Falls is justified in requesting a seasonal average WLA of 3.19 pounds of total phosphorus per day in the revision to the February 2010 Total Maximum Daily Load Water Quality Improvement Report (7.65 mgd x 0.050 ppm x 8.34 pounds per gallon). This is a reasonable and prudent waste load allocation rather than the currently allocated 1.5 ppd.

It is important to note that the 5-day carbonaceous biochemical oxygen ($CBOD_5$) demand must be increased proportionately to the flow rate increase for Post Falls. At a reasonably achievable value of 4 mg/L (below the 5 mg/L listed in the PSU report), that would equate to 255 ppd. Additionally, ammonia appears to be insignificant for Idaho point sources, as documented in the September 1, 2009 LimnoTech modeling analysis utilizing 8 mg/L for all Idaho point sources and submitted in your October 30, 2009 comments to the Draft TMDL. However, the TMDL appears to provide Idaho point sources a WLA based on 0.71 mg/L. This should also be adjusted to a fair and reasonable WLA based on 4 mg/L of ammonia (255 ppd).

J-U-B ENGINEERS, Inc., Rathdrum Prairie Wastewater Master Plan - Final, April 2009, http://www.postfallsidaho.org/pzdept/Rathdrum%20Prairie%20Waste%20Water%20Plan%20Exec%20Summary.pdf
Kootenai Metropolitan Planning Organization, KMPO Growth Projections, March 5, 2009, http://www.kmpo.net/Data_Publications/KMPO%20Board%20Approved%20Growth%20Projections%203-5-09.pdf
Portland State University, Spokane River Modeling Final Scenarios Report, January 29, 2010, http://www.ecy.wa.gov/programs/wq/tmdl/spokaneriver/dissolved_oxygen/FinalSpokRvrScenariosRpt092009.pdf
Spokane County, Wastewater Facilities Plan - Final, December, 17, 2007, http://www.spokanecounty.org/utilities/rptdoc/2008jan/02-02%20Basis%20of%20Planning%20Summary.pdf
Stravens, J.P. Planning Associates, Inc., Demographic Analysis & Growth Projections for City of Post Falls, ID, January 2, 2007, http://www.postfallsidaho.org/city_info/misc%20docs/Demographiics_GrowthReport.pdf
Washington Department of Ecology, Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load , February 2010, http://www.ecy.wa.gov/pubs/0710073.pdf

KMPO 2010/2020/2035 FUTURE GROWTH PROJECTIONS

FINAL DRAFT

Jurisdiction	1990 Census Population	2000 Census Population	2010 (1) 2010 Census Population	2010 Census Occupied TOTAL Housing	(6) 2010 Est. Avg. Persons per Household (PPH) Occupied	(2) Total Dwelling Units (Occupied)	POP % of County	Total Percentage Change in Growth 2000-2010 Census	PROPOSED (3) Average Annual Growth Rates Proposed for Model Projections	COMPARISON ONLY (7) Growth Per Year Comparison to ID DOL Econ.	2007 Previous Growth Rate
			Historic Annual Growth Rates								
Cities (Incorporated areas Only in 2007 data - ACI's are included in 2030 projections)											
Athol	346	676	692	282	2.45	282	0.50%	2.37%	0.234%	0.000%	0.500%
Coeur d'Alene	24,563	34,514	44,137	18,395	2.40	18,395	31.87%	27.88%	2.499%	2.400%	1.800%
Dalton Gardens	1,951	2,278	2,335	883	2.64	883	1.69%	2.50%	0.247%	0.126%	0.500%
Fernan (Included w/CDA)	170	186	169	72	2.35	72	0.12%	-9.14%	0.000%		0.000%
Harrison	226	267	203	100	2.03	100	0.15%	-23.97%	0.000%	2.146%	3.000%
Hauser Lake	380	668	678	302	2.25	302	0.49%	1.50%	0.149%	0.010%	2.500%
Hayden	3,744	9,159	13,294	5,212	2.55	5,212	9.60%	45.15%	3.796%	1.675%	3.000%
Hayden Lake	338	494	574	256	2.24	256	0.41%	16.19%	1.512%	0.621%	1.000%
Huetter (Incld w/Post Falls)	82	96	100	42	2.38	42	0.07%	4.17%	0.409%		1.000%
Post Falls	7,249	17,247	27,574	10,263	2.69	10,263	19.91%	59.88%	4.801%	3.001%	2.800%
Rathdrum	2,000	4,816	6,826	2,427	2.81	2,427	4.93%	41.74%	3.549%	4.010%	3.000%
Spirit Lake	790	1,376	1,945	739	2.63	739	1.40%	41.35%	3.521%	3.960%	2.000%
State Line (Included w/Post Falls)	26	28	38	20	1.90	13	0.03%	35.71%	3.101%		0.000%
Worley	182	223	257	104	2.47	105	0.19%	15.25%	1.429%	0.400%	1.000%
Urban Totals	42,047	72,028	98,822	39,097	2.41	39,091	71.35%	18.61%	3.25%	1.668%	2.3%
Unincorporated County (Outside of Incorporated areas)											
Post Falls Highway District			10,844	4,135	2.62	4,139	7.64%		0.217%		
Lakes Highway District			18,704	6,902	2.71	6,902	12.74%		0.363%		
Eastside Highway District			5,970	2,429	2.46	2,427	4.48%	8.22%	0.128%		
Worley Highway District			4,155	1,636	2.54	1,636	3.02%		0.086%		
Unincorporated Totals:	27,748	36,657	39,672	15,103	2.58	15,104	28.65%	Overall % AVERAGE	0.794% 0.255%		1.700%
DISTRICTWIDE:											
Post Falls Highway Dept.			54,224	21,603	2.51		39.15%				
Lakes Highway Distrtict			63,423	23,906	2.65		45.79%				
Eastside Highway Dist			12,241	5,163	2.37		8.84%				
Worley Highway District			8,607	3,526	2.44		6.21%				
			138,495	54,198	2.49		100.00%				
Note: County will do TAZ distribution for areas outside the ACI's. Distribution may differ from highway district totals above, however total unincorporated county values should match this table.											
Kootenal County Total	69,795	108,685	138,494	54,200	2.52	54,195	100.00%	26.84%	2.40%		2.1%

Jurisdiction	2014 (4) Total Population	(5) Total Dwelling Units	POP % of County	Total Increase 2010-2014 Pop'n Increase	No. of New Dwelling Units to Distribute (add to 2010 values)	NEW Dwelling Units Total % of County Growth	2020 (4) Total Population	(5) Total Dwelling Units	POP % of County	Total Increase 2010-2020 Pop'n Increase	No. of New Dwelling Units to Distribute (add to 2010 values)	NEW Dwelling Units Total % of County Growth
Athol	699	285	0.5%	7	282	0.632%	708	289	0.4%	16	7	0.043%
Coeur d'Alene	48,717	20,304	31.9%	4580	20301	45.494%	56,494	23,545	31.7%	12357	5150	33.316%
Dalton Gardens	2,358	892	1.5%	23	889	1.992%	2,393	905	1.3%	58	22	0.143%
Fernan (Included w/CDA)	169	72	0.1%	0	70	0.156%	169	72	0.1%	0	0	0.000%
Harrison	203	100	0.1%	0	98	0.220%	203	100	0.1%	0	0	0.000%
Hauser Lake	682	304	0.4%	4	302	0.676%	688	307	0.4%	10	5	0.029%
Hayden	15,430	6,050	10.1%	2136	6047	13.551%	19,296	7,565	10.8%	6002	2353	15.223%
Hayden Lake	610	272	0.4%	36	270	0.604%	667	297	0.4%	93	41	0.268%
Huetter (Incld w/Post Falls)	102	43	0.1%	2	40	0.090%	104	44	0.1%	4	2	0.011%
Post Falls	33,263	12,380	21.8%	5689	12378	27.737%	44,071	16,403	24.7%	16497	6140	39.723%
Rathdrum	7,848	2,790	5.1%	1022	2788	6.247%	9,674	3,440	5.4%	2848	1013	6.552%
Spirit Lake	2,234	849	1.5%	289	846	1.896%	2,749	1,045	1.5%	804	306	1.977%
State Line (Included w/Post Falls)	43	23	0.0%	5	21	0.046%	52	27	0.0%	14	14	0.091%
Worley	272	110	0.2%	15	108	0.241%	296	120	0.2%	39	15	0.096%
Urban Totals	112,629	44,472	74%	13,807	44470	99.653%	137,565	54,158	77%	38,743	15,067	97.472%
Unincorporated County (Outside of Incorporated areas)												
Post Falls Highway District	10,939	4,175	7.2%	94	36	0.081%	11,082	4,230	6.2%	238	91	0.587%
Lakes Highway District	18,977	7,003	12.4%	273	101	0.226%	19,395	7,157	10.9%	690	255	1.648%
Eastside Highway District	6,001	2,439	3.9%	31	12	0.028%	6,047	2,458	3.4%	77	31	0.202%
Worley Highway District	4,170	1,642	0	14	6	0.013%	4,191	1,650	0	36	14	0.091%
Unincorporated Totals:	40,087	15,259	26.25%	412	155	0.347%	40,715	15,495	23%	1040	391	2.528%
												Overall % AVERAGE
DISTRICTWIDE:												
Post Falls Highway Dept.	59,792	23,808	39%	5568			69,801	27,763	39%			
Lakes Highway Distrtict	69,935	26,346	46%	6513			81,642	30,723	46%			
Eastside Highway Dist	13,499	5,690	9%	1257			15,758	6,635	9%			
Worley Highway District	9,491	3,886	6%	884			11,080	4,531	6%			
	152,716	59,731	100%	14222			178,280	69,653	100%			
Note: County will do TAZ distribution for areas outside the ACI's. Distribution may differ from highway district totals above, however total unincorporated county values should match this table.												
Kootenal County Total	152,716	59,731	100.0%	14,219	44,625	100.000%	178,280	69,653	100.0%	39,783	15,458	100.000%

Jurisdiction	PROPOSED (3) Average Annual Growth Rates Proposed for Model Projections	2035 (4) Total POP	(5) Total Dwelling Units	POP % of County	No. of New Dwelling Units to Distribute (add to 2020 values)	Total Increase 2010-2035 Pop'n Increase	TOTAL NEW Dwelling Units	NEW Dwelling Units Total % of County Growth
Athol	0.234%	734	299	0.3%	10	42	17	0.0%
Coeur d'Alene	2.499%	81,808	34,095	29.9%	10,550	37,671	15,700	30.0%
Dalton Gardens	0.247%	2,484	939	0.9%	34	149	56	0.1%
Fernan (Included w/CDA)	0.000%	169	72	0.1%	0	0	0	0.0%
Harrison	0.000%	203	100	0.1%	0	0	0	0.0%
Hauser Lake	0.149%	704	313	0.3%	7	26	11	0.0%
Hayden	3.796%	33,742	13,229	12.3%	5,664	20,448	8,017	15.3%
Hayden Lake	1.512%	835	373	0.3%	75	261	117	0.2%
Huetter (Incld w/Post Falls)	0.409%	111	47	0.0%	3	11	5	0.0%
Post Falls	4.801%	89,050	33,144	32.6%	16,741	61,476	22,881	43.8%
Rathdrum	3.549%	16,324	5,804	6.0%	2,364	9,498	3,377	6.5%
Spirit Lake	3.521%	4,620	1,755	1.7%	711	2,675	1,016	1.9%
State Line (Included w/Post Falls)	3.101%	82	43	0.0%	16	44	30	0.1%
Worley	1.429%	366	148	0.1%	28	109	43	0.1%
Urban Totals	3.253%	231,230	90,361	84.5%	36,203	132,408	51,270	98%
Unincorporated County (Outside of Incorporated areas)								
Post Falls Highway District	0.217%	11,448	4,369	27.0%	140	604	230	0.4%
Lakes Highway District	0.363%	20,478	7,556	48.4%	400	1,773	654	1.3%
Eastside Highway District	0.128%	6,164	2,506	14.6%	48	194	79	0.2%
Worley Highway District	0.086%	4,245	1,671	10.0%	21	90	35	0.1%
Unincorporated Totals:	0.794%	42,336	16,103	15.5%	608	2,664	999	2%
	Overall % AVERAGE 0.794% 0.255%							
DISTRICTWIDE:								
Post Falls Highway Dept.		107,107	42,436	39.2%				
Lakes Highway Distrtict		125,278	46,960	45.8%				
Eastside Highway Dist		24,180	10,142	8.8%				
Worley Highway District		17,001	6,926	6.2%				
		273,567	106,464	100.0%				
Note: County will do TAZ distribution for areas outside the ACI's. Distribution may differ from highway district totals above, however total unincorporated county values should match this table.								
Kootenal County Total	2.400%	273,566	106,464	100.0%	36,812	135,072	52,269	100%

NOTES:
PPH = Persons per Household

2.30 w/11% surplus housing (2.4 - 0.11)
2.41 Urban Average
2.52 overall Kootenal PPH (as reported by US Census Bureau)

65,229
76,296
14,726

10,354
166,605

(1) 2010 population based on us Census Bureau Dicennial Census Data.

(2) Dwelling Units based on PPH combined average of occupied single and multi-family units from US Census Bureau Records for 2010.

(3) Anticipated Average Annual Growth Rates were updated in 2010, Based on Historical growth rate from 2010 US Census Bureau Data, from 2000 to 2010.

(4) 2035 Population Projections were based on the 2010 US Census Bureau population compounded annually using Projections", over 25 years.

(5) 2020 & 2035 Dwelling units were calculated by dividing 2035 projected population by average (PPH) household size from US Census Bureau 2010 (Direct calculation 2010 Pop/Total # Occupied Dwelling Units)

(6) Persons per household, calculated for cities by dividing the known Population by the known occupied housing units. (Population/Occupied Dwelling Units).

(7) Estimate from Alivia Metts, Regional Economist, IMPLAN Janurary 6, 2012.

Note: Unincorportaed area totals determined by using Kootenai County Structure (dwelling units) file and Highway District Boundaries in GIS.

United States Environmental Protection Agency (EPA)
Region 10
1200 Sixth Avenue Suite 900
Seattle, Washington 98101

Authorization to Discharge Under the National Pollutant Discharge Elimination System

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 *et seq*., as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

City of Post Falls
Water Reclamation Facility
2002 West Seltice Way
Post Falls, ID 83854

is authorized to discharge from the wastewater facility located in Post Falls, Idaho, at the following location(s):

Outfall	**Receiving Water**	**Latitude**	**Longitude**
001	Spokane River	47° 42' 30"	116° 58' 10"

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective

This permit and the authorization to discharge shall expire at midnight,

The permittee shall reapply for a permit reissuance on or before, 180 days before the expiration of this permit if the permittee intends to continue operations and discharges at the facility beyond the term of this permit.

Signed this day of

Preliminary Draft
Daniel D. Opalski, Director
Office of Water and Watersheds

Schedule of Submissions

The following is a summary of some of the items the permittee must complete and/or submit to EPA during the term of this permit:

Item	Due Date
1. Discharge Monitoring Reports (DMR)	DMRs are due monthly and must be postmarked on or before the 10th day of the month following the monitoring month (see III.B).
2. Quality Assurance Plan (QAP)	The permittee must provide EPA and the Idaho Department of Environmental Quality (IDEQ) with written notification that the Plan has been developed and implemented within 180 days after the effective date of the final permit (see II.C). The Plan must be kept on site and made available to EPA and IDEQ upon request.
3. Operation and Maintenance (O&M) Plan	The permittee must provide EPA and IDEQ with written notification that the Plan has been developed and implemented within 180 days after the effective date of the final permit (see II.A). The Plan must be kept on site and made available to EPA and IDEQ upon request.
4. Phosphorus Management Plan	The permittee must provide written notice to EPA and IDEQ that the plan has been developed within 1 year after the effective date of the final permit and implemented within 18 months of the effective date of the final permit (see II.B).
5. NPDES Application Renewal	The application must be submitted at least 180 days before the expiration date of the permit (see V.B).
6. Surface Water Monitoring Report	The report must be submitted to EPA and IDEQ annually by January 31st of the following year.
7. Compliance Schedule	Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date (see I.C, I.D, and III.J).
8. Twenty-Four Hour Notice of Noncompliance Reporting	The permittee must report certain occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances. (See I.B.2 and III.G).
9. Emergency Response and Public Notification Plan	The permittee must develop and implement an overflow emergency response and public notification plan. The permittee must submit written notice to EPA and IDEQ that the plan has been developed and implemented within 180 days of the effective date of the final permit (see II.D).
10. Submission of Pretreatment Program	The permittee must submit a pretreatment program meeting the requirements of 40 CFR 403.8, as amended at 70 FR 60134, for EPA approval within 1 year after the effective date of the final permit.

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11. Annual Pretreatment Report	The Report must be submitted to the pretreatment coordinator no later than January 31st of each calendar year. (See II.A.10).

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I. Limitations and Monitoring Requirements

A. Discharge Authorization

During the effective period of this permit, the permittee is authorized to discharge pollutants from Outfall 001 to the Spokane River, within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

B. Effluent Limitations and Monitoring

1. The permittee must limit and monitor discharges from outfall 001 as specified in Table 1, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the table at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

Table 1: Final Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Units	Effluent limits			Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Location	Frequency	Sample Type
Flow	mgd	Report	—	Report	Effluent	Continuous	Recording
Five-day carbonaceous biochemical oxygen demand ($CBOD_5$) November – January	mg/L	25	40	—	Influent and Effluent	1/week	24-Hour Composite
	lb/day	1043	1668	—			Calculation[2]
	% removal	85% (min.)	—	—	% removal	1/month	Calculation[3]
$CBOD_5$ February – October	mg/L	25	40	—	Influent and Effluent	3/week	24-Hr. Comp.
	lb/day	Seasonal Average Limit: 255 lb/day. See I.B.10.					Calculation[2]
	% removal	85% (min.)	—	—	% removal	1/month	Calculation[3]
Total Suspended Solids	mg/L	30	45	—	Influent and Effluent	1/week	24-Hr. Comp.
	lb/day	1251	1877	—			Calculation[2]
	% removal	85% (min.)	—	—	% removal	1/month	Calculation[3]
pH October – June	s.u.	6.3 – 9.0 at all times			Effluent	5/week	Grab
pH July – September	s.u.	6.4 – 9.0 at all times			Effluent	5/week	Grab
E. coli	#/100 ml	126[4] (geometric mean)	—	406 (inst. max.)	Effluent	5/month	Grab
Total Residual Chlorine July – September if chlorine is used for disinfection or elsewhere in the treatment process	µg/L	127	—	294	Effluent	2/day	Grab
	lb/day	5.30	—	13.6			Calculation[2]

Table 1: Final Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Units	Effluent limits			Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Location	Frequency	Sample Type
Total Residual Chlorine October – June if chlorine is used for disinfection or elsewhere in the treatment process	µg/L	244	—	565	Effluent	1/day	Grab
	lb/day	10.2	—	23.6			Calculation[2]
Total Residual Chlorine If chlorine is not used for disinfection or elsewhere in the treatment process	No monitoring or reporting required.						
Chlorine Usage	lb/day	—	—	Report	Chlorine contact chamber	1/day	Measure
Total Ammonia as N February –October	mg/L	Report	—	Report	Effluent	3/week	24-Hr. Comp.
	lb/day	Seasonal Average Limit: 255 lb/day. See I.B.10.					Calculation[2]
Total Ammonia as N July – September	mg/L	8.2	—	29.5	Effluent	3/week	24-Hr. Comp.
	lb/day	342	—	1230			Calculation[2]
Total Ammonia as N November – January	mg/L	25.4	—	91.7	Effluent	1/month	24-Hr. Comp.
	lb/day	1059	—	3824			Calculation[2]
Total Phosphorus as P[1] February – October	µg/L	Report	Report	—	Effluent	3/week	24-Hr. Comp.
	lb/day	Report	Report	—			Calculation[2]
	lb/day	Seasonal Average Limit: 3.19 lb/day. See I.B.10.					
Total Phosphorus as P November – January	µg/L	Report	Report	—	Effluent	1/week	24-Hr. Comp.
Cadmium	µg/L	Report	Report	—	Effluent	1/month	24-Hr. Comp.
	lb/day	See I.C.					Calculation[2]
Copper (July – September)	µg/L	13.8	—	27.7	Effluent	1/month	24-Hr. Comp.
	lb/day	0.58	—	1.16			Calculation[2]
Copper (Oct. – June)	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Lead	µg/L	2.05	—	3.79	Effluent	1/month	24-Hr. Comp.
	lb/day	See I.C.					Calculation[2]
Zinc	µg/L	84.3	—	115	Effluent	1/month	24-Hr. Comp.
	lb/day	See I.C.					Calculation[2]
Temperature	ºC	Report	—	Report	Effluent	5/week	Grab
Silver	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Alkalinity	mg/L as $CaCO_3$	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Hardness	mg/L as $CaCO_3$	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Oil and Grease	mg/L	Report	—	Report	Effluent	1/quarter	Grab
Total Dissolved Solids	mg/L	Report	—	Report	Effluent	1/quarter	24-Hr. Comp.
Polychlorinated Biphenyl (PCB) Congeners[5]	pg/L	Report	—	Report	Influent	1/2 months	24-Hr. Comp.
PCB Congeners[5]	pg/L	Report	—	Report	Effluent	1/quarter	24-Hr. Comp.
2,3,7,8 tetrachloro-dibenzo-p-dioxin (TCDD)[6]	pg/L	Report	—	Report	Influent and Effluent	1/quarter	24-Hr. Comp.
Orthophosphate as P	µg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.

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Table 1: Final Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Units	Effluent limits			Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit	Location	Frequency	Sample Type
Total Kjeldahl Nitrogen	mg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Nitrate + Nitrite as N	mg/L	Report	—	Report	Effluent	1/month	24-Hr. Comp.
Dissolved Oxygen	mg/L	Report minimum and average			Effluent	1/month	Grab
NPDES Application Form 2A Effluent Testing	See I.B.10				Effluent	3x/5years	—
Whole Effluent Toxicity	TU_c	See I.F.			Effluent	2/year	24-Hr. Comp.

Notes:
1. These effluent limits are subject to a compliance schedule. See I.D and I.E.
2. Loading is calculated by multiplying the concentration in mg/L by the corresponding flow (in mgd) for the day of sampling and a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the *NPDES Self-Monitoring System User Guide* (EPA 833-B-85-100, March 1985).
3. Percent removal is calculated using the following equation:
(average monthly influent concentration – average monthly effluent concentration) ÷ average monthly influent concentration.
4. The average monthly E. coli bacteria counts must not exceed a geometric mean of 126/100 ml based on a minimum of five samples taken every 3-7 days within a calendar month. See Part VI for a definition of geometric mean.
5. See I.B.11.
6. See I.B.12.

2. The permittee must report within 24 hours of discovery any violation of the maximum daily or instantaneous maximum limits for the following pollutants: E. coli, total ammonia as N, copper, lead, zinc, and total residual chlorine. Violations of all other effluent limits are to be reported at the time that discharge monitoring reports are submitted (See III.B and III.H).

3. Effluent loading and concentration of cadmium, copper, lead, silver and zinc must be reported as total recoverable metal.

4. The permittee must not discharge floating, suspended, or submerged matter of any kind in amounts causing nuisance or objectionable conditions or that may impair designated beneficial uses of the Spokane River.

5. The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

6. Minimum Levels. For all effluent monitoring, the permittee must use methods that can achieve a minimum level (ML) less than the effluent limitation. If the effluent limit is less than the minimum level of the most sensitive EPA-approved analytical method, the permittee must use the most sensitive EPA-approved analytical method. For parameters that do not have effluent limitations, the permittee must use methods that can achieve MLs less than or equal to those specified in Table 2. If no minimum level is listed in Table 2 and the pollutant is not subject to an effluent limit, the permittee may use any EPA-approved method for analysis. For monitoring of PCBs and 2,3,7,8 TCDD, the permittee must comply with parts I.B.11 and I.B.12 of this permit.

Table 2: Maximum MLs for Pollutants Not Subject to Concentration Effluent Limitations

Parameter	Units	Maximum ML
Cadmium	µg/L	1
Nitrate – Nitrite as N	µg/L	50
Silver	µg/L	0.3
Total Ammonia as N	µg/L	50
Total Kjeldahl Nitrogen	µg/L	50
Total Phosphorus	µg/L	10
PCB Congeners	pg/L	See I.B.12.
2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD)	pg/L	See I.B.13.
Mercury (expanded effluent testing)	µg/L	0.01

7. For purposes of reporting on the DMR for a single sample, if a value is less than the MDL, the permittee must report "less than {numeric value of the MDL}." If a value is less than the ML, the permittee must report "less than {numeric value of the ML}," except for PCBs and 2,3,7,8 TCDD. For PCBs and 2,3,7,8 TCDD, if a value is greater than the MDL, the permittee must report the actual value, even if it is less than the ML.

8. For purposes of calculating seasonal, monthly and weekly averages, zero may be assigned for values less than the MDL, and the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is equal to or greater than the ML, the permittee must report and use the actual value. The resulting average value must be compared to the compliance level, the ML, in assessing compliance.

9. The permittee must perform the effluent testing required by Parts B.6 and D of NPDES application Form 2A (EPA Form 3510-2A, revised 1-99). The permittee must submit the results of this testing with its application for renewal of this NPDES permit. To the extent that effluent monitoring required by other conditions of this permit satisfies this requirement, these samples may be used to satisfy the requirements of this paragraph.

10. Seasonal average effluent limits for total phosphorus, $CBOD_5$ and ammonia:

    a) The seasonal average phosphorus load must not exceed 3.19 lb/day for the season of February 1st through October 31st each year, inclusive.

    b) The seasonal average $CBOD_5$ load must not exceed 255 lb/day for the season of February 1st through October 31st each year, inclusive.

    c) The seasonal average ammonia load must not exceed 255 lb/day for the season of February 1st through October 31st each year, inclusive.

    d) The seasonal average phosphorus, $CBOD_5$, and ammonia loads must be calculated as the sum of all daily discharges measured during February 1st through October 31st each year, inclusive, divided by the number of daily discharges measured during that season. If the daily average effluent flow rate is zero for at least three days during the season, the permittee may include

zero pound per day daily discharge values in the calculation of the seasonal average phosphorus, $CBOD_5$ and ammonia loads as specified in Attachment A of this permit.

e) The seasonal average phosphorus, $CBOD_5$ and ammonia loads must be reported on the October DMR, regardless of whether a discharge of pollutants occurs during the month of October.

f) The permittee must report the monthly average, maximum weekly average, and/or daily maximum total phosphorus, $CBOD_5$ and ammonia loads and concentrations on the monthly DMRs for February – October, inclusive, as stated in Table 1.

g) In addition to the seasonal average limits for $CBOD_5$ and ammonia, the permittee must comply with the average monthly, average weekly and/or maximum daily limits stated in Table 1.

h) On the DMRs for February – September, inclusive, the permittee must calculate and report the partial seasonal average phosphorus, $CBOD_5$ and ammonia loads for February 1st through the last day of the monitoring month, inclusive. The partial seasonal average loads must be reported every month from February through September, inclusive, regardless of whether a discharge of pollutants occurs during a given month. The partial seasonal average phosphorus, $CBOD_5$ and ammonia loads must be calculated as the sum of all daily discharges measured during the season of February 1st through the last day of the monitoring month, inclusive, divided by the number of daily discharges measured during that time frame. If the daily average effluent flow rate is zero for at least three days during the season, the permittee may include zero pound per day values in the calculation of the partial seasonal average phosphorus load as specified in Attachment A of this permit.

i) If the partial seasonal average phosphorus, $CBOD_5$ and/or ammonia loads for calculated as described in part I.B.10.h, above, are greater than the corresponding seasonal average effluent limit(s), the permittee must submit a written report with the DMR, explaining the steps that the permittee will take to reduce its discharge of total phosphorus, $CBOD_5$ and/or ammonia in order to achieve compliance with the seasonal average effluent limit(s) by October 31st.

11. The permittee must analyze influent and effluent samples for polychlorinated biphenyl (PCB) congeners and report the results as specified below.

a) For the first four influent and effluent samples for PCB congeners, the permittee must use EPA Method 1668 for analysis.

b) If at least one of the first four influent or effluent samples contains less than 5.0 nanograms per liter total PCBs, the permittee must continue to use EPA method 1668 for subsequent analysis of PCB congeners at such location(s).

c) If all of the first four influent or effluent samples contain at least 5.0 nanograms per liter total PCBs, the permittee may use either EPA Method

8082 or 1668 for analysis of PCB congeners in subsequent samples at the location(s) where concentrations were always greater than or equal to 5.0 nanograms per liter in the first four samples.

d) For any analysis of influent or effluent PCB congeners using EPA Method 8082, the permittee must target an ML no greater than 5.0 nanograms per liter per congener and must, at a minimum, analyze for each of the individual congeners listed in Section 1.1 of the method.

e) For any analysis of influent or effluent PCB congeners using EPA Method 1668, the permittee must target an MDL no greater than 10 picograms per liter per congener and must analyze for each of the 209 individual congeners.

f) The permittee must report results on the DMRs as total PCBs. The total PCB concentration must be calculated as the sum of the concentrations of all PCB congeners measured at concentrations greater than the MDLs. The permittee must submit the laboratory results of the congener analysis with the DMRs.

g) The permittee must analyze a split of each influent and effluent PCB sample for total suspended solids (TSS). When the timing of sample collection coincides with that of the TSS sampling required in Table 1, analysis of the split sample will fulfill the requirements of Table 1 as well.

12. The permittee must analyze influent and effluent samples for 2,3,7,8 TCDD and report the results as specified below.

a) For analysis of influent and effluent samples for 2,3,7,8 TCDD, the permittee must use EPA Method 1613B and must target an ML no greater than 10 picograms per liter.

b) The permittee must analyze a split of each influent and effluent 2,3,7,8 TCDD sample for TSS. When the timing of sample collection coincides with that of the TSS sampling required in Table 1, analysis of the split sample will fulfill the requirements of Table 1 as well.

C. Loading Effluent Limits for Cadmium, Lead and Zinc

The permittee must comply with the more stringent of the effluent limits for cadmium, lead and zinc specified below.

Table 3: Cadmium, Lead and Zinc Effluent Limits Based on the State of Idaho's Clean Water Act Section 401 Certification

Parameter	Units	Effluent limits		
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit[2]
Cadmium[1]	lb/day	0.0078	0.011	—
Lead[1]	lb/day	0.059	—	0.110
Zinc[1]	lb/day	2.45	—	3.34

Notes:
1. See I.C.1.
2. See I.B.2.

Table 4: Cadmium, Lead and Zinc Effluent Limits Based on the Clean Water Act and Federal Regulations

Parameter	Units	Effluent limits		
		Average Monthly Limit	Average Weekly Limit	Max. Daily Limit[2]
Cadmium[1]	lb/day	Report	Report	—
Lead[1]	lb/day	0.0855	—	0.158
Zinc[1]	lb/day	3.52	—	4.80

Notes:
1. The offset plan described in Part I.C.1 below may not be used to demonstrate compliance with any of the effluent limits in this table.
2. See I.B.2.

1. Offset Plan for cadmium, lead and zinc loading limits based on the State of Idaho's Clean Water Act Section 401 Certification: The permittee may demonstrate compliance with the loading (lb/day) limits for cadmium, lead and zinc in Table 3, above, which are based on the State of Idaho's Clean Water Act Section 401 Certification, by subtracting the loading of cadmium, lead, and/or zinc reduced through an offset plan that is approved by IDEQ when reporting the cadmium, lead, and/or zinc loading on monthly DMRs.
   a) The offset plan may not be utilized to demonstrate compliance with any of the effluent limits for lead or zinc in Tables 1 or 4, above.
   b) The offset plan may not be utilized to adjust the reported loading or concentration of cadmium for the purposes of Tables 1 or 4, above.
   c) Prior to using offsets to demonstrate compliance with the cadmium, lead, and/or zinc loading limits, the permittee must submit the following documents to EPA:
      (i) The offset plan.
      (ii) Written documentation of IDEQ's approval of the offset plan.
      (iii) A written certification that the offset plan has been implemented.
   d) The offset plan must demonstrate that any increased loading of cadmium, lead, and/or zinc in excess of the effluent loading limits in Table 3, above, will be offset by other actions or projects in the watershed.

D. Schedules of Compliance

1. The permittee must comply with all effluent limitations and monitoring requirements in Part I.B beginning on the effective date of this permit, except the total phosphorus effluent limits in effect during February – October.
2. The permittee must achieve compliance with the final effluent limitations for total phosphorus as set forth in Part I.B (Table 1) of the permit, not later than ten (10) years after the effective date of the final permit.

E. Interim Requirements for Schedules of Compliance

1. While the schedules of compliance specified in Part I.D are in effect, the permittee must comply with interim effluent limitations and monitoring requirements as specified in Table 5, below.
2. By one (1) year after the effective date of the final permit, the permittee must provide a preliminary engineering report to EPA and IDEQ outlining estimated costs and schedules for completing capacity expansion and implementation of technologies to achieve final effluent limitations. This schedule must include a timeline for full scale pilot testing and results of any testing conducted to date.
3. By three (3) years after the effective date of the final permit, the permittee must provide written notice to EPA and IDEQ that full scale pilot testing of the technology that will be employed to achieve the final limits has been completed and must submit a summary report of results and plan for implementation.
4. By five (5) years after the effective date of the final permit, the permittee must provide EPA and IDEQ with written notice that design has been completed and bids have been awarded to begin construction to achieve final effluent limitations.
5. By eight (8) years after the effective date of the final permit, the permittee must provide EPA and DEQ with written notice that construction has been completed on the facilities to achieve final effluent limitations.
6. By ten (10) years after the effective date of the final permit, the permittee must provide EPA and DEQ with a written report providing details of a completed start up and optimization phase of the new treatment system and must achieve compliance with the final effluent limitations of Part LB. The report shall include two years of effluent data demonstrating that final effluent limits can be achieved by year ten (10).
7. By years six (6), seven (7), and eight (8) after the effective date of the final permit, the permittee must submit to EPA and IDEQ progress reports, which outline the progress made toward achieving compliance with the total phosphorus effluent limitations. At a minimum, the reports must include:
   a) An assessment of the previous year of effluent data and comparison to the interim effluent limitations.
   b) A report on progress made toward meeting the final effluent limits.
   c) Further actions and milestones targeted for the upcoming year.

Table 5: Interim Effluent Limits and Monitoring Requirements for Outfall 001

Parameter	Units	Effluent limits		Monitoring Requirements		
		Average Monthly Limit	Average Weekly Limit	Location	Frequency	Sample Type
Total Phosphorus as P February – October	mg/L	Report	Report	Influent and Effluent	3/week	24-Hr. Comp.
	lb/day	68.5	110			Calculation
	% removal	70% (min.)	—		1/month	Calculation

F. Whole Effluent Toxicity Testing Requirements

The permittee must conduct chronic toxicity tests on effluent samples from outfall 001**.** Testing must be conducted in accordance with subsections 1 through 7, below.

1. Toxicity testing must be conducted on 24-hour composite samples of effluent. In addition, a split of each sample collected must be analyzed for those chemical and physical parameters required in Part I.B above with a required sampling frequency of monthly or more frequently. When the timing of sample collection coincides with that of the sampling required in Part I.B, analysis of the split sample will fulfill the requirements of Part I.B as well.

2. Chronic Test Species and Methods

   a) For outfall 001, chronic tests must be conducted twice per year, once during the period from October 1 through June 30, and once during the period from July 1 through September 30.

   b) The permittee must conduct short-term tests with the water flea, *Ceriodaphnia dubia* (survival and reproduction test), the fathead minnow, *Pimephales promelas* (larval survival and growth test), and a green alga, *Selenastrum capricornutum* (growth test) for the first three suites of tests. After this screening period, monitoring must be conducted using the most sensitive species.

   c) The presence of chronic toxicity must be determined as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002.

   d) Results must be reported in TU_c (chronic toxic units), which is defined as follows:

      (i) For survival endpoints, $TU_c = 100/NOEC$.

      (ii) For all other test endpoints, $TU_c = 100/IC_{25}$.

      (iii) IC_{25} means "25% inhibition concentration." The IC_{25} is a point estimate of the toxicant concentration, expressed in percent effluent, that causes a 25% reduction in a non-quantal biological measurement (e.g., reproduction or growth) calculated from a continuous model (e.g., Interpolation Method).

      (iv) NOEC means "no observed effect concentration." The NOEC is the highest concentration of toxicant, expressed in percent effluent, to which organisms are exposed in a chronic toxicity test [full life-cycle or partial life-cycle (short term) test], that causes no observable adverse effects on the test organisms (i.e., the highest concentration of effluent in which the values for the observed responses are not statistically significantly different from the controls).

3. Quality Assurance

a) The toxicity testing on each organism must include a series of five test dilutions and a control. The dilution series must include the receiving water concentration (RWC), which is the dilution associated with the chronic toxicity trigger, two dilutions above the RWC, and two dilutions below the RWC. The RWCs are:

(i) 5.8% effluent for July 1 through September 30

(ii) 2.9% effluent for October 1 through June 30.

b) All quality assurance criteria and statistical analyses used for chronic tests and reference toxicant tests must be in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002, and individual test protocols.

c) In addition to those quality assurance measures specified in the methodology, the following quality assurance procedures must be followed:

(i) If organisms are not cultured in-house, concurrent testing with reference toxicants must be conducted. If organisms are cultured in-house, monthly reference toxicant testing is sufficient. Reference toxicant tests must be conducted using the same test conditions as the effluent toxicity tests.

(ii) If either of the reference toxicant tests or the effluent tests do not meet all test acceptability criteria as specified in the test methods manual, the permittee must re-sample and re-test within 14 days of receipt of the test results.

(iii) Control and dilution water must be receiving water or lab water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control, using culture water must also be used. Receiving water may be used as control and dilution water upon notification of EPA and IDEQ. In no case shall water that has not met test acceptability criteria be used for either dilution or control.

4. Reporting

a) The permittee must submit the results of the toxicity tests with the discharge monitoring reports (DMRs). Toxicity tests taken from October 1st through June 30th must be reported on the August DMR. Toxicity tests taken from July 1st through September 30th must be reported on the November DMR.

b) The report of toxicity test results must include all relevant information outlined in Section 10, Report Preparation, of *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002. In addition to toxicity test results, the permittee must report: Dates of sample collection and initiation of each test; effluent flow rate at the time of sample collection; and the results of the monitoring required in Part I.B of this permit,

for parameters with a required monitoring frequency of once per month or more frequently.

5. Preparation of initial investigation toxicity reduction evaluation (TRE) plan: Prior to initiation of the toxicity testing required by this permit, the permittee shall submit to EPA a copy of the permittee's initial investigation TRE workplan. This plan shall describe the steps the permittee intends to follow in the event chronic toxicity is detected at levels greater than the triggers in Part I.F.6, and should include at a minimum:

   a) A description of the investigation and evaluation techniques that would be used to identify potential causes/sources of toxicity, effluent variability, treatment system efficiency;

   b) A description of the facility's method of maximizing in-house treatment efficiency, good housekeeping practices, and a list of all chemicals used in operation of the facility; and

   c) If a toxicity identification evaluation (TIE) is necessary, who will conduct it (i.e., in-house or other).

6. Accelerated testing

   a) The chronic toxicity triggers are:

      (i) 17.2 TU_c for July 1 – September 30.

      (ii) 34.3 TU_c for October 1 – June 30.

   b) If chronic toxicity is detected above the triggers in Part I.F.6.a, the permittee must implement the initial investigation TRE workplan. If implementation of the initial investigation TRE workplan indicates the source of toxicity (for instance, a temporary plant upset), then only one additional test is necessary.

   c) If chronic toxicity is detected above the triggers in Part I.F.6.a in the test required under Part I.F.6.b, above, then the permittee shall conduct six more tests, bi-weekly (every two weeks), over a twelve-week period. Testing shall commence within two weeks of receipt of the sample results of the exceedance.

7. Toxicity Reduction Evaluation (TRE)

   a) If chronic toxicity is detected above the triggers in Part I.F.6.a in any of the six additional tests required under Part I.F.6.c, then, in accordance with the permittee's initial investigation TRE workplan and EPA manual EPA 833-B-99-002 (*Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*), the permittee shall initiate a TRE within fifteen (15) days of receipt of the sample results of the exceedance. The permittee will develop as expeditiously as possible a more detailed TRE workplan, which includes:

      (i) Further actions to investigate and identify the cause of toxicity;

      (ii) Actions the permittee will take to mitigate the impact of the discharge and to prevent the recurrence of toxicity; and

(iii) A schedule for these actions.

b) The permittee may initiate a TIE as part of the overall TRE process described in the EPA acute and chronic TIE manuals EPA/600/6-91/005F (Phase I), EPA/600/R-92/080 (Phase II), and EPA-600/R-92/081 (Phase III).

c) If none of the six tests required under Part I.F.6.c above indicated toxicity, then the permittee may return to the normal testing frequency.

d) If a TIE is initiated prior to completion of the accelerated testing, the accelerated testing schedule may be terminated or used as necessary in performing the TIE.

G. Surface Water Monitoring

The permittee must conduct surface water monitoring. Surface water monitoring must start within 180 days after the effective date of the permit and continue as long as this permit remains in force. The program must meet the following requirements:

1. Monitoring stations must be established in the Spokane River at the following locations:

   a) Spokane River downstream of the Hayden Area Regional Sewer Board (HARSB) outfall and upstream of the City of Post Falls outfall.

   b) Spokane River downstream of the City of Post Falls outfall.

2. Monitoring locations for PCBs may be different from the monitoring locations for other parameters as long as such PCB monitoring locations fit the descriptions in Part I.G.1.

3. The permittee must seek approval of the surface water monitoring stations from IDEQ prior to initiating surface water monitoring.

4. A failure to obtain IDEQ approval of surface water monitoring stations does not relieve the permittee of the surface water monitoring requirements of this permit.

5. All ambient samples must be grab samples.

6. Samples must be analyzed for the parameters listed in Table 6, and must achieve minimum levels (MLs) that are equivalent to or less than those listed in Table 6. The permittee may request different MLs. The request must be in writing and must be approved by EPA. If no maximum ML is listed in Table 6 for a particular pollutant, the permittee may use any EPA-approved method for analysis.

7. Quality assurance/quality control plans for all the monitoring must be documented in the Quality Assurance Plan required under Part II.D, "Quality Assurance Plan".

8. The permittee must submit surface water monitoring results for the previous calendar year for all parameters in an annual report to EPA and IDEQ by January 31st of the following year**.** At a minimum, the annual report must include the following:

   a) Dates of sample collection and analyses.

b) Results of sample analysis.

c) Relevant quality assurance/quality control (QA/QC) information.

9. Any receiving water sampling for PCBs performed by or for the Spokane River Regional Toxics Task Force that otherwise meets the receiving water PCB sampling requirements of this permit may be used to fulfill such requirements.

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Table 6: Surface Water Monitoring Requirements				
Parameter (units)	**Sample Locations**	**Sample Frequency**	**Sample Type**	**Maximum ML**
$CBOD_5$	Upstream and Downstream	8/year[1]	Grab	—
Total Ammonia as N (mg/L)	Upstream and Downstream	8/year[1]	Grab	0.05 mg/L
pH (standard units)	Upstream and Downstream	8/year[1]	Grab	—
Nitrate + Nitrite as N (mg/L)	Upstream and Downstream	8/year[1]	Grab	0.1 mg/L
Total Phosphorus as P (µg/L)	Upstream and Downstream	8/year[1]	Grab	5 µg/L
Orthophosphate as P (µg/L)	Upstream and Downstream	8/year[1]	Grab	5 µg/L
Dissolved Oxygen (mg/L)	Upstream and Downstream	8/year[1]	Grab	—
Chlorophyll a	Upstream and Downstream	8/year[1]	Grab	—
PCB Congeners	Upstream and Downstream	2/year[2]	Grab	Note 3

Notes:
1. The permittee must sample the receiving water at least twice per month during the months of July, August, September, and October.
2. The permittee must sample the receiving water at least once during the season of April 1 – June 30 and at least once during the season of July 1 – October 31.
3. The permittee must use EPA Method 1668 for analysis of receiving water samples for PCBs, must target an MDL no greater than 10 pg/L per congener, and must analyze for each of the 209 individual congeners.

II. Special Conditions

A. Operation and Maintenance Plan

In addition to the requirements specified in Section III.E of this permit (Proper Operation and Maintenance), the permittee must develop an operations and maintenance (O&M) plan for the wastewater treatment facility and provide written notice to EPA and IDEQ that the O&M plan has been developed and implemented within 180 days of the effective date of this permit. Any existing operation and maintenance plans may be modified for compliance with this section. The plan must include any operational changes necessary to minimize the effluent loading of total phosphorus as required by II.B.3, below. The plan must be retained on site and made available on request to EPA and IDEQ.

B. Phosphorus Management Plan

The permittee must submit to EPA and IDEQ a phosphorus management plan for the facility within 1 year of the effective date of this permit. The information obtained in compliance with Parts II.B.1-5 must be recorded and retained by the permittee within the phosphorus management plan. The permittee must provide written notice to EPA

and IDEQ that it has implemented the phosphorus management plan within 18 months of the effective date of the final permit. The phosphorus management plan must meet the requirements below.

1. The permittee must compile influent and effluent phosphorus data for the water reclamation facility.
2. The permittee must evaluate the water reclamation facility's phosphorus reduction potential.
   a) The permittee must compare its effluent phosphorus concentrations against typical values for wastewater treatment plants utilizing similar treatment technology.
   b) If the effluent phosphorus concentrations are higher than typical levels, the permittee must investigate the cause of the high phosphorus concentrations and take steps to reduce phosphorus concentrations.
3. The permittee must identify phosphorus reduction goals for the water reclamation facility.
   a) The effluent phosphorus reduction goals must be consistent with interim or final phosphorus effluent limits, as appropriate, or with typical values for the type of treatment process employed by the water reclamation facility, whichever results in the lower effluent phosphorus concentrations or greater reductions in total phosphorus.
   b) Effluent phosphorus reduction goals may change depending on whether phosphorus effluent limits are in effect and the value of the phosphorus limits, however, phosphorus reduction goals must be identified for all times.
   c) The permittee must identify an influent phosphorus reduction goal.
4. The permittee must evaluate the phosphorus reduction potential of non-domestic users of the POTW.
   a) The Plan must list the non-domestic users of the treatment works which fit the following categories:
      (i) Agricultural co-ops.
      (ii) Car/truck washing facilities.
      (iii) Dairies.
      (iv) Food processing plants.
      (v) Meat packing and locker plants.
      (vi) Metal finishing facilities.
      (vii) Municipal water treatment plants that add phosphorus to drinking water.
      (viii) Nursing homes.
      (ix) Restaurants.

(x) Schools.

(xi) Any other non-domestic users of the POTW which contribute at least 5% of the total influent phosphorus loading to the POTW.

b) In the Plan, the permittee must evaluate which of these non-domestic users have the greatest opportunity for reducing phosphorus.

c) For those non-domestic users which the permittee determines to have the greatest potential to reduce phosphorus loading to the POTW, the permittee must work with the non-domestic user to develop a phosphorus reduction goal.

5. The permittee must identify the phosphorus reduction strategies to be used to meet the phosphorus reduction goals. The permittee must select and describe phosphorus reduction strategies for the following four phosphorus contributors, if applicable. The permittee must note which of the four contributors listed below are included in the plan, and which were omitted. For those contributors which are omitted, the permittee must explain the omission.

   a) Non-domestic users (see II.C.4).

   b) The water reclamation facility.

   c) Residential or domestic users.

   d) Drinking water treatment plant.

6. For each group of phosphorus contributor in the plan (see II.B.4 and II.B.5), the permittee must consider the following phosphorus reduction strategies and list which strategy or strategies it will employ for phosphorus reduction.

   a) Source reduction or prevention (e.g. process changes and water recovery for industrial users and restrictions on the sale or use of phosphate detergents for domestic users).

   b) Water conservation.

   c) Wastewater re-use.

   d) Education (e.g. information about environmentally preferable purchasing of low or non-phosphorus products).

   e) Staff training (at the WRF and for non-domestic users).

   f) Pretreatment requirements for non-domestic users (e.g. local limits).

   g) Phosphorus removal at the WRF (chemical, physical, and biological methods).

   h) Ongoing monitoring.

7. The permittee must revise the phosphorus management plan within 180 days whenever:

   a) It is found to be ineffective in reaching the phosphorus reduction goals, or

   b) Changes to the treatment process that affect the phosphorus reduction potential of the water reclamation facility (II.C.2.) are completed.

8. The permittee must submit to EPA and IDEQ an annual report of phosphorus reductions achieved through the phosphorus management plan. The first annual report is due 2 years after the effective date of the final permit, and subsequent reports are due annually thereafter.

C. Quality Assurance Plan (QAP)

The permittee must develop a quality assurance plan (QAP) for all monitoring required by this permit. The permittee must submit written notice to EPA and IDEQ that the Plan has been developed and implemented within 180 days of the effective date of this permit. Any existing QAPs may be modified for compliance with this section.

1. The QAP must be designed to assist in planning for the collection and analysis of effluent and receiving water samples in support of the permit and in explaining data anomalies when they occur.
2. Throughout all sample collection and analysis activities, the permittee must use the EPA-approved QA/QC and chain-of-custody procedures described in *Requirements for Quality Assurance Project Plans* (EPA/QA/R-5) and *Guidance for Quality Assurance Project Plans* (EPA/QA/G-5). The QAP must be prepared in the format that is specified in these documents.
3. At a minimum, the QAP must include the following:
   a) Details on the number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantitation limits for each target compound, type and number of quality assurance field samples, precision and accuracy requirements, sample preparation requirements, sample shipping methods, and laboratory data delivery requirements.
   b) Map(s) indicating the location of each sampling point.
   c) Qualification and training of personnel.
   d) Name(s), address(es) and telephone number(s) of the laboratories used by or proposed to be used by the permittee.
4. The permittee must amend the QAP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAP.
5. Copies of the QAP must be kept on site and made available to EPA and/or IDEQ upon request.

D. Emergency Response and Public Notification Plan

1. The permittee must develop and implement an overflow emergency response and public notification plan that identifies measures to protect public health from overflows that may endanger health and unanticipated bypasses or upsets that exceed any effluent limitation in the permit. At a minimum the plan must include mechanisms to:

a) Ensure that the permittee is aware (to the greatest extent possible) of all overflows from portions of the collection system over which the permittee has ownership or operational control and unanticipated bypass or upset that exceed any effluent limitation in the permit;

b) Ensure appropriate responses including assurance that reports of an overflow or of an unanticipated bypass or upset that exceed any effluent limitation in the permit are immediately dispatched to appropriate personnel for investigation and response;

c) Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;

d) Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained; and

e) Provide emergency operations.

2. The permittee must submit written notice to EPA and IDEQ that the plan has been developed and implemented by 180 days after the effective date of the final permit. Any existing emergency response and public notification plan may be modified for compliance with this section.

E. Pretreatment Requirements

1. Submission of Program

   The permittee must submit a pretreatment program meeting the requirements of 40 CFR 403.8, as amended at 70 FR 60134, for EPA approval within 1 year after the effective date of the final permit.

2. Implementation

   The permittee must implement its pretreatment program in accordance with the legal authorities, policies, procedures, staffing levels and financial provisions described in its original approved pretreatment program submission, any program amendments submitted thereafter and approved by EPA, and the general pretreatment regulations (40 CFR 403, as amended at 70 FR 60134). At a minimum, the permittee must carry out the following activities:

   a) Enforce prohibitive discharge standards as set forth in 40 CFR 403.5(a) and (b), categorical pretreatment standards promulgated pursuant to Section 307(b) and (c) of the Act (where applicable), and local limitations and BMPs developed by the permittee in accordance with 40 CFR 403.5(c), whichever are more stringent and are applicable to non-domestic users discharging wastewater into the permittee's collection system. Locally derived limitations must be defined as pretreatment standards under Section 307(d) of the Act.

   b) Implement and enforce the requirements of the most recent and EPA-approved portions of local law and regulations (e.g. municipal code, sewer use ordinance) addressing the regulation of non-domestic users.

c) Update its inventory of non-domestic users at a frequency and diligence adequate to ensure proper identification of non-domestic users subject to pretreatment standards, but no less than once per year. The permittee must notify these users of applicable pretreatment standards in accordance with 40 CFR 403.8(f)(2)(iii).

d) Issue, reissue, and modify, in a timely manner, industrial wastewater discharge permits to at least all Significant Industrial Users (SIUs) and categorical industrial users. These documents must contain, at a minimum, conditions identified in 40 CFR 403.8(f)(1)(iii), including Best Management Practices, if applicable. The permittee must follow the methods described in its implementation procedures for issuance of individual permits.

e) Develop and maintain a data management system designed to track the status of the permittee's non-domestic user inventory, non-domestic user discharge characteristics, and their compliance with applicable pretreatment standards and requirements. The permittee must retain all records relating to its pretreatment program activities for a minimum of three years, as required by 40 CFR 403.12(o), and must make such records available to EPA upon request. The permittee must also provide public access to information considered effluent data under 40 CFR 2.

f) Establish, where necessary, legally binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements in 40 CFR Part 403 by industrial users within these jurisdictions. These legally binding agreements must identify the agency responsible for the various pretreatment implementation and enforcement activities in the contributing jurisdiction and outline the specific roles, responsibilities and pretreatment activities of each jurisdiction.

g) Carry out inspections, surveillance, and monitoring of non-domestic users to determine compliance with applicable pretreatment standards and requirements. A complete inspection of all SIUs and sampling of all SIUs' effluent must be conducted at least annually.

h) Require SIUs to conduct wastewater sampling as specified in 40 CFR 403.12(e) or (h). Frequency of wastewater sampling by the SIUs must be appropriate for the character and volume of the wastewater but no less than twice per year. Sample collection and analysis must be performed in accordance with 40 CFR 403.12(b)(5)(ii) through (v) and 40 CFR 136. In cases where the Pretreatment Standard requires compliance with a Best Management Practice or pollution prevention alternative, the permittee must require the User to submit documentation to determine compliance with the Standard. If the permittee elects to conduct all non-domestic user monitoring for any SIU instead of requiring self-monitoring, the permittee must conduct sampling in accordance with the requirements of this paragraph, and the requirements of 40 CFR 403.12(g)(2).

i) Enforce and obtain remedies for any industrial user noncompliance with applicable pretreatment standards and requirements. This must include timely

and appropriate reviews of industrial reports to identify all violations of the user's permit, the local ordinance, and federal pretreatment standards and requirements. Once violations have been uncovered, the permittee must take timely and appropriate action to address the noncompliance. The permittee's enforcement actions must follow its EPA-approved enforcement response procedures.

j) Publish, at least annually, in a newspaper or newspapers of general circulation that provides meaningful public notice within the jurisdiction(s) served by the POTW, a list of all non-domestic users which, at any time in the previous 12 months, were in significant noncompliance as defined in 40 CFR 403.8 (f)(2)(viii).

k) Maintain adequate staff, funds and equipment to implement its pretreatment program.

l) Conduct an analysis annually to determine whether influent pollutant loadings are approaching the maximum allowable headworks loadings calculated in the permittee's most recent local limits calculations. Any local limits found to be inadequate by this analysis must be revised. The permittee may be required to revise existing local limits or develop new limits if deemed necessary by EPA.

3. Spill Prevention and Slug Discharges

The permittee must implement an accidental spill prevention program to reduce and prevent spills and slug discharges of pollutants from non-domestic users.

a) Control mechanisms for SIUs must contain requirements to control slug discharges if determined by the POTW to be necessary [40 CFR 403.8(f)(1)(iii)(B)(6)].

b) SIUs must be evaluated for the need for a plan or other action to control slug discharges within 1 year of being designated an SIU. For IUs designated as significant prior to November 14, 2005, this evaluation must be conducted by October 14, 2006 [40 CFR 403.8(f)(2)(vi)].

c) SIUs must notify the POTW immediately of any changes at their facilities affecting the potential for a slug discharge [40 CFR 403.8(f)(2(vi)].

4. Enforcement Requirement

Whenever EPA finds, on the basis of any available information, that the owner or operator of any source is introducing a pollutant into the POTW in violation of national pretreatment standards, including prohibited discharges, local limits, or categorical standards, or has caused interference or pass through, EPA may notify the owner or operator of the POTW of such violation. If, within 30 days after such notification has been sent by EPA to the POTW, the POTW fails to commence appropriate enforcement action to correct the violation, EPA may take appropriate enforcement action under the authority provided in section 309(f) of the Clean Water Act.

5. Modification of the Pretreatment Program

If the permittee elects to modify any components of its pretreatment program, it must comply with the requirements of 40 CFR 403.18. No substantial program modification, as defined in 40 CFR 403.18(b), may be implemented prior to receiving written authorization from EPA.

6. Local Limits Evaluation

   Within 1 year of the effective date of this permit, the permittee must submit to EPA a complete local limits evaluation pursuant to 40 CFR 403.5(c)(1). The study must take into account water quality in the receiving stream, inhibition levels for biological processes in the treatment plant, and sludge quality goals. The study must address at least the following pollutants: arsenic, 5-day biochemical oxygen demand, cadmium, chromium, copper, cyanide, lead, mercury, molybdenum, nickel, selenium, silver, total suspended solids, and zinc and any other pollutants of concern. The permittee must address total phosphorus and total ammonia as N if the POTW accepts non-domestic discharges of these pollutants. Submitted results of the study must include proposed local limits, maximum allowable headworks loadings, all supporting calculations, and all assumptions.

7. Control of Undesirable Pollutants

   The permittee must not allow introduction of the following pollutants into the publicly owned treatment works (POTW):

   a) Pollutants which will create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 ºF or 60 ºC using the test methods specified in 40 CFR 261.21;

   b) Pollutants which will cause corrosive structural damage to the POTW, but in no case, discharges with a pH lower than 5.0, unless the POTW is designed to accommodate such discharges;

   c) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW (including the collection system) resulting in interference;

   d) Any pollutant, including oxygen demanding pollutants (BOD, etc.), released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;

   e) Heat in amounts which inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 ºC (104 ºF) unless the Regional Administrator, upon request of the POTW, approves alternate temperature limits;

   f) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

   g) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and

h) Any trucked or hauled pollutants, except at discharge points designated by the POTW.

8. Requirements for Industrial users

The permittee must require any industrial user of its treatment works to comply with any applicable requirements in 40 CFR 403 through 471.

9. Sampling Requirements for Development and Maintenance of Local Limits

a) The permittee must conduct one-time sampling in support of its initial local limits calculations, as described in Table 7, below. To the extent that monitoring required by other conditions of this permit satisfies the requirements of Table 7, this sampling can be used to satisfy the requirements of Table 7.

Table 7: One-Time Monitoring Requirements for Development of Local Limits

Parameter	Minimum Days To Sample			
	POTW Influent	POTW Effluent	POTW Sludge	Collection System
Arsenic	7	7	2	7
Cadmium	7	7	2	7
Chromium	7	7	2	7
Copper	7	7	2	7
Cyanide	7	7	2	7
Lead	7	7	2	7
Mercury	7	7	2	7
Molybdenum	7	7	2	7
Nickel	7	7	2	7
Selenium	7	7	2	7
Silver	7	7	2	7
Zinc	7	7	2	7
$CBOD_5$	7	7	N/A	7
TSS	7	7	N/A	7
Ammonia	7	7	2	7
Phosphorus	7	7	2	7
Organic Priority Pollutants	1	1	1	1
Percent Solids	N/A	N/A	2	N/A

b) The permittee must conduct ongoing sampling for continued local limits analysis and evaluation as described in Table 8, below. To the extent that monitoring required by other conditions of this permit satisfies the requirements of Table 8, this sampling can be used to satisfy the requirements of Table 8.

Table 8: Ongoing Pretreatment Monitoring

Pollutant	Locations	Frequency
Pollutants for which local limits were developed	Influent, Effluent, Sludge	1/quarter
Pollutants for which maximum allowable headworks loadings were	Influent, Effluent, Sludge	Annual

calculated but no local limits were adopted		
Organic priority pollutants	Influent	Annual

c) Sampling procedures for pretreatment monitoring: 24-hour composite samples must be used except for the following pollutants (if applicable): pH, cyanide, VOCs, total phenols, oil and grease, total petroleum hydrocarbons, sulfide, flashpoint, and temperature. When grab samples are used, at least four grab samples should be collected per sampling event.

d) Analytical methods for pretreatment monitoring: For analysis of wastewater, the permittee must use the approved methods 40 CFR 136. For analysis of sludge, the permittee must comply with 40 CFR 503.

e) Sludge Sampling: Sludge samples must be taken as the sludge leaves the dewatering device or digesters.

f) Sludge Reporting: Metals concentrations in sludge must be reported in mg/kg, dry weight.

g) Reporting Results: Analytical results for each day's samples must be reported separately. Sample results must be submitted with the pretreatment annual report required in paragraph 10, below.

h) Cyanide sampling: Influent and effluent sampling for cyanide must be conducted as follows. At least four discrete grab samples must be collected over a 24-hour day. Each grab sample must be at least 100 ml. Each sample must be checked for the presence of chlorine and/or sulfides prior to preserving and compositing (refer to Standard Methods, 4500-CN B). If chlorine and/or sulfides are detected, the sample must be treated to remove any trace of these parameters. After testing and treating for the interference compounds, the pH of each sample must be adjusted, using sodium hydroxide, to 12.0 standard units. Each sample can then be composited into a larger container which has been chilled to 4 degrees Celsius, to allow for one analysis for the day.

10. Pretreatment Report

a) The permittee must submit an annual report pursuant to 40 CFR 403.12(i) that describes the permittee's program activities over the January 1st through December 31st report year. This report must be submitted to the following address no later than January 31st of each year:

Pretreatment Coordinator
U.S. Environmental Protection Agency
Region 10, OWW-130
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

b) The pretreatment report must be compiled following the Region 10 Annual Report Guidance. At a minimum, the report must include:

(i) An updated non-domestic user inventory, including those facilities that are no longer discharging (with explanation), and new dischargers, appropriately categorized and characterized. Categorical users should have the applicable category noted as well as cases where more stringent local limits apply instead of the categorical standard.

(ii) Results of wastewater and sludge sampling at the POTW as specified in Part II.E.8 (above).

(iii) Calculations of removal rates for each pollutant for each day of sampling.

(iv) An analysis and discussion of whether the existing local limitations in the permittee's sewer use ordinance continue to be appropriate to prevent treatment plant interference and pass through of pollutants that could affect water quality or sludge quality. This should include a comparison between influent loadings and the most recent relevant maximum allowable headworks loadings calculated for the treatment plant.

(v) Status of program implementation, including:

(a) Any planned modifications to the pretreatment program that have been approved by EPA, including staffing and funding updates.

(b) A description of any interference, upset, or NPDES permit violations experienced at the POTW which were directly or indirectly attributable to non-domestic users, including:

(i) Date & time of the incident

(ii) Description of the effect on the POTW's operation

(iii) Effects on the POTW's effluent and biosolids quality

(iv) Identification of suspected or known sources of the discharge causing the upset

(v) Steps taken to remedy the situation and to prevent recurrence

(c) Listing of non-domestic users inspected and/or monitored during the report year with dates and an indication compliance status.

(d) Listing of non-domestic users planned for inspection and/or monitoring for the coming year along with associated frequencies.

(e) Listing of non-domestic users whose permits have been issued, reissued, or modified during the report year along with current permit expiration dates.

(f) Listing of non-domestic users notified of promulgated pretreatment standards and/or local standards during the report year as required in 40 CFR 403.8(f)(2)(iii).

(g) Listing of non-domestic users notified of promulgated pretreatment standards or applicable local standards who are on compliance

schedules. The listing must include the final date of compliance for each facility.

(vi) Status of enforcement activities including:

(a) Listing of non-domestic users who failed to comply with applicable pretreatment standards and requirements, including:

(i) Summary of the violation(s).

(ii) Enforcement action taken or planned by the permittee.

(iii) Present compliance status as of the date of preparation of the pretreatment report.

(b) Listing of those users in significant noncompliance during the report year as defined in 40 CFR 403.8(f)(2)(viii) and a copy of the newspaper publication of those users' names.

(c) EPA may require more frequent reporting on those users who are determined to be in significant noncompliance.

F. Causes for Modification

1. This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the permittee) or upon EPA's initiative. However, permits may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 122.63 and 122.64. All requests must be in writing and must contain facts or reasons supporting the request. If a permit modification satisfies the criteria in 40 CFR 122.63 for "minor modifications," the permit may be modified without a draft permit or public review. Otherwise, a draft modified permit must be prepared and other procedures in 40 CFR Part 124 followed.

2. New information may be a cause for modification of this permit. The permit may be modified during its term for this cause only if the information was not available at the time of permit issuance (other than revised regulations, guidance or test methods) and would have justified the application of different permit conditions at the time of issuance. New information may include, but is not limited to, the following:

a) Information supporting water quality trading or aggregate ("bubble") water quality-based effluent limits ("WQBELs"). Any water quality trading or aggregate WQBEL provisions included in a modified permit must ensure compliance with EPA's Water Quality Trading Policy (dated January 13, 2003), any applicable EPA trading guidance, and the IDEQ Water Quality Pollutant Trading Guidance (dated July 2010). If such provisions allow trading with pollution sources in the State of Washington, any water quality trading provisions included in a modified permit must ensure compliance with WAC 173-201A-450. Information supporting water quality trading includes, but is not limited to, the following:

(i) Location ratios;

(ii) Uncertainty ratios;

(iii) Equivalency ratios;

(iv) Available best management practices for nonpoint source reduction; and

(v) Information regarding the effectiveness of pollutant reduction by sources that can generate trading credits.

b) Effluent and/or receiving water quality and/or quantity data.

c) New water quality modeling analyses, including, but not limited to, the following:

(i) Modeling demonstrating that an alternate set of effluent limits for total phosphorus ("TP"), ammonia, and $CBOD_5$ causes an equivalent or lesser impact to dissolved oxygen in the State of Washington as the current set of limits.

(ii) Modeling incorporating new information regarding the bioavailability of TP in the permittee's effluent, including but not limited to the fraction of the TP in the permittee's effluent that is present as reactive phosphorus or orthophosphate.

3. Any modification of this permit must comply with all applicable requirements of the Clean Water Act and implementing regulations, including, but not limited to:

a) The antibacksliding provisions of the Clean Water Act and federal regulations (CWA §§ 402(o) and 303(d)(4); 40 CFR 122.44(l)). See Part II.G of this permit regarding the application of anti-backsliding to phosphorus, ammonia and $CBOD_5$ limits.

b) Technology-based treatment requirements (40 CFR Parts 125.3 and 133; CWA § 301(b)(1)(B))

c) The applicable water quality requirements of all affected States (40 CFR Parts 122.4(d) and 122.44(d); CWA §§ 301(b)(1)(C) and 401(a)(2)).

d) Any conditions included in the State of Idaho's Section 401 certification of the modified permit which are necessary to ensure compliance with the applicable provisions of CWA §§ 208(e), 301, 302, 303, 306 and 307 and with appropriate requirements of Idaho law.

G. Antibacksliding

The water quality-based effluent limits for total phosphorus (TP), total ammonia as N (NH_3) and 5-day carbonaceous biochemical oxygen demand ($CBOD_5$) in this permit are established at levels necessary to ensure compliance with the State of Washington's water quality standards for dissolved oxygen (DO), while considering the cumulative effect of all human actions that may affect DO. In the future, the State of Washington may modify the Spokane River TMDL and/or the effluent limits in NPDES permits for point sources discharging to the Spokane River within the State of Washington. Such modifications may allow for less-stringent effluent limits for

total phosphorus, ammonia and/or $CBOD_5$ in this permit, while nonetheless ensuring that the cumulative effect of all such revised effluent limitations will ensure the attainment of water quality standards for DO in the State of Washington. In that case, EPA could revise the water quality-based effluent limits for total phosphorus, ammonia and/or $CBOD_5$. Such revised effluent limits would not violate the antibacksliding provisions of the Clean Water Act if those limits would ensure compliance with all applicable water quality standards for waters of the States of Idaho and Washington (CWA §§ 303(d)(4) and 402(o)(3)).

H. Regional Toxics Task Force

The goal of the Spokane River Regional Toxics Task Force (Task Force) is to develop a comprehensive plan to make measurable progress toward bringing the Spokane River into compliance with applicable water quality standards for PCBs.

To accomplish this goal, the permittee shall participate in the Task Force under the terms and conditions of the January 23, 2012, Memorandum of Agreement Regarding Spokane River Regional Toxics Task Force and the Operational Concepts incorporated therein. The permittee shall not be required to be a member of any non-profit organization or other business entity affiliated with the Task Force.

I. Best Management Practices for PCBs and 2,3,7,8 TCDD

1. By 180 days after the effective date of the final permit, the permittee must submit to EPA and IDEQ a Toxics Management Plan (TMP). By one year after the effective date of the final permit, the permittee must submit written notification to EPA and IDEQ that the plan has been implemented. The goal of the TMP must be to reduce loadings of PCBs and 2,3,7,8 TCDD to the Spokane River to the maximum extent practicable. The TMP must address source control and elimination of PCBs and 2,3,7,8 TCDD as follows:

   a) From contaminated soils, sediments, storm water and groundwater entering the POTW collection system via inflow and infiltration.

   b) From industrial and commercial sources. If any industrial user's discharges of PCBs and/or 2,3,7,8 TCDD to the POTW treatment plant cause pass through or interference, the permittee must require the industrial user to reduce or eliminate such discharges in compliance with 40 CFR 403.

   c) By means of eliminating existing sources that are within the direct control of the permittee including but not limited to:

      (i) Machinery manufactured prior to May 31, 1979.

      (ii) Electrical equipment and components containing insulating or dielectric oil manufactured prior to May 31, 1979, including but not limited to transformers, capacitors, regulators, reactors, circuit breakers, switch gear and fluorescent lighting ballasts.

      (iii) Construction material including but not limited to paints and caulking.

(iv) Commercial materials including but not limited to ink, dyes and lubricants.

d) By means of changing the permittee's procurement practices, control and minimize the future generation and release of PCBs and 2,3,7,8 TCDD that is within the direct control of the permittee, including preferential use of PCB free substitutes for those products containing PCBs below the regulated level of 50 ppm, in sources including but not limited to:

(i) Electrical equipment and components containing insulating or dielectric oil, including but not limited to transformers, capacitors, regulators, reactors, circuit breakers, switch gear and fluorescent lighting ballasts.

(ii) Construction materials including but not limited to paints and caulking,

(iii) Commercial materials including but not limited to ink, dyes, and lubricants.

(iv) Soaps and cleaners.

e) Within two years of the effective date of the final permit, the permittee, either individually or in collaboration with other dischargers to the Spokane River, must develop and implement a public education program to educate the public about the following:

(i) The difference between products free of PCBs and those labeled non-PCB but which contain PCBs below the TSCA regulatory threshold of 50 ppm.

(ii) Proper disposal of waste products that may contain PCBs including those containing PCBs below the TSCA regulatory threshold of 50 ppm and the hazards associated with improper disposal.

f) The education program must include distribution of appropriate educational materials to the target audiences at least once per year.

g) At least once per year, the permittee must prepare and distribute appropriate information relevant to the TMP to a newspaper(s) of general circulation within the jurisdiction(s) served by the POTW that provide(s) meaningful public notice.

h) The permittee must make all relevant TMP documents available to the public.

2. Beginning two years after the effective date of the final permit, the permittee must submit an annual report to EPA and IDEQ. Each annual report must contain the following information:

a) Monitoring results for PCBs and 2,3,7,8 TCDD for the previous 12-month period, including laboratory data sheets.

b) Copies of education materials, ordinances (or other regulatory mechanisms), inventories, guidance materials, or other products produced as part of the TMP.

c) A description and schedule for implementation of additional actions that may be necessary, based on monitoring results, to ensure compliance with applicable water quality standards.

d) A summary of the actions the permittee plans to undertake to reduce discharges of PCBs and 2,3,7,8 TCDD during the next reporting cycle.

e) A summary of the actions taken to reduce discharges of PCBs and 2,3,7,8 TCDD during the previous 12-month period.

III. Monitoring, Recording and Reporting Requirements

A. Representative Sampling (Routine and Non-Routine Discharges)

Samples and measurements must be representative of the volume and nature of the monitored discharge.

In order to ensure that the effluent limits set forth in this permit are not violated at times other than when routine samples are taken, the permittee must collect additional samples at the appropriate outfall whenever any discharge occurs that may reasonably be expected to cause or contribute to a violation that is unlikely to be detected by a routine sample. The permittee must analyze the additional samples for those parameters limited in Part I.B of this permit that are likely to be affected by the discharge.

The permittee must collect such additional samples as soon as the spill, discharge, or bypassed effluent reaches the outfall. The samples must be analyzed in accordance with paragraph III.C ("Monitoring Procedures"). The permittee must report all additional monitoring in accordance with paragraph III.D ("Additional Monitoring by Permittee").

B. Reporting of Monitoring Results

The permittee must either submit monitoring data and other reports in paper form, or must report electronically using NetDMR, a web-based tool that allows permittees to electronically submit DMRs and other required reports via a secure internet connection. Specific requirements regarding submittal of data and reports in paper form and submittal using NetDMR are described below.

1. Paper Copy Submissions

The permittee must summarize monitoring results each month on the Discharge Monitoring Report (DMR) form (EPA No. 3320-1) or equivalent. The permittee must submit reports monthly, postmarked by the 10th day of the following month. The permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of Part V.E. of this permit ("Signatory Requirements"). The

permittee must submit the legible originals of these documents to the Director, Office of Compliance and Enforcement, with copies to IDEQ at the following addresses:

US EPA Region 10
Attn: ICIS Data Entry Team
1200 Sixth Avenue, Suite 900
OCE-133
Seattle, Washington 98101-3140

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Pkwy
Coeur d'Alene, ID 83814

2. Electronic submissions

Monitoring data must be submitted electronically to EPA no later than the 10th of the month following the completed reporting period. All reports required under this permit must be submitted to EPA as a legible electronic attachment to the DMR. The permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of Part V.E. of this permit ("Signatory Requirements"). Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit paper copies of DMRs or other reports to EPA and insert State/Tribal agency.

The permittee may use NetDMR after requesting and receiving permission from US EPA Region 10. NetDMR is accessed from http://www.epa.gov/netdmr.

C. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR 136, unless other test procedures have been specified in this permit or approved by EPA as an alternate test procedure under 40 CFR 136.5.

D. Additional Monitoring by Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the permittee must include the results of this monitoring in the calculation and reporting of the data submitted in the DMR.

Upon request by EPA, the permittee must submit results of any other sampling, regardless of the test method used.

E. Records Contents

Records of monitoring information must include:

1. the date, exact place, and time of sampling or measurements;
2. the name(s) of the individual(s) who performed the sampling or measurements;
3. the date(s) analyses were performed;

4. the names of the individual(s) who performed the analyses;
5. the analytical techniques or methods used; and
6. the results of such analyses.

F. Retention of Records

The permittee must retain records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, copies of DMRs, a copy of the NPDES permit, and records of all data used to complete the application for this permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of EPA or IDEQ at any time.

G. Twenty-four Hour Notice of Noncompliance Reporting

1. The permittee must report the following occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances:
   a) any noncompliance that may endanger health or the environment;
   b) any unanticipated bypass that exceeds any effluent limitation in the permit (See Part IV.F, "Bypass of Treatment Facilities");
   c) any upset that exceeds any effluent limitation in the permit (See Part IV.G, "Upset Conditions"); or
   d) any violation of a maximum daily discharge limitation for applicable pollutants identified by Part I.B.2.
   e) any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limitation in the permit.
2. The permittee must also provide a written submission within five days of the time that the permittee becomes aware of any event required to be reported under subpart 1 above. The written submission must contain:
   a) a description of the noncompliance and its cause;
   b) the period of noncompliance, including exact dates and times;
   c) the estimated time noncompliance is expected to continue if it has not been corrected; and
   d) steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
   e) if the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

3. The Director of the Office of Compliance and Enforcement may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the NPDES Compliance Hotline in Seattle, Washington, by telephone, (206) 553-1846.
4. Reports must be submitted to the addresses in Part III.B ("Reporting of Monitoring Results").

H. Other Noncompliance Reporting

The permittee must report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports for Part III.B ("Reporting of Monitoring Results") are submitted. The reports must contain the information listed in Part III.G.2 of this permit ("Twenty-four Hour Notice of Noncompliance Reporting").

I. Notice of New Introduction of Toxic Pollutants

The permittee must notify the Director of the Office of Water and Watersheds and IDEQ in writing of:

5. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to Sections 301 or 306 of the Act if it were directly discharging those pollutants; and
6. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
7. For the purposes of this section, adequate notice must include information on:
   a) The quality and quantity of effluent to be introduced into the POTW, and
   b) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.
8. The permittee must notify the Director of the Office of Water and Watersheds at the following address:

   US EPA Region 10
   Attn: NPDES Permits Unit Manager
   1200 Sixth Avenue
   Suite 900, M/S OWW-130
   Seattle, WA 98101

J. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

Draft

IV. Compliance Responsibilities

A. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

B. Penalties for Violations of Permit Conditions

1. Civil and Administrative Penalties. Pursuant to 40 CFR Part 19 and the Act, any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $37,500 per day for each violation).

2. Administrative Penalties. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Pursuant to 40 CFR 19 and the Act, administrative penalties for Class I violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $16,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $37,500). Pursuant to 40 CFR 19 and the Act, penalties for Class II violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $16,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $177,500).

3. Criminal Penalties:

   a) Negligent Violations. The Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to

criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

b) Knowing Violations. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

c) Knowing Endangerment. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

d) False Statements. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

C. Need To Halt or Reduce Activity not a Defense

It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this permit.

D. Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. Bypass of Treatment Facilities

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur that does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2 and 3 of this Part.
2. Notice.
   a) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it must submit prior written notice, if possible at least 10 days before the date of the bypass.
   b) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required under Part III.G ("Twenty-four Hour Notice of Noncompliance Reporting").
3. Prohibition of bypass.
   a) Bypass is prohibited, and the Director of the Office of Compliance and Enforcement may take enforcement action against the permittee for a bypass, unless:
      (i) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      (ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance; and
      (iii) The permittee submitted notices as required under paragraph 2 of this Part.

b) The Director of the Office of Compliance and Enforcement may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 3.a. of this Part.

G. Upset Conditions

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee meets the requirements of paragraph 2 of this Part. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
2. Conditions necessary for a demonstration of upset. To establish the affirmative defense of upset, the permittee must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   a) An upset occurred and that the permittee can identify the cause(s) of the upset;
   b) The permitted facility was at the time being properly operated;
   c) The permittee submitted notice of the upset as required under Part III.G, "Twenty-four Hour Notice of Noncompliance Reporting;" and
   d) The permittee complied with any remedial measures required under Part IV.D, "Duty to Mitigate."
3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

H. Toxic Pollutants

The permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

I. Planned Changes

The permittee must give written notice to the Director of the Office of Water and Watersheds as specified in Part III.I.4. and IDEQ as soon as possible of any planned physical alterations or additions to the permitted facility whenever:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29(b); or
2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this permit.

3. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application site.

J. Anticipated Noncompliance

The permittee must give written advance notice to the Director of the Office of Compliance and Enforcement and IDEQ of any planned changes in the permitted facility or activity that may result in noncompliance with this permit.

K. Reopener

This permit may be reopened to include any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Act. The Director may modify or revoke and reissue the permit if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

V. General Provisions

A. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 122.62, 122.64, or 124.5. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

B. Duty to Reapply

If the permittee intends to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. In accordance with 40 CFR 122.21(d), and unless permission for the application to be submitted at a later date has been granted by the Regional Administrator, the permittee must submit a new application at least 180 days before the expiration date of this permit.

C. Duty to Provide Information

The permittee must furnish to EPA and IDEQ, within the time specified in the request, any information that EPA or IDEQ may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee must also furnish to EPA or IDEQ, upon request, copies of records required to be kept by this permit.

D. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or that it submitted incorrect information in a permit application or any report to EPA or IDEQ, it must promptly submit the omitted facts or corrected information in writing.

E. Signatory Requirements

All applications, reports or information submitted to EPA and IDEQ must be signed and certified as follows.

1. All permit applications must be signed as follows:
   a) For a corporation: by a responsible corporate officer.
   b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.
   c) For a municipality, state, federal, Indian tribe, or other public agency: by either a principal executive officer or ranking elected official.
2. All reports required by the permit and other information requested by EPA or IDEQ must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a) The authorization is made in writing by a person described above;
   b) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and
   c) The written authorization is submitted to the Director of the Office of Compliance and Enforcement and IDEQ.
3. Changes to authorization. If an authorization under Part V.E.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part V.E.2. must be submitted to the Director of the Office of Compliance and Enforcement and IDEQ prior to or together with any reports, information, or applications to be signed by an authorized representative.
4. Certification. Any person signing a document under this Part must make the following certification:

   > "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my

knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. Availability of Reports

In accordance with 40 CFR 2, information submitted to EPA pursuant to this permit may be claimed as confidential by the permittee. In accordance with the Act, permit applications, permits and effluent data are not considered confidential. Any confidentiality claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice to the permittee. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR 2, Subpart B (Public Information) and 41 Fed. Reg. 36902 through 36924 (September 1, 1976), as amended.

G. Inspection and Entry

The permittee must allow the Director of the Office of Compliance and Enforcement, EPA Region 10; IDEQ; or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

H. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, nor any infringement of federal, tribal, state or local laws or regulations.

I. Transfers

This permit is not transferable to any person except after written notice to the Director of the Office of Water and Watersheds as specified in Part III.I.4. The Director may require modification or revocation and reissuance of the permit to change the name of

the permittee and incorporate such other requirements as may be necessary under the Act. (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory).

J. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act.

VI. Definitions

1. "Act" means the Clean Water Act.
2. "Administrator" means the Administrator of the EPA, or an authorized representative.
3. "Average monthly discharge limitation" means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.
4. "Average weekly discharge limitation" means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.
5. "Best Management Practices" (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.
6. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
7. "Composite" - see "24-hour composite".
8. "Credit" means a measured or estimated unit of pollutant reduction per unit of time at the discharge location of the buyer or user of the credit. A seller generates excess load reductions by controlling its discharge beyond what is needed to meet its baseline. A buyer compensates a seller for creating the excess load reductions that are then converted into credits by using trade ratios. Where appropriate, the buyer can use the credits to meet a regulatory obligation.
9. "Daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of

measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

10. "Director of the Office of Compliance and Enforcement" means the Director of the Office of Compliance and Enforcement, EPA Region 10, or an authorized representative.
11. "Director of the Office of Water and Watersheds" means the Director of the Office of Water and Watersheds, EPA Region 10, or an authorized representative.
12. "DMR" means discharge monitoring report.
13. "EPA" means the United States Environmental Protection Agency.
14. "Equivalency ratio" means a factor applied to pollutant reduction credits to adjust for trading different pollutants or different forms of the same pollutant.
15. "Geometric Mean" means the nth root of a product of n factors, or the antilogarithm of the arithmetic mean of the logarithms of the individual sample values.
16. "Grab" sample is an individual sample collected over a period of time not exceeding 15 minutes.
17. "IDEQ" means the Idaho Department of Environmental Quality.
18. "Inhibition concentration", IC, is a point estimate of the toxicant concentration that causes a given percent reduction (p) in a non-quantal biological measurement (e.g., reproduction or growth) calculated from a continuous model (e.g., Interpolation Method).
19. "Interference" is defined in 40 CFR 403.3.
20. "Location ratio" means a factor applied to pollutant reduction credits when sources are upstream of a waterbody of concern that accounts for the distance and unique watershed features between a pollutant source and the downstream waterbody (e.g., bay, estuary, lake, reservoir) or area of interest (e.g., a hypoxic zone in a waterbody).
21. "Maximum daily discharge limitation" means the highest allowable "daily discharge."
22. "Method Detection Limit (MDL)" means the minimum concentration of a substance (analyte) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
23. "Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.

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24. "NPDES" means National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits . . . under sections 307, 402, 318, and 405 of the CWA.
25. "Pass Through" means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).
26. "QA/QC" means quality assurance/quality control.
27. "Regional Administrator" means the Regional Administrator of Region 10 of the EPA, or the authorized representative of the Regional Administrator.
28. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
29. "Significant Industrial User" means all industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N; and any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)). Upon a finding that an industrial user meeting above the criteria has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority (as defined in 40 CFR 403.12(a)) may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.
30. "Uncertainty ratio" means a factor applied to pollutant reduction credits generated by nonpoint sources that accounts for lack of information and risk associated with best management practice measurement, implementation and performance.
31. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Draft

32. "24-hour composite" sample means a combination of at least eight (8) discrete sample aliquots of at least 100 milliliters, collected over periodic intervals from the same location, during the operating hours of a facility over a 24 hour period. The composite must be flow proportional. The sample aliquots must be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

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Attachment A

Including Days of Zero Discharge in the Calculation of Seasonal Average TP, $CBOD_5$ and Ammonia Loads

If the permittee's daily average effluent flow is zero for at least three days during the seasons during which seasonal average effluent limits apply, the permittee may include zero pounds per day daily discharge values in the calculation of the permittee's seasonal average total phosphorus, $CBOD_5$ and ammonia loads for February 1st through October 31st. The number of zero pound per day daily discharge values included in the calculation of the permittee's seasonal average loads must not exceed the number listed in Table A-1 below.

The number of zeros allowed for averaging is equal to the required sampling frequency of three times per week (0.429 samples per day), multiplied by the number of days of zero discharge, and rounded down to the nearest whole number.

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Table A-1: Number of Zero lb/day Daily Discharge Values Allowed for Calculation of Seasonal Avg. Load

Days of Zero Discharge	Zeros Allowed for Avg.	Days of Zero Discharge	Zeros Allowed for Avg.	Days of Zero Discharge	Zeros Allowed for Avg.	Days of Zero Discharge	Zeros Allowed for Avg.	Days of Zero Discharge	Zeros Allowed for Avg.
1	0	60	25	119	51	178	76	237	101
2	0	61	26	120	51	179	76	238	102
3	1	62	26	121	51	180	77	239	102
4	1	63	27	122	52	181	77	240	102
5	2	64	27	123	52	182	78	241	103
6	2	65	27	124	53	183	78	242	103
7	3	66	28	125	53	184	78	243	104
8	3	67	28	126	54	185	79	244	104
9	3	68	29	127	54	186	79	245	105
10	4	69	29	128	54	187	80	246	105
11	4	70	30	129	55	188	80	247	105
12	5	71	30	130	55	189	81	248	106
13	5	72	30	131	56	190	81	249	106
14	6	73	31	132	56	191	81	250	107
15	6	74	31	133	57	192	82	251	107
16	6	75	32	134	57	193	82	252	108
17	7	76	32	135	57	194	83	253	108
18	7	77	33	136	58	195	83	254	108
19	8	78	33	137	58	196	84	255	109
20	8	79	33	138	59	197	84	256	109
21	9	80	34	139	59	198	84	257	110
22	9	81	34	140	60	199	85	258	110
23	9	82	35	141	60	200	85	259	111
24	10	83	35	142	60	201	86	260	111
25	10	84	36	143	61	202	86	261	111
26	11	85	36	144	61	203	87	262	112
27	11	86	36	145	62	204	87	263	112
28	12	87	37	146	62	205	87	264	113
29	12	88	37	147	63	206	88	265	113
30	12	89	38	148	63	207	88	266	114
31	13	90	38	149	63	208	89	267	114
32	13	91	39	150	64	209	89	268	114
33	14	92	39	151	64	210	90	269	115
34	14	93	39	152	65	211	90	270	115
35	15	94	40	153	65	212	90	271	116
36	15	95	40	154	66	213	91	272	116
37	15	96	41	155	66	214	91	273	117
38	16	97	41	156	66	215	92		
39	16	98	42	157	67	216	92		
40	17	99	42	158	67	217	93		
41	17	100	42	159	68	218	93		
42	18	101	43	160	68	219	93		
43	18	102	43	161	69	220	94		
44	18	103	44	162	69	221	94		
45	19	104	44	163	69	222	95		
46	19	105	45	164	70	223	95		
47	20	106	45	165	70	224	96		
48	20	107	45	166	71	225	96		
49	21	108	46	167	71	226	96		
50	21	109	46	168	72	227	97		
51	21	110	47	169	72	228	97		
52	22	111	47	170	72	229	98		
53	22	112	48	171	73	230	98		
54	23	113	48	172	73	231	99		
55	23	114	48	173	74	232	99		
56	24	115	49	174	74	233	99		
57	24	116	49	175	75	234	100		
58	24	117	50	176	75	235	100		
59	25	118	50	177	75	236	101		

Draft

1200 6th Avenue
Suite 900 M/S OWW-130
Seattle, WA 98101

Revised Fact Sheet

Public Comment Start Date:
Public Comment Expiration Date:

Technical Contact: Brian Nickel
206-553-6251
800-424-4372, ext. 6251 (within Alaska, Idaho, Oregon and Washington)
Nickel.Brian@epa.gov

Proposed Reissuance of a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA)

City of Post Falls
Water Reclamation Facility

The EPA Proposes To Reissue NPDES Permit
The EPA proposes to reissue an NPDES permit to the facility referenced above. The draft permit places conditions on the discharge of pollutants from the water reclamation facility to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

401 Certification
The EPA is requesting that the Idaho Department of Environmental Quality certify the NPDES permit for this facility, under section 401 of the Clean Water Act. Comments regarding the certification should be directed to:

Regional Administrator
Idaho Department of Environmental Quality
2110 Ironwood Pkwy
Coeur d'Alene, ID 83814

Public Comment

Pursuant to 40 CFR 124.14(c), at this time, the EPA is only accepting comments on aspects of the draft permit that are different from those in the draft permit that was issued for public comment on February 16, 2007. These are as follows:

- The final effluent limitations for total phosphorus, five day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), ammonia, copper, pH, and chlorine have been revised (see the revised draft permit at Table 1, Part I.B).
- The draft permit now includes effluent limits for cadmium.
- The permit allows the permittee to demonstrate compliance with loading (i.e., lb/day) limits for cadmium, lead, and zinc that were specified by the State of Idaho in its draft Clean Water Act Section 401 certification by developing and implementing an offset plan.
- Effluent limits and monitoring requirements for chlorine now apply only when chlorine is used for disinfection or elsewhere in the treatment process.
- The schedule of compliance for new water quality-based $CBOD_5$ limits has been deleted (see the revised draft permit at Part I.C).
- The schedules of compliance, including the interim milestones and the interim effluent limitations for phosphorus (which apply during the term of the compliance schedule) have been revised (see the revised draft permit at Part I.D).
- Surface water monitoring requirements have been changed (see the revised draft permit at Part I.F).
- The draft permit no longer contains a compliance evaluation level for total residual chlorine effluent limits.
- The draft permit now requires more frequent effluent monitoring for whole effluent toxicity and total residual chlorine relative to the 2007 draft permit (see the revised draft permit at Parts I.B and I.E).
- In addition to more frequent monitoring, the draft permit includes additional requirements for whole effluent toxicity testing (e.g. accelerated testing, toxicity reduction evaluation) to ensure consistency with EPA guidance (see the revised draft permit at Part I.E).
- The permit now includes influent and effluent monitoring requirements for 2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD) (see the revised draft permit at Parts I.B and II.H).
- The phosphorus management plan requirements have been changed (see the revised draft permit at Part II.B).
- The permit now includes best management practices requirements intended to reduce the discharge of polychlorinated biphenyls (PCBs) and 2,3,7,8 TCDD (see the revised draft permit at Part II.I).
- The permit now requires the permittee to participate in the Spokane River Regional Toxics Task Force (see the revised draft permit at Part II.H).

Persons wishing to comment on the tentative determinations contained in the draft permit may do so in writing to the above address or by e-mail to “Nickel.Brian@epa.gov” within 45 days of the date of this public notice. Comments must be received within the 45 day period to be considered in the formulation of final determinations regarding the applications. All comments should

include the name, address and telephone number of the commenter and a concise statement of the exact basis of any comment and the relevant facts upon which it is based. All written comments and requests should be submitted to the EPA at the above address to the attention of the Director, Office of Water and Watersheds.

Workshop and Public Hearing
A workshop and public hearing will be held.

Date: TBD
Time: Workshop from 5:00 PM to 7:00 PM
Public hearing from 7:00 PM to 9:00 PM
Place: TBD

Comments made on the draft permits at the public hearing will become part of the administrative record for the permits, along with any written comments received.

After the Public Notice expires, and all comments have been considered, the EPA's regional Director for the Office of Water will make a final decision regarding permit issuance. If no substantive comments are received, the proposed conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, the EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days of the service of notice of the final permit decision.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting the EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at "http://epa.gov/r10earth/waterpermits.htm."

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Suite 900 M/S OWW-130
Seattle, Washington 98101
(206) 553-6251 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Pkwy
Coeur d'Alene, ID 83814
208-799-4370

1-877-541-3304

Post Falls Library
821 North Spokane Street
Post Falls, ID 83854
208-773-1506

Hayden Lake Library
8385 North Government Way
Hayden, ID 83835
208-772-5612, ext. 11

U.S. Environmental Protection Agency
Idaho Operations Office
1435 North Orchard
Boise, ID 83706
208-378-5748

U.S. Environmental Protection Agency
Coeur d'Alene Field Office
1910 Northwest Blvd., Suite 208
Coeur d'Alene, ID 83814
208-665-0458

Washington State Department of Ecology
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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
AML	Average Monthly Limit
BOD_5	Biochemical oxygen demand, five-day
°C	Degrees Celsius
CFR	Code of Federal Regulations
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
IDEQ	Idaho Department of Environmental Quality
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
:g/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OW	Office of Water
O&M	Operations and maintenance
POTW	Publicly owned treatment works
QAP	Quality assurance plan

RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WRF	Water reclamation facility
WWTP	Wastewater treatment plant

I. Applicant

This fact sheet provides information on the draft NPDES permit for the following entity:

City of Post Falls
NPDES Permit # ID-002585-2

Mailing Address
408 North Spokane Street
Post Falls, ID 83854

Physical Address:
2002 West Seltice Way
Post Falls, ID 83854

Contact:
Terry Werner, Public Services Director

Federal regulations state that comments filed during a reopened comment period shall be limited to the substantial new questions that caused its reopening, and that the public notice under 40 CFR 124.10 shall define the scope of the reopening (40 CFR 124.14). As stated in the public notice, the EPA is only accepting comments on permit conditions that are different from those proposed in the draft permit that was issued for public review and comment on February 16, 2007.

The EPA is making significant changes to the draft permit as it was proposed in February 2007. These changes result from comments made during the initial public comment period, the availability of the final *Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load: Water Quality Improvement Report*, hereinafter referred to as the Spokane DO TMDL (Ecology 2010), more recent effluent and receiving water quality and quantity data, updated computer modeling of the impact of the discharge, a revised draft Clean Water Act (CWA) Section 401 certification prepared by the Idaho Department of Environmental Quality (IDEQ), and EPA guidance documents. To allow the public an opportunity to comment on all of these changes, the EPA has decided to reopen the public comment period to accept comments on these specific changes. The changed conditions are as follows:

- The final effluent limitations for total phosphorus, five day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), ammonia, copper, pH, and chlorine have been revised (see the revised draft permit at Table 1, Part I.B).
- The draft permit now includes effluent limits for cadmium.
- The permit allows the permittee to demonstrate compliance with loading (i.e., lb/day) limits for cadmium, lead, and zinc that were specified by the State of Idaho in its draft Clean Water Act Section 401 certification by developing and implementing an offset plan.
- Effluent limits and monitoring requirements for chlorine now apply only when chlorine is used for disinfection or elsewhere in the treatment process (see the revised draft permit at Table 1, Part I.B).
- The draft permit no longer contains a compliance evaluation level for total residual chlorine effluent limits.

- The schedule of compliance for new water quality-based $CBOD_5$ limits has been deleted (see the revised draft permit at Part I.C).
- The schedules of compliance, including the interim milestones and the interim effluent limitations for phosphorus (which apply during the term of the compliance schedule) have been revised (see the revised draft permit at Part I.D).
- Surface water monitoring requirements have been changed (see the revised draft permit at Part I.F).
- The draft permit now requires more frequent effluent monitoring for whole effluent toxicity and total residual chlorine relative to the 2007 draft permit (see the revised draft permit at Parts I.B and I.E).
- In addition to more frequent monitoring, the draft permit includes additional requirements for whole effluent toxicity testing (e.g. accelerated testing, toxicity reduction evaluation) to ensure consistency with EPA guidance (see the revised draft permit at Part I.E).
- The permit now includes influent and effluent monitoring requirements for 2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD) (see the revised draft permit at Parts I.B and II.I).
- The phosphorus management plan requirements have been changed (see the revised draft permit at Part II.B).
- The permit now includes best management practices requirements intended to reduce the discharge of polychlorinated biphenyls (PCBs) and 2,3,7,8 TCDD (see the revised draft permit at Part II.I).
- The permit now requires the permittee to participate in the Spokane River Regional Toxics Task Force (see the revised draft permit at Part II.H)

II. Facility Information

In general, facility information is provided in the fact sheet for the initial public comment period dated February 16, 2007. The POTW has been expanded to a design flow of 5.0 mgd since the time the 2007 draft permit was issued. A map of the treatment plant and discharge location is provided in Appendix A.

III. Receiving Water

This facility discharges to the Spokane River in Kootenai County, Idaho. The outfall is located approximately 0.2 miles downstream of the Post Falls Dam and approximately 4.5 miles upstream of the Washington line, at river mile 100.5.

A. Low Flow Conditions

The *Technical Support Document for Water Quality-Based Toxics Control* (hereinafter referred to as the TSD) (EPA 1991) and the Idaho Water Quality Standards (WQS) recommend the flow conditions for use in calculating water quality-based effluent limits (WQBELs) using steady-state modeling. The TSD and the Idaho WQS state that WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria. However, because the chronic criterion for ammonia is a 30-day average concentration not to be exceeded more than once every three years,

the EPA has used the 30Q10 for the chronic ammonia criterion instead of the 7Q10. In the 2007 draft permit, the 30B3 flow rate was generally paired with the chronic ammonia criterion. However, later versions of the software used to calculate low flow conditions do not allow the calculation of the 30B3 flow rate on a seasonal basis, so the 30Q10 flow rate has been used instead of the 30B3. The 30Q10 is as protective as the 30B3 and may be used instead of the 30B3 (64 FR 71976).

The EPA has re-calculated the low flow values, using more recent river flow data, since the close of the 2007 public comment period. The values in Table 1 were calculated using data from the Post Falls gauge (USGS station # 12419000), using a period of record of 1978-2008.

The seasons used to calculate the critical low flows have also been changed relative to the 2007 draft permit and fact sheet in order to match the seasonal calculations used to develop the 1999 permit. This allows a direct comparison to determine if the effluent limits in the 1999 permit remain adequate to protect water quality in the Spokane River.

From July – September, the critical low flow rates based on historical data are less than the minimum flow rates specified in the Federal Energy Regulatory Commission (FERC) license for the Post Falls Dam. The EPA has used the FERC minimum flows for effluent limit calculations, in lieu of the historical low flows.

Table 1: Seasonal Low Flows in the Spokane River

Season	1Q10 (CFS)	7Q10 (CFS)	30Q10 (CFS)
October – June	890	1030	1270
July – Sep. (based on historical data)	248	292	363
July – Sep. (FERC license)	500		

B. Water Quality Standards

Section 301(b)(1)(C) of the Clean Water Act (Act) requires that NPDES permits contain effluent limits more stringent than technology-based limits when necessary to meet water quality standards. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as cold water aquatic life, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

Idaho Water Quality Standards

At the point of discharge, the Spokane River is protected for the following designated uses (IDAPA 58.01.02.110.12):

- cold water aquatic life habitat
- salmonid spawning
- primary contact recreation
- domestic water supply

In addition, the Idaho Water Quality Standards state that all waters of the State of Idaho are protected for industrial and agricultural water supply (Section 100.03.b and c.), wildlife habitats (100.04) and aesthetics (100.05).

Primary contact recreation is defined by the Idaho Water Quality Standards as "water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to swimming, water skiing, or skin diving."

The Spokane River also has site-specific criteria for ammonia (IDAPA 58.01.02.283). The site-specific ammonia criteria are identical to the statewide ammonia criteria for waters designated for cold water aquatic life when early life stages of fish are present (IDAPA 58.01.02.250.02.d.).

Idaho's Antidegradation Policy

The EPA is required under Section 301(b)(1)(C) of the Clean Water Act (CWA) and implementing regulations (40 CFR 122.4(d) and 122.44(d)) to establish conditions in NPDES permits that ensure compliance with State water quality standards, including antidegradation requirements. The antidegradation analysis is conducted as part of the State's CWA Section 401 certification (see Appendix H).

Washington Water Quality Standards

The City of Post Falls water reclamation facility outfall is located approximately 4.5 river miles upstream from the Washington border. Federal regulations require that NPDES permits include conditions necessary to ensure compliance with the water quality requirements of all affected States (40 CFR 122.4(d), 40 CFR 122.44(d)(4), see also CWA Section 401(a)(2)). Therefore it is necessary to determine if the discharge has the reasonable potential to cause or contribute to excursions above Washington's water quality standards, in addition to Idaho's water quality standards. If the discharge has the reasonable potential to cause or contribute to excursions above Washington's water quality standards, effluent limits must be established, which ensure compliance with Washington's water quality standards, in addition to Idaho's water quality standards. The EPA has determined that the discharge has the reasonable potential to cause or contribute to excursions above Washington's water quality standards for dissolved oxygen. See Appendix B for a complete discussion of the effluent limits based upon Washington's water quality standards.

C. Water Quality Limited Segment

A water quality limited segment is any waterbody, or definable portion of a waterbody, where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards. In accordance with section 303(d) of the Clean Water Act, States must identify waters not achieving water quality standards in spite of the application of technology-based controls in National Pollutant Discharge Elimination System (NPDES) permits for point sources. Such waterbodies are known as water quality limited segments (WQLSs), and the list of such waterbodies is called the "303(d) list." Once a water body is identified as a WQLS, the States are required under the Clean Water Act to develop a total maximum daily load (TMDL). A TMDL is a determination of the amount of a pollutant, or property of a pollutant, from point, nonpoint, and natural background sources (including a

margin of safety) that may be discharged to a water body without causing the water body to exceed the water quality criterion for that pollutant. The Spokane River flows through Idaho and Washington, and various segments of the river are water quality limited in both States.

Total Phosphorus (Idaho)

The Spokane River is listed in Idaho's 2010 303(d)/305(b) integrated report as not attaining or not being expected to attain water quality standards for total phosphorus. As explained in Appendix B, the water quality-based effluent limits for total phosphorus in the draft permit will ensure compliance with Idaho's narrative water quality criterion for nutrients (IDAPA 58.01.02.200.06).

Cadmium, Lead and Zinc (Idaho)

The segment of the Spokane River to which the City of Post Falls discharges was listed in Idaho's 1998 303(d) list as not attaining or not expected to meet State water quality standards for cadmium, lead, and zinc. In August of 2000, the EPA approved a TMDL submitted by the State of Idaho for metals in the Coeur d'Alene River Basin, which included this segment of the Spokane River. However, in 2003, the Idaho Supreme Court determined that the TMDL was invalid. Therefore, the Spokane River remains listed in the 2010 303(d)/305(b) integrated report as being impaired for cadmium, lead, and zinc.

Even though the Idaho Supreme Court invalidated the Coeur d'Alene River Basin TMDL under State law, the EPA must nonetheless evaluate whether water quality-based effluent limits are necessary for cadmium, lead, and zinc under CWA regulations at 40 CFR 122.44(d)(1)(i – iii), and assure that any such effluent limits are derived from and comply with applicable water quality standards (40 CFR 122.44(d)(1)(vii)(A)). Furthermore, NPDES permits issued by the EPA must incorporate the requirements specified in a CWA Section 401 certification (40 CFR 122.44(d)(3), 124.53(e), 124.55(a)(2)).

The 1999 permit included effluent limits for lead and zinc. The EPA has determined that the concentration effluent limits for lead and zinc in the 1999 permit are stringent enough to ensure compliance with water quality criteria, with no mixing zone (i.e., without considering dilution). Therefore, the EPA has maintained the prior permit's concentration limits for these parameters under the anti-backsliding provisions of the Clean Water Act.

In its draft CWA Section 401 certification, the State of Idaho specified effluent limits for cadmium. The certification states that these limits are necessary to ensure compliance with IDAPA 58.01.02.055.04. Because the State of Idaho's 2010 integrated report lists the Spokane River as a high priority for TMDL development, IDAPA 58.01.02.055.04 requires that the loading of pollutants causing water quality impairments remains constant or decreases within the watershed. The limits specified by the State of Idaho will ensure that the City's loading of cadmium remains constant or decreases. NPDES permits issued by the EPA must incorporate the requirements specified in a CWA Section 401 certification (40 CFR 122.44(d)(3), 124.53(e), 124.55(a)(2)). Therefore, the draft permit includes the cadmium limits specified in the draft CWA Section 401 certification. The draft CWA Section 401 certification also states that the loading limits for lead and zinc must be at least as stringent as those in the 1999 permit (even though the design flow of the POTW has increased) in order to ensure compliance with IDAPA

58.01.02.055.04. The effluent loading limits for cadmium, lead and zinc that are based on the draft CWA Section 401 certification are stated in the draft permit in Table 3.

The draft CWA Section 401 certification states that the City may increase its effluent load of cadmium, lead and zinc in excess of the effluent limits that are specified in the certification (in Table 3 of the draft permit) if, prior to the discharge of an increased load, an offset plan is developed by the City and approved by IDEQ. Therefore, the draft permit includes a provision allowing the City to demonstrate compliance with the cadmium, lead and zinc loading limits by subtracting the amount of loading specified in an IDEQ-approved offset plan when reporting their loading on their DMRs.

Even if the draft CWA Section 401 certification had not specified effluent limits for cadmium, lead, or zinc, the discharge nonetheless has the reasonable potential to cause or contribute to excursions above water quality standards for lead and zinc, and thus the CWA and federal regulations independently require effluent limits for lead and zinc (40 CFR 122.44(d)(1)(i – iii)). Because, under federal regulations, effluent limits must be calculated based on the current design flow of the POTW (40 CFR 122.45(b)(1)), the loading limits for lead and zinc that are based on the CWA and federal regulations (as opposed to the State of Idaho's CWA Section 401 certification) are less stringent than those based on the CWA Section 401 certification.

The effluent loading (i.e. lb/day) limits for lead and zinc that are based on the CWA and federal regulations are stated in the draft permit in Table 4. If any approved offset plan for the lead and zinc limits in Table 3 effectively results in loading limits less stringent than the lead and zinc limits in Table 4, then the limits in Table 4 are the loading limits that the permittee must meet. In other words, the permittee must comply with the effluent limits for lead and zinc in Table 4 at the point of discharge, regardless of any offset plan. Because the discharge does not have the reasonable potential to cause or contribute to excursions above water quality standards for cadmium, the CWA and federal regulations would not independently require effluent limits for cadmium, and there are no effluent limits for cadmium in Table 4 of the draft permit.

The EPA is specifically requesting comments on the effluent loading (i.e., lb/day) limits for cadmium, lead, and zinc. A more detailed discussion of the effluent limits for cadmium, lead, and zinc is provided in Appendix C.

Temperature (Idaho)

The fact sheet dated February 16, 2007 stated that the Spokane River was listed in Idaho's 2002/2004 303(d)/305(b) integrated report as being impaired for temperature. The Spokane River is not listed for temperature in Idaho's 2010 integrated report. The 1999 permit did not include effluent limits for temperature. When developing the 2007 draft permit, the EPA determined that the discharge did not have the reasonable potential to cause or contribute to excursions above water quality standards for temperature, and no temperature effluent limits were proposed in the 2007 draft permit. In developing the revised draft permit, the EPA re-evaluated the need for effluent limits for temperature and has once again determined that the discharge does not have the reasonable potential to cause or contribute to excursions above water quality standards for temperature; therefore, no effluent limits are proposed for temperature in the revised draft permit.

The finding that the discharge does not have the reasonable potential to cause or contribute to excursions above Idaho's water quality standards for temperature has not changed since the 2007

draft permit was issued for public review and is not one of the substantial new questions that caused the reopening of the comment period.

Dissolved Oxygen (Washington)

In the fact sheets dated February 16, 2007 for the Cities of Coeur d'Alene and Post Falls and the Hayden Area Regional Sewer Board (HARSB), the EPA made a finding that the discharges of oxygen-demanding pollution from those sources have the reasonable potential to cause or contribute to excursions below Washington's water quality criterion for dissolved oxygen in Lake Spokane. The draft permits issued for public review and comment in February 2007 therefore included water quality-based effluent limits for phosphorus, $CBOD_5$, and ammonia, which were intended to ensure compliance with Washington's water quality criterion for dissolved oxygen in lakes and reservoirs, as required by federal regulations (40 CFR 122.4(d)). The "reasonable potential" finding (which determines whether or not water quality-based effluent limits based upon Washington water quality standards are necessary for oxygen-demanding pollutants, see 40 CFR 122.44(d)(1)(i – iii)) remains valid.

However, comments received during the public comment period regarding the calculation of phosphorus, ammonia, and $CBOD_5$ limits led the EPA to re-evaluate the effluent limits for these parameters. Commenters stated that the effluent limits should be calculated based on the cumulative dissolved oxygen impact of all human actions. Furthermore, in February 2008, after the close of the initial public comment period, EPA approved revisions to Washington's water quality standards, which made those revised standards effective for Clean Water Act purposes, including NPDES permits (40 CFR 131.21). Among the changes to Washington's water quality standards was a change to the water quality criterion for dissolved oxygen (DO) in lakes and reservoirs. At the time of the initial public comment period in 2007, the water quality criterion for DO in lakes and reservoirs that was in effect for Clean Water Act purposes read "no measurable decrease from natural conditions" (WAC 173-201A-030(5)(c)(ii), 1997). The revised standard reads "for lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions" (WAC 173-201A-200(1)(d)(ii), 2006). The significant differences between the old and current criteria are that the allowable amount of DO decrease relative to the natural condition is now numeric (0.2 mg/L) instead of a narrative statement ("no measurable decrease"), and the current criterion states that this allowable DO decrease is based on the cumulative impact of human actions.

In addition, the State of Washington has prepared and the EPA has approved the *Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load: Water Quality Improvement Report*, dated February 2010 and hereinafter referred to as the Spokane DO TMDL. In the Spokane DO TMDL, the State of Washington made specific assumptions about the amounts of oxygen-demanding pollution that will be discharged by sources in Idaho.

In light of the comments received during the initial comment period, the changes to the Washington water quality standards, and the availability of the Spokane DO TMDL, the EPA has determined that the effluent limits for phosphorus, ammonia and $CBOD_5$ proposed in the 2007 draft permit should be changed in order to ensure compliance with Washington's dissolved oxygen criterion for lakes and reservoirs.

Therefore, the EPA has proposed revised water quality-based effluent limitations for phosphorus, ammonia, and five-day carbonaceous biochemical oxygen demand in the City of Post Falls draft

permit. These effluent limits ensure that the level of water quality to be achieved by limits on point sources is derived from and complies with all applicable water quality standards (40 CFR 122.44(d)(1)(vii)(A)). The effluent limits are based on the cumulative impact of all human actions that affect dissolved oxygen concentrations in Lake Spokane. See Appendix B for a complete explanation of the water quality-based phosphorus, ammonia, and $CBOD_5$ effluent limits in the draft permit, that are based on Washington water quality standards for dissolved oxygen. The EPA is specifically requesting public comments on the revised water quality-based effluent limits in the draft permit for total phosphorus, $CBOD_5$ and ammonia, which are derived from Washington's water quality standards.

Metals (Washington)

The segment of the Spokane River immediately downstream from the State line is listed in Washington's 2008 303(d)/305(b) integrated report for cadmium, lead, and zinc. The listing category for these metals is 4A, which means that a TMDL has been prepared for these pollutants. The *Spokane River Dissolved Metals Total Maximum Daily Load* (Butkus and Merrill, 1999) was approved by the EPA on August 25, 1999.

As stated in the fact sheet dated February 16, 2007, the EPA has determined that the City's discharge does not have the reasonable potential to cause or contribute to excursions above Washington's water quality standards for cadmium, lead or zinc. The finding that the discharge does not have the reasonable potential to cause or contribute to excursions above Washington's water quality standards for cadmium, lead, or zinc has not changed since the 2007 draft permit was issued for public review and is not one of the substantial new questions that caused the reopening of the comment period.

Temperature (Washington)

The segment of the Spokane River immediately downstream from the State line is listed in Washington's 2008 303(d)/305(b) integrated report as not attaining or not being expected to attain water quality standards for temperature. As explained in Appendix B, the EPA has determined that the discharges from Idaho point sources do not have the reasonable potential to cause or contribute to excursions above Washington's water quality standards for temperature in the Spokane River.

The finding that the discharge does not have the reasonable potential to cause or contribute to excursions above Washington's water quality standards for temperature has not changed since the 2007 draft permit was issued for public review and is not one of the substantial new questions that caused the reopening of the comment period.

Total Polychlorinated Biphenyls and Dioxin (Washington)

The Spokane River is listed in Washington's 2008 303(d)/305(b) integrated report as not attaining or not being expected to attain water quality standards for total polychlorinated biphenyls (PCBs), due to elevated concentrations in fish tissue. The Spokane Tribe of Indians has EPA-approved water quality standards for its waters, which are downstream of the Long Lake Dam, and data from lower Lake Spokane indicate that the Tribe's water quality criterion for PCBs (in the water column) is not being attained (Serdar et al. 2011). The Spokane River is also listed in Washington's 2008 303(d)/305(b) integrated report as not attaining or not being

expected to attain water quality standards for 2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD), due to elevated concentrations in fish tissue.

Currently, there are insufficient data to determine if the discharges from point sources to the Spokane River in Idaho have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters of the State of Washington or the Spokane Tribe of Indians. There are also insufficient data to determine if the discharges from point sources to the Spokane River in Idaho have the reasonable potential to cause or contribute to excursions above water quality standards for 2,3,7,8 TCDD. Therefore, no numeric water quality-based effluent limits are proposed for PCBs or 2,3,7,8 TCDD in the draft permit.

The draft permits for the Cities of Post Falls and Coeur d'Alene and HARSB propose influent, effluent and surface water column monitoring for PCBs. These data will be used to determine if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters of the State of Idaho, the State of Washington or the Spokane Tribe of Indians. Monitoring requirements for PCBs are discussed in more detail in Section VI.D below.

The permits propose quarterly influent and effluent monitoring for 2,3,7,8 TCDD. The permits do not propose surface water monitoring for 2,3,7,8 TCDD because the detection limit of EPA Method 1613B (4.4 picograms per liter) is much greater than the water quality criterion for 2,3,7,8 TCDD that is currently in effect for Clean Water Act purposes in Idaho (0.013 picograms per liter) (EPA 1994). Thus, surface water monitoring for 2,3,7,8 TCDD using Method 1613B would be unlikely to yield meaningful data.

The NPDES permits for municipal separate storm sewer systems that discharge pollutants to the Spokane River in Idaho also include monitoring requirements for PCBs.

The average total PCB concentration at the Washington – Idaho border is 106 picograms per liter (pg/L) (Serdar et al. 2011). This concentration is 38% less than Washington's and Idaho's water quality criteria for total PCBs (170 pg/L) that are in effect under the CWA.[1] The Spokane Tribe's water quality criterion for PCBs is 3.37 pg/L. Furthermore, in 1999, the USGS performed sampling of fish tissue in Idaho at station #12419000 (Spokane River near Post Falls, Idaho). The concentration of PCBs measured in fish collected from this station was 270 µg/kg (USGS 2003). The 170 pg/L Clean Water Act effective water column criterion for PCBs in Idaho and Washington corresponds to a fish tissue concentration of 5.3 µg/kg.[2,3] Since the measured fish tissue concentration is greater than the fish tissue concentration that corresponds to the water column criterion, the measured fish tissue concentration indicates elevated levels of PCBs.

PCBs have been detected in effluent from POTWs discharging to the Spokane River in the State of Washington (i.e., the City of Spokane and the Liberty Lake Sewer and Water District) as well

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[1] Idaho's PCB water quality criterion that is in effect under State law is 64 pg/L. However, the EPA has disapproved this criterion and therefore it is not in effect for Clean Water Act purposes. (See 40 CFR 131.21(c)(2))

[2] The PCB water quality criterion that is in effect under State law in Idaho is equivalent to a fish tissue concentration of 2.0 µg/kg.

[3] The bioconcentration factor (BCF) is the ratio of a substance's concentration in tissue versus its concentration in water, in situations where the food chain is not exposed or contaminated. For non-metabolized substances, it represents equilibrium partitioning between water and organisms. The BCF for PCBs is 31,200 L/kg (EPA 2002). Multiplying the BCF by the water column criterion yields the equivalent fish tissue concentration.

as other POTWs in Washington State operated by the Cities of Medical Lake, Okanogan, College Place, Walla Walla, Pullman, Colfax, Albion, Bremerton, Tacoma, and Everett, and King and Pierce counties. Effluent concentrations of total PCBs at these 14 facilities (a total of 34 samples) ranged from 46.6 to 39,785 pg/L with a median concentration of 810 pg/L, and 82% of the results (28 out of 34) were greater than Idaho's and Washington's Clean Water Act effective water quality criterion of 170 pg/L (Coots and Deligeannis 2010; Ecology 2010; Johnson et al. 2004; Serdar 2003; Serdar et al. 2011; personal communication with Richard Koch, Ecology, September 8, 2011). Design flows of these POTWs range from 0.54 mgd (Okanogan) to 215 mgd (King County West Point). PCBs were also detected in 96% of samples (69 out of 72) of effluents collected from 18 POTWs discharging to the Yakima River in central Washington State in 2007 and 2008. The median effluent concentration of total PCBs at these 18 POTWs was 370 pg/L and the maximum concentration was 7,400 pg/L; 82% of the samples (59 out of 72) exceeded Washington's water quality criterion of 170 pg/L (Johnson et al. 2010).

The fact that the average concentration of PCBs at the State line is more than half the value of the water quality criterion that is in effect under the Clean Water Act in Washington and Idaho and that high concentrations of PCBs have been measured in fish tissue in the Spokane River in Idaho, in addition to the frequent detection of PCBs at concentrations above water quality criteria in other POTWs as described above, suggests that pollution sources in Idaho may be contributing to exceedances of water quality criteria for PCBs.

Moreover, 2,3,7,8 TCDD has been detected in the effluent from the City of Medical Lake wastewater treatment plant (1.85 mgd design flow) in Washington State at a concentration of 0.56 pg/L, which is 43 times the criterion that is in effect for Clean Water Act purposes in both Idaho and Washington, which is 0.013 pg/L (Coots and Deligeannis 2010).[4] According to data obtained from the EPA's Envirofacts database, 2,3,7,8 TCDD has also been detected in the effluents from seven POTWs in Arizona, California and Florida. The median concentration of 2,3,7,8 TCDD among 36 samples from those seven POTWs was 1.05 pg/L, which is 81 times the criterion (Nickel 2011). Design flows of the Arizona, California, and Florida POTWs with 2,3,7,8 TCDD effluent data range from 2.2 to 37 mgd.

Studies in the 1990s found mixtures of dioxins and furans in POTW effluents of 0.27 to 0.81 toxicity equivalents (TEQ)[5] (EPA 2006). Potential sources of dioxins and furans in POTW discharges include laundry wastewater, particularly from clothing dyes and pigments containing dioxins and furans and from cotton treated with pentachlorophenol (which is used in some developing countries), runoff from streets with high traffic density, and industrial sources such as metal manufacturing (EPA 2006). This information suggests that point sources in Idaho may also be contributing to excursions above water quality standards for 2,3,7,8 TCDD in waters of the State of Washington.

Therefore, although it is not known at this time which specific sources contribute PCBs or 2,3,7,8 TCDD to the Spokane River in Idaho, the EPA believes that, similar to POTWs in the State of Washington and elsewhere, the Idaho POTWs may be discharging PCBs and 2,3,7,8 TCDD, and that best management practices (BMP) requirements to control or abate the

[4] Idaho's 2,3,7,8 TCDD water quality criterion that is in effect under State law is 0.005 pg/L. However, the EPA has disapproved this criterion and therefore it is not in effect for Clean Water Act purposes. (See 40 CFR 131.21(c)(2))
[5] The TEQ procedure translates the complex mixture of dioxins and furans characteristic of environmental releases into an equivalent toxicity concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), the most toxic member of this class of compounds.

discharge of PCBs and 2,3,7,8 TCDD are reasonably necessary to carry out the purposes and intent of the Clean Water Act. Due to the lack of data, it is infeasible to calculate numeric water quality-based effluent limits for PCBs and 2,3,7,8 TCDD at this time. Therefore, the draft permit includes BMP requirements for PCBs and 2,3,7,8 TCDD, consistent with 40 CFR 122.44(k)(3) and (4). The BMP requirements are in Part II.I of the draft permit.

The draft permit also requires the City to participate in the Spokane River Regional Toxics Task Force (SRRTTF). See the draft permit at Part II.H.

The EPA is specifically requesting comments on the monitoring and BMP requirements for PCBs and 2,3,7,8 TCDD and the requirement to participate in the SRRTTF.

IV. Effluent Limitations

A. Basis for Effluent Limitations

In general, the Clean Water Act (Act) requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards of a waterbody are being met and may be more stringent than technology-based effluent limits. The bases for the proposed effluent limits in the draft permit are provided in Appendices B, C, D, E, F, and G.

B. Proposed Effluent Limitations

Below are the proposed effluent limits that are in the draft permit (see Part I.B).

1. Removal Requirements for $CBOD_5$ and TSS: The monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration. Percent removal of $CBOD_5$ and TSS must be reported on the Discharge Monitoring Reports (DMRs). For each parameter, the monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.
2. The permittee must not discharge floating, suspended or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.

Table 2 (below) presents the proposed final seasonal average, average monthly, average weekly, maximum daily, and instantaneous maximum effluent limits. Limits that are different from those in the 2007 draft permit are shown in italic type. The EPA is specifically requesting public comments on all of these revised effluent limits.

Table 2: Proposed Final Effluent Limits				
Parameter	**Units**	**Effluent Limits**		
		Average Monthly Limit	**Avg. Weekly Limit**	**Max. Daily Limit**
Five-Day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) November – January	mg/L	25	40	—
	lb/day	*1043*	*1668*	—
	% removal	85% (min.)	—	—
$CBOD_5$ February – October	mg/L	*25*	*40*	—
	lb/day	*Seasonal Average Limit: 255 lb/day*		
	% removal	85% (min.)	—	—
Total Suspended Solids (TSS)	mg/L	30	45	—
	lb/day	*1251*	*1877*	—
	% removal	85% (min.)	—	—
pH (October – June)	s.u.	*6.3 – 9.0*		
pH (July – September)	s.u.	*6.4 – 9.0*		
Total Phosphorus as P^2 (Feb. – Oct.)	lb/day	*Seasonal Average Limit: 3.19 lb/day*		
E. Coli Bacteria	#/100 ml	126 (geo. mean)	—	406 (single sample max.)
Total Residual Chlorine (July – September if chlorine is used for disinfection or elsewhere in the treatment process)	µg/L	*127*	—	*294*
	lb/day	*5.30*	—	*13.6*
Total Residual Chlorine (October – June if chlorine is used for disinfection or elsewhere in the treatment process)	µg/L	*244*	—	*565*
	lb/day	*10.2*	—	*23.6*
Total Residual Chlorine (If chlorine is not used for disinfection or elsewhere in the treatment process)	*No monitoring or reporting required.*			
Total Ammonia as N (February – October)	lb/day	*Seasonal Average Limit: 255 lb/day*		
Total Ammonia as N (July – September)	mg/L	8.2	—	29.5
	lb/day	*342*	—	*1230*
Total Ammonia as N (November – February)	mg/L	25.4	—	91.7
	lb/day	*1059*	—	*3824*
Cadmium (Based on the State of Idaho's draft CWA Section 401 certification. See the draft permit at Table 3.)	lb/day	*0.0078*	*0.011*	—
Cadmium (Based on the CWA and federal regulations. See the draft permit at Table 4.)	lb/day	—	—	—
Copper (July – September)	µg/L	13.8	—	27.7
	lb/day	*0.58*	—	*1.16*
Lead (Concentration)	µg/L	2.05	—	3.79
Lead (Load based on the State of Idaho's draft CWA Section 401 certification. See the draft permit at Table 3.)	lb/day	*0.059*	—	*0.110*
Lead (Load based on the CWA and federal regulations. See the draft permit at Table 4.)	lb/day	*0.0855*	—	*0.158*
Zinc (Concentration)	µg/L	84.3	—	115

Table 2: Proposed Final Effluent Limits				
Parameter	**Units**	**Effluent Limits**		
		Average Monthly Limit	**Avg. Weekly Limit**	**Max. Daily Limit**
Zinc (Load based on the State of Idaho's draft CWA Section 401 certification. See the draft permit at Table 3.)	lb/day	*2.45*	—	*3.34*
Zinc (Load based on the CWA and federal regulations. See the draft permit at Table 4.)	lb/day	*3.52*	—	*4.80*

Notes:
1. No single sample may exceed 406 organisms per 100 ml (instantaneous maximum limit).
2. These effluent limits are subject to a compliance schedule. Until the final effluent limits become effective, the permittee must comply with interim effluent limitations (see Table 3, below).
3. The monthly geometric mean concentration of E. coli must not exceed 126 organisms per 100 ml.

C. Schedules of Compliance

Schedules of compliance are authorized by federal NPDES regulations at 40 CFR 122.47 and by Section 400.03 of the Idaho Water Quality Standards. The Idaho water quality standards allow for compliance schedules "when new limitations are in the permit for the first time." The federal regulation allows schedules of compliance "when appropriate," and requires that such schedules require compliance as soon as possible. When the compliance schedule is longer than 1 year, federal regulations require that the schedule shall set forth interim requirements and the dates for their achievement. The time between the interim dates shall generally not exceed 1 year, and when the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress toward completion of these interim requirements. Federal regulations also generally require that interim effluent limits be at least as stringent as the final limits in the previous permit (40 CFR 122.44(l)(1)).

EPA policy states that, in order to grant a compliance schedule, a permitting authority must make a reasonable finding that the permittee cannot comply with the effluent limit immediately upon the effective date of the final permit (see memorandum from Jim Hanlon to Alexis Strauss, May 10, 2007). Some of the proposed effluent limits for phosphorus, $CBOD_5$, ammonia, chlorine, and cadmium are new limits that are in the permit for the first time. However, the EPA has determined that the permittee can, in fact, comply with all of these effluent limits, except phosphorus, immediately upon the effective date of the final permit, as explained in Appendix G.

Therefore, a compliance schedule is proposed only for phosphorus. The compliance schedule includes interim effluent limitations, as shown in Table 3, below. The interim phosphorus limits retain the 70% removal effluent limit from the 1999 permit, in order to ensure compliance with 40 CFR 122.44(l)(1), which requires that interim effluent limits in a reissued permit generally be as stringent as the final limits in the previous permit. In order to ensure compliance with 40 CFR 122.45(f), which requires that effluent limits are expressed in terms of mass, the EPA has calculated interim mass effluent limits for phosphorus, which apply in addition to the removal rate limits. The interim monthly average mass limit is equal to the mass loading of phosphorus that the permittee could have discharged while maintaining compliance with the removal rate effluent limit in the 1999 permit. In order to ensure compliance with 40 CFR 122.45(d)(2), which requires that effluent limits for POTWs shall be expressed as average weekly and average monthly discharge limitations, the EPA has included an interim average weekly mass limit for

phosphorus, which is equal to the average monthly limit multiplied by 1.6. This accounts for effluent variability within a month.

The compliance schedules are based on the draft Clean Water Act Section 401 certification provided to the EPA by the Idaho Department of Environmental Quality. The final permit will contain compliance schedules consistent with the State of Idaho's final Clean Water Act Section 401 certification, which may differ from the draft certification. The EPA believes that the compliance schedule proposed for phosphorus complies with the regulatory requirement that compliance be achieved "as soon as possible" (40 CFR 122.47(a)(1)), as explained in Appendix G.

Because the compliance schedules are authorized by the State of Idaho in the Section 401 certification, comments on the compliance schedules should be directed to the Idaho Department of Environmental Quality at the address listed on the front page of this Fact Sheet and in the public notice of the availability of this draft permit, in addition to the EPA.

Table 3: Interim Effluent Limits

Parameter	Units	Effluent Limits	
		Average Monthly Limit	Average Weekly Limit
Total Phosphorus as P February – October	lb/day	68.5	110
	% rem.	70% (min.)	—

D. Deletion of Total Residual Chlorine Compliance Evaluation Level

The 2007 draft permit contained a compliance evaluation level of 100 µg/L (0.1 mg/L) for total residual chlorine. This compliance evaluation level was based on the minimum level (ML) of chlorine analytical methods that are no longer approved for use in NPDES permitting (see 40 CFR 136). In the revised draft permit, the proposed effluent limits for total residual chlorine are greater than the concentrations that can be quantified using approved analytical methods for chlorine. Therefore, the compliance evaluation level has been deleted.

E. Basis for Substitution of Different Pollutant Parameters for 1999 Effluent Limits

The draft permit proposes effluent limits for E. coli in lieu of the 1999 permit's fecal coliform limits and also proposes $CBOD_5$ limits in lieu of BOD_5 limits. The bases for these changes are explained in the fact sheet dated February 16, 2007. The proposed substitutions of E. coli for the 1999 permit's fecal coliform limits and $CBOD_5$ for the 1999 permit's BOD_5 limits are unchanged from the draft permit issued for public review in 2007 and are not among the substantial new questions that caused the EPA to reopen the public comment period and is included here for the purpose of providing background context. Therefore, the EPA is not requesting comments on the E. coli limits at this time. However, because the magnitude of the $CBOD_5$ limits has changed relative to the 2007 draft permit, the EPA is requesting comments on the $CBOD_5$ effluent limits.

F. Basis for Less-Stringent Mass Limits for TSS, Copper and Winter $CBOD_5$ and Ammonia

The increase in the mass limits for $CBOD_5$ (for November – January) and TSS are not subject to the anti-backsliding provisions of the Act (Section 402(o)(1)), because these technology-based limits are based on the "secondary treatment" requirement of Sections 301(b)(1)(B) and 304(d)(1) of the Act. The anti-backsliding provisions of the Clean Water Act apply to effluent limits established based on Sections 301(b)(1)(C), 303(d) or (e), or 402(a)(1)(B) (i.e., water quality based effluent limits and effluent limits based on best professional judgment). Effluent limits for POTWs must be calculated based on the design flow of the POTW (40 CFR 122.45(b)(1)) and the design flow of the POTW has increased from 3.48 mgd to 5.0 mgd since the time the prior permit was issued (1999). The increased mass limits for TSS and winter $CBOD_5$ ensure compliance with the State of Idaho's antidegradation policy. The EPA is specifically requesting comments on the revised mass limits for winter $CBOD_5$ and for TSS.

Similarly, the EPA has revised the mass limits for copper and the winter mass limits (November – January) for ammonia. These effluent limits were water quality-based effluent limits. Therefore, unlike the TSS and $CBOD_5$ limits discussed above, they are subject to the anti-backsliding provisions of the Clean Water Act. However, an exception is applicable in this case.

As explained in Appendix C, the EPA has determined that the prior permit's concentration limits for copper and winter ammonia are stringent enough to ensure compliance with water quality standards for these parameters, even though the design flow of the POTW has increased from 3.48 mgd to 5.0 mgd. The increased design flow of the POTW is a material and substantial alteration or addition to the facility, which provides an exception to the general prohibition on backsliding in the Clean Water Act (Section 402(o)(2)(A)). Effluent limits for POTWs must be calculated based on the design flow of the POTW (40 CFR 122.45(b)(1)) and the design flow of the POTW has increased from 3.48 mgd to 5.0 mgd since the time the prior permit was issued (1999). Therefore, the mass limits for copper and winter ammonia have been re-calculated based on the increased design flow of the POTW.

G. Basis for Less-Stringent Effluent Limits for Total Residual Chlorine

At the time the 1999 permit was issued, the Post Falls facility used chlorine for disinfection. The facility now uses ultraviolet disinfection, but retains the ability to disinfect with chlorine as a backup. The switch from chlorine to ultraviolet disinfection is a material and substantial alteration or addition to the facility, which provides an exception to the general prohibition on backsliding in the Clean Water Act (Section 402(o)(2)(A)).

Although the Post Falls facility uses ultraviolet disinfection, the City has continued to monitor the effluent for chlorine. The effluent data indicate that the facility has the reasonable potential to cause or contribute to excursions above water quality standards for chlorine when the facility uses chlorine for disinfection or elsewhere in the treatment process. Therefore, the draft permit proposes water quality-based effluent limits for chlorine, under these circumstances.

Effluent data indicate that the facility does not have the reasonable potential to cause or contribute to excursions above water quality standards for chlorine if chlorine is not used in the treatment process. Therefore, no effluent limits or monitoring requirements are proposed for total residual chlorine when chlorine is not used in the treatment process.

The concentration and mass limits are less stringent than those in the prior permit. The effluent limits have been recalculated based on current water quality criteria, the authorized mixing zone, and the variability of the effluent concentrations observed when chlorine is used in the treatment process. As explained above, the switch from chlorine to ultraviolet disinfection and the increased design flow of the POTW are material and substantial alterations or additions to the permitted facility, which provide an exception to the general prohibition on backsliding in the Clean Water Act (Section 402(o)(2)(A)).

The EPA is specifically requesting comments on the changes to the effluent limitations for chlorine.

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and the federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) or on the application for renewal, as appropriate, to the EPA.

B. Effluent Monitoring

In general, the basis for the effluent monitoring requirements in the draft permit was explained in the fact sheet dated February 16, 2007. Some changes to the effluent monitoring requirements are proposed, as explained below. The proposed effluent monitoring requirements are shown in Table 4, below.

Whole Effluent Toxicity

The whole effluent toxicity (WET) testing requirements have been expanded to include a requirement to prepare an initial investigation toxicity reduction evaluation (TRE) plan, a requirement to conduct accelerated testing in the event of an excursion above a trigger value (which is based on the dilution of the effluent in the receiving water at the edge of the authorized mixing zone) and a requirement to conduct a TRE if an additional excursion above the trigger occurs during accelerated testing. These requirements are consistent with the recommendations of the EPA *Regions 9 and 10 Guidance for Implementing Whole Effluent Toxicity Testing Programs* (EPA 1996b). These requirements were included in the 1999 permit, but were omitted from the 2007 draft permit.

In addition, the revised draft permit proposes a semi-annual (twice per year) monitoring frequency for WET, which is the same as the 1999 permit. The 2007 draft permit had proposed annual (once per year) monitoring for WET, however, there is no basis to reduce the WET monitoring frequency relative to the 1999 permit. Finally, in the draft permit, the EPA is proposing to require the permittee to use three organisms for toxicity testing (a fish, an invertebrate, and a plant), consistent with the recommendations of the *Regions 9 and 10 Guidance for Implementing Whole Effluent Toxicity Testing Programs* (Page 2-18) and the

Technical Support Document for Water Quality-based Toxics Control (Section 3.3.3). The 2007 draft permit only required testing of a fish and an invertebrate.

The EPA is specifically requesting public comment on the revised WET testing requirements.

Total Residual Chlorine

In the 2007 draft permit, the EPA had proposed to reduce the monitoring frequency for total residual chlorine from twice per day in the 1999 permit to once per month. As stated in the 2007 fact sheet (Page 20), this was done because the permittee generally does not use chlorine for disinfection.

However, as explained above, under the heading "Basis for Less-Stringent Effluent Limits for Total Residual Chlorine," the EPA has determined that effluent limits and monitoring requirements for chlorine should be conditional, based on whether or not the facility uses chlorine in the treatment process. Effluent monitoring for total residual chlorine is not required when chlorine is not used in the treatment process.

When chlorine is used in the treatment process, effluent limits are proposed in the draft permit, and monitoring is required. The EPA has adapted the *Interim Guidance for Performance - Based Reductions of NPDES Permit Monitoring Frequencies* (interim monitoring reduction guidance) to determine the appropriate monitoring frequency. The required sampling frequency for total residual chlorine, in the prior permit, was twice per day. The interim monitoring reduction guidance does not provide recommended reduced monitoring frequencies for a baseline frequency of twice per day, so the EPA has adapted the recommendations for a baseline monitoring frequency of twice per week to the daily monitoring frequency. The average effluent concentration of total residual chlorine, at times when the facility uses chlorine in the treatment process, is 91 µg/L, which is 72% of the proposed average monthly effluent limit for July – September, and 37% of the proposed average monthly effluent limit for October – June. If the prior permit's required monitoring frequency had been twice per week, the ratio for the July – September effluent limit would not support a reduction in the monitoring frequency. However, the October – June ratio would support a reduction.

Therefore, at times when chlorine is used in the treatment process, the EPA proposes a monitoring frequency for chlorine of twice per day for July – September (the same as the prior permit), and once per day for October – June. The EPA is specifically requesting comments on the revised monitoring requirements for chlorine.

Permit Application Monitoring

The draft permit proposes to require all of the monitoring that would be necessary to produce a complete application for renewal of this permit. Effluent monitoring required by Part B.6 of application form 2A (which is required of all facilities with a design flow greater than or equal to 0.1 mgd) is required at a frequency of quarterly for oil and grease and total dissolved solids, and monthly for nitrogen and phosphorus species that are not subject to effluent limits. More frequent monitoring is required for nitrogen and phosphorus species because these are nutrients, and nutrients are known to contribute to water quality impairments in this watershed (i.e., for dissolved oxygen in the State of Washington and total phosphorus in the State of Idaho).

Effluent monitoring required by Part D of application form 2A, which is not required by other provisions of this permit, is required at the minimum frequency required by the application (three samples over the term of the permit).

Table 4: Effluent Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	Continuous	Recording
$CBOD_5$ November – January	mg/L	Influent and Effluent	1/week	24-hour composite
	lbs/day	Influent and Effluent		calculation[1]
	% Removal	—	1/month	calculation[2]
$CBOD_5$ February – October	mg/L	Influent and Effluent	3/week	24-hour composite
	lbs/day	Influent and Effluent		calculation[1]
	% Removal	—	1/month	calculation[2]
TSS	mg/L	Influent and Effluent	1/week	24-hour composite
	lbs/day	Influent and Effluent		calculation[1]
	% Removal	—	1/month	calculation[2]
pH	standard units	Effluent	5/week	grab
E. Coli Bacteria	#/100 ml	Effluent	5/month	grab
Total Residual Chlorine (July – September if chlorine is used for disinfection or elsewhere in the treatment process)	µg/L	Effluent	2/day	grab
	lb/day			calculation
Total Residual Chlorine (October – June if chlorine is used for disinfection or elsewhere in the treatment process)	µg/L	Effluent	1/day	grab
	lb/day			calculation
Total Residual Chlorine (If chlorine is not used for disinfection or elsewhere in the treatment process)	No monitoring or reporting required.			
Chlorine Usage	lb/day	Chlorine contact chamber	1/day	Measure
Total Ammonia as N (Feb. – Oct.)	mg/L	Effluent	3/week	24-hour composite
	lb/day			calculation
Total Ammonia as N (Nov. – Jan.)	mg/L	Effluent	1/month	24-hour composite
	lb/day			calculation
Total Phosphorus February – October	µg/L	Effluent	3/week	24-hour composite
	lb/day			calculation
Total Phosphorus November – January	µg/L	Effluent	1/week	24-hour composite
Cadmium	µg/L	Effluent	1/month	24-hour composite
	lb/day			calculation
Copper July – September	µg/L	Effluent	1/month	24-hour composite
	lb/day			calculation
Copper October - June	µg/L	Effluent	1/month	24-hour composite
Lead	µg/L	Effluent	1/month	24-hour composite
	lb/day			calculation
Zinc	µg/L	Effluent	1/month	24-hour composite
	lb/day			calculation
Temperature	ºC	Effluent	5/week	grab
Silver	µg/L	Effluent	1/month	24-hour composite

Table 4: Effluent Monitoring Requirements				
Parameter	**Unit**	**Sample Location**	**Sample Frequency**	**Sample Type**
Alkalinity	mg/L as $CaCO_3$	Effluent	1/month	24-hour composite
Hardness	mg/L as $CaCO_3$	Effluent	1/month	24-hour composite
Oil and Grease	mg/L	Effluent	1/quarter	grab
Total Dissolved Solids	mg/L	Effluent	1/quarter	24-hour composite
Polychlorinated Biphenyl (PCB) Congeners	pg/L	Influent	1/2 months	24-hour composite
PCB Congeners	pg/L	Effluent	1/quarter	24-hour composite
2,3,7,8 Tetrachlorodibenzo-p-dioxin	pg/L	Influent and Effluent	1/quarter	24-hour composite
Orthophosphate as P	mg/L	Effluent	1/month	24-hour composite
Total Kjeldahl Nitrogen	mg/L	Effluent	1/month	24-hour composite
Nitrate plus Nitrite Nitrogen	mg/L	Effluent	1/month	24-hour composite
Dissolved Oxygen	mg/L	Effluent	1/month	grab
NPDES Application Form 2A Expanded Effluent Testing	—	Effluent	3x/5years	—
Whole Effluent Toxicity	TU_c	Effluent	2/year	24-hour composite

Notes:
1. Maximum daily loading is calculated by multiplying the concentration in mg/L by the average daily flow in mgd and a conversion factor of 8.34.
2. Percent removal is calculated using the following equation:
(average monthly influent - effluent) ÷ average monthly influent.

C. Surface Water Monitoring

The EPA received comments during the 2007 public comment period regarding the surface water monitoring requirements. Commenters stated that the 2007 draft permit proposed to require surface water monitoring at locations that are outside the influence or control of the dischargers performing the sampling, and that sampling should instead be required exclusively upstream and downstream of each discharger's outfall.

The EPA agrees that surface water monitoring upstream and downstream of each discharger's outfall would adequately characterize the dischargers' effect on water quality in the Spokane River. The EPA therefore proposes to change the surface water monitoring requirements such that the permit requires surface water monitoring upstream and downstream of each discharger's outfall.

Commenters also stated that the permit should not require surface water monitoring in Skalan Creek. Commenters stated that access to the mouth of the creek (the proposed required sampling point in the 2007 draft permit) required access to private property that could not be assured, and that the creek does not flow for much of the year. Given the lack of reliable access to the mouth of Skalan Creek, the fact that the creek does not flow for much of the year, and the fact that the Spokane River discharges have no influence upon water quality in Skalan Creek, the EPA has deleted the surface water monitoring requirements for Skalan Creek from the draft permit. The EPA is specifically requesting public comment on the revised surface water monitoring requirements in the draft permit.

Table 5: Surface Water Monitoring Requirements				
Parameter (units)	**Sample Locations**	**Sample Frequency**	**Sample Type**	**Maximum ML**
$CBOD_5$	Upstream and Downstream	8/year[1]	Grab	—
Total Ammonia as N (mg/L)	Upstream and Downstream	8/year[1]	Grab	0.05 mg/L
pH (standard units)	Upstream and Downstream	8/year[1]	Grab	—
Total Nitrogen (mg/L)	Upstream and Downstream	8/year[1]	Grab	0.05 mg/L
Total Phosphorus as P (µg/L)	Upstream and Downstream	8/year[1]	Grab	5 µg/L
Orthophosphate as P (µg/L)	Upstream and Downstream	8/year[1]	Grab	5 µg/L
Dissolved Oxygen (mg/L)	Upstream and Downstream	8/year[1]	Grab	—
Chlorophyll a	Upstream and Downstream	8/year[1]	Grab	—
PCB Congeners	Upstream and Downstream	2/year[2]	Grab	See Note 3.

Notes:
1. The permittee must sample the receiving water at least twice per month during the months of July, August, September, and October.
2. The permittee must sample the receiving water at least once during the season of April 1 – June 30 and at least once during the season of July 1 – September 30.
3. The permittee must use EPA Method 1668 for analysis of receiving water samples for PCBs, must target an MDL no greater than 10 pg/L per congener, and must analyze for each of the 209 individual congeners.

D. Monitoring Requirements for PCBs

The draft permits for the Cities of Post Falls and Coeur d'Alene and HARSB propose bi-monthly influent and quarterly effluent monitoring for PCB congeners. These monitoring frequencies are the same as required in the State of Washington's permit for the Liberty Lake Sewer and Water District.

The draft permits also propose twice yearly surface water column monitoring upstream and downstream of the outfall for PCB congeners. The surface water column monitoring is required because there are very little data available for PCB concentrations in the Spokane River in Idaho. To reduce duplication of effort, the permit allows surface water monitoring performed by or for the SRRTTF to be used to fulfill permit requirements, if such monitoring would otherwise meet the requirements of the permit.

These data will be used to determine if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters of the State of Idaho, the State of Washington or the Spokane Tribe of Indians and to evaluate the effectiveness of the toxics management plan.

The permit specifies the analytical methods and maximum detection limits that must be used for analysis of PCB congeners and 2,3,7,8 TCDD. In general, the draft permit requires the use of

EPA Method 1668 for PCB monitoring because it is the most sensitive method available, and it analyzes for all 209 of the individual PCB congeners. However, EPA method 8082 may be used for influent and effluent monitoring (but not receiving water monitoring), if initial screening with method 1668 shows that influent and/or effluent PCB concentrations are high enough that method 8082 could accurately quantify the PCB concentrations at those location(s).

Federal regulations require that, to assure compliance with permit limitations, permits must include requirements to monitor "according to procedures approved under 40 CFR Part 136," unless another method is required by 40 CFR Parts 400 – 471, 501, or 503 (i.e. pretreatment requirements, effluent limit guidelines, or sewage sludge requirements). See 40 CFR 122.44(i)(1)(iv).

EPA methods 1668 and 8082 are not approved methods under 40 CFR Part 136, thus, if effluent limits for total PCBs are established in the future, methods 1668 or 8082 could not be used to determine compliance with such effluent limits unless those methods are approved under 40 CFR 136 for either nationwide or limited use at the time such limits are established. The EPA proposed to approve Method 1668 Revision C on September 23, 2010 (75 FR 58027). On May 18, 2012, the EPA chose to defer approval of Method 1668C while it considers the large number of public comments received on the proposed approval. However, the EPA noted that "this decision does not negate the merits of this method for the determination of PCB congeners in regulatory programs or for other purposes when analyses are performed by an experienced laboratory" (77 FR 29763).

The EPA may require the use of methods 1668 or 8082 in this case because the permit requires analysis of PCB congeners, and the methods approved under 40 CFR 136 are not capable of analysis for individual PCB congeners. While method 8082 cannot measure for all 209 PCB congeners, it can measure for some individual congeners. Congener analysis is appropriate in this case because it will aid in source identification, which is one of the goals of the toxics management plan requirements. For pollutants for which there are no approved methods under 40 CFR Part 136 (such as PCB congeners), monitoring must be conducted according to a test procedure specified in the permit (40 CFR 122.44(i)(1)(iv)). Therefore, the EPA has specified the use of EPA method 1668, or, if it would be adequately sensitive, 8082. Furthermore, the monitoring is being required for effluent and receiving water characterization as opposed to determining compliance with effluent limits.

VI. Sludge (Biosolids) Requirements

EPA Region 10 separates wastewater and sludge permitting. Under the CWA, the EPA has the authority to issue separate sludge-only permits for the purposes of regulating biosolids. The EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

Until future issuance of a sludge-only permit, sludge management and disposal activities at each facility continue to be subject to the national sewage sludge standards at 40 CFR Part 503 and any requirements of the State's biosolids program. The Part 503 regulations are self-implementing, which means that facilities must comply with them whether or not a permit has been issued.

The absence of specific biosolids requirements in the draft permit is unchanged from the 2007 draft permit. This information is included here for the purpose of providing background context and is not one of the substantial new questions that caused the EPA to reopen the public

comment period. Therefore the EPA is not requesting comments on the absence of specific biosolids requirements in the draft permit at this time.

VII. Other Permit Conditions

A. Quality Assurance Plan

The quality assurance plan requirements (see the revised draft permit at Part II.C) are identical to those in the 2007 draft permit and are explained in the fact sheet dated February 16, 2007. The quality assurance plan requirements are not among the substantial new questions that caused the EPA to reopen the public comment period. The requirements are discussed here for the purpose of providing background context. Therefore the EPA is not requesting comments on the quality assurance plan requirements at this time.

B. Phosphorus Management Plan

In general, the phosphorus management plan requirements (see the revised draft permit at Part II.B) are similar to those in the 2007 draft permit. However, unlike the 2007 draft permit, the revised draft permit requires that the phosphorus management plan and implementation plan be submitted to the EPA and IDEQ, and requires annual reporting of reductions achieved through the phosphorus management plan. The phosphorus management plan requirements are effective year-round, including November – January when no numeric phosphorus limits are in place. The EPA is specifically requesting public comments on the phosphorus management plan requirements.

C. Pretreatment

The proposed permit contains requirements that the Board control industrial dischargers, as required by 40 CFR 403 (see the revised draft permit at Part II.E). Indirect dischargers to the treatment plant must comply with the applicable requirements of 40 CFR 403 and any categorical pretreatment standards promulgated by the EPA. The pretreatment requirements are not among the substantial new questions that caused the EPA to reopen the public comment period and are discussed here for the purpose of providing background context. Therefore, the EPA is not requesting comments on the pretreatment requirements at this time.

D. Sanitary Sewer Overflows and Proper Operation and Maintenance of the Collection System

Untreated or partially treated discharges from separate sanitary sewer systems are referred to as sanitary sewer overflows (SSOs). SSOs may present serious risks of human exposure when released to certain areas, such as streets, private property, basements, and receiving waters used for drinking water, fishing and shellfishing, or contact recreation. Untreated sewage contains pathogens and other pollutants, which are toxic. SSOs are not authorized under this permit. Pursuant to the NPDES regulations, discharges from separate sanitary sewer systems authorized by NPDES permits must meet effluent limitations that are based upon secondary treatment. Further, discharges must meet any more stringent effluent limitations that are established to meet State or Tribal water quality standards.

The permit contains language to address SSO reporting and public notice and operation and maintenance of the collection system. The permit requires that the permittee identify SSO occurrences and their causes. In addition, the permit establishes reporting, record keeping and third party notification of SSOs. Finally, the permit requires proper operation and maintenance of the collection system. The following specific permit conditions apply:

Immediate Reporting – The permittee is required to notify the EPA of an SSO within 24 hours of the time the permittee becomes aware of the overflow. (See 40 CFR 122.41(l)(6)).

Written Reports – The permittee is required to provide the EPA a written report within five days of the time it became aware of any overflow that is subject to the immediate reporting provision. (See 40 CFR 122.41(l)(6)(i)).

Third Party Notice – The permit requires that the permittee establish a process to notify specified third parties of SSOs that may endanger health due to a likelihood of human exposure; or unanticipated bypass and upset that exceeds any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The permittee is required to develop, in consultation with appropriate authorities at the local, county, tribal and/or state level, a plan that describes how, under various overflow (and unanticipated bypass and upset) scenarios, the public, as well as other entities, would be notified of overflows that may endanger health. The plan should identify all overflows that would be reported and to whom, and the specific information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials. (See 40 CFR 122.41(l)(6)).

Record Keeping – The permittee is required to keep records of SSOs. The permittee must retain the reports submitted to the EPA and other appropriate reports that could include work orders associated with investigation of system problems related to a SSO, that describes the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the SSO. (See 40 CFR 122.41(j)).

Proper Operation and Maintenance – The permit requires proper operation and maintenance of the collection system. (See 40 CFR 122.41(d) and (e)). SSOs may be indicative of improper operation and maintenance of the collection system. The permittee may consider the development and implementation of a capacity, management, operation and maintenance (CMOM) program.

The permittee may refer to the Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (EPA 305-B-05-002). This guide identifies some of the criteria used by EPA inspectors to evaluate a collection system's management, operation and maintenance program activities. Owners/operators can review their own systems against the checklist (Chapter 3) to reduce the occurrence of sewer overflows and improve or maintain compliance.

E. Additional Permit Provisions

Sections III, IV, and V of the draft permit contain standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

VIII. Other Legal Requirements

A. Endangered Species Act and Essential Fish Habitat

As explained in the fact sheet dated February 16, 2007, the EPA has determined that the discharge will have no effect on any threatened or endangered species. In general, the effluent limitations in the revised draft permit are as stringent as or more stringent than those in the 2007 draft permit. Furthermore, on August 9, 2007, the bald eagle was removed from the list of threatened and endangered species. Therefore, consultation under the Endangered Species Act is not necessary.

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires the EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect EFH (i.e., reduce quality and/or quantity of EFH).

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EPA has determined that issuance of this permit is not likely to adversely affect EFH in the vicinity of the discharge. The Spokane River is not designated as EFH. The EPA has provided NOAA Fisheries with copies of the draft permit and fact sheet during the public notice period. Any comments received from NOAA Fisheries regarding EFH will be considered prior to reissuance of this permit.

B. State/Tribal Certification

Section 401 of the CWA requires the EPA to seek State or Tribal certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards.

C. Permit Expiration

The permit will expire five years from the effective date.

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Appendix A: Facility Map

Appendix B: Water Quality-based Effluent Limits for Phosphorus, Ammonia and Carbonaceous Biochemical Oxygen Demand Necessary to Meet Water Quality Criteria for Dissolved Oxygen in Washington and Nutrients in Idaho

A. Overview

Federal regulations require NPDES permits to be conditioned to ensure compliance with the water quality requirements of all affected States (40 CFR 122.4(d), 122.44(d)(4), see also Clean Water Act Section 401(a)(2)). The EPA has determined that waters of the State of Washington are affected by discharges of nutrient and oxygen-demanding pollution, specifically total phosphorus (TP), five-day carbonaceous biochemical oxygen demand ($CBOD_5$), and total ammonia as nitrogen (ammonia), from point sources in Idaho. These three pollutants can decrease dissolved oxygen concentrations in the Spokane River and in Lake Spokane, in the State of Washington. Thus, the EPA must establish water quality-based effluent limits for these parameters, which ensure that the level of water quality to be achieved by limits on point sources is derived from and complies with all applicable water quality standards, including Washington water quality standards (40 CFR 122.44(d)(1)(vii)(A)). Some of the applicable water quality standards for the State of Washington explicitly require that the cumulative impact of all human actions be considered. Therefore, the effluent limits will assure that these discharges, considered cumulatively with all other human sources of pollution, including those in the State of Washington, will achieve the Washington DO standard in Lake Spokane.

B. Requirement to Meet Washington's Water Quality Standards

The federal regulation 40 CFR 122.4(d) states that "no permit may be issued…when the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." In the reasonable potential analysis described below, the EPA determined that discharges of TP, $CBOD_5$, and ammonia from the City of Coeur d'Alene, the City of Post Falls and the Hayden Area Regional Sewer Board (HARSB) affect water quality in waters of the State of Washington, because they have the reasonable potential to cause or contribute to excursions below Washington's water quality criteria for DO. Therefore, the State of Washington is an "affected State" under 40 CFR 122.4(d).

Furthermore, 40 CFR 122.44(d)(4) requires that NPDES permits must include any requirements necessary to "conform to applicable water quality requirements under section 401(a)(2) of CWA when the discharge affects a State other than the certifying State." Therefore, the EPA must establish conditions in the permits for these facilities, which ensure compliance with the applicable water quality requirements of the State of Washington.

Reasonable Potential Analysis

The federal regulation 40 CFR 122.44(d)(1)(i), which implements Section 301(b)(1)(C) of the Clean Water Act, requires that NPDES permits contain water quality-based effluent limitations for all pollutants or pollutant parameters that the EPA determines are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including narrative criteria for water quality.

In the fact sheets for the 2007 draft permits for the Cities of Coeur d'Alene and Post Falls and HARSB, the EPA found that the discharges of oxygen-demanding pollution from those sources have the reasonable potential to cause or contribute to excursions below Washington's water quality criterion for dissolved oxygen in Lake Spokane. Specifically, the modeling conducted in support of the 2007 draft Idaho permits showed that the levels of discharge allowed by the 1999 permits, from the Idaho wastewater treatment plants alone, could decrease dissolved oxygen concentrations in Lake Spokane by 0.57 mg/L as an average over depth below 8 meters, at the time and location of maximum impact.[1] Washington's water quality standard only allows a DO decrease of 0.2 mg/L below the natural condition for all human sources considered cumulatively (see "Applicable Water Quality Standards and Status of Waters," below). Therefore, a decrease of 0.57 mg/L would cause an excursion above Washington's water quality criterion for DO in lakes and reservoirs (because it is a greater decrease than allowed by the standards). In addition, the modeling conducted in support of the 2007 draft Idaho permits showed that currently permitted levels of discharge could increase pH at the state line to more than 9.0 standard units, which is an excursion above both Idaho and Washington water quality standards (Cope 2006).

Reasonable potential determinations must account for existing controls on point and nonpoint sources of pollution (40 CFR 122.44(d)(1)(ii)). Additional anthropogenic nutrients and oxygen demand discharged by municipal separate storm sewer systems in Idaho further contribute to excursions below dissolved oxygen standards, which serves as additional evidence for the reasonable potential finding.

Therefore, the discharges of TP, ammonia, and $CBOD_5$ from the three WWTPs discharging to the Spokane River in Idaho affect water quality in waters of the State of Washington and have the reasonable potential to cause or contribute to excursions above water quality standards for dissolved oxygen and pH in waters of the State of Washington. The EPA has therefore established water quality-based effluent limits for TP, ammonia and $CBOD_5$ for the Idaho dischargers to the Spokane River that ensure a level of water quality that is derived from and complies with both Washington's and Idaho's water quality standards (40 CFR 122.44(d)(1)(vii)(A)).

C. Applicable Water Quality Standards and Status of Waters

Lake Spokane (also called "Long Lake"), a reservoir located in the State of Washington, and the segments of the Spokane River between the Idaho-Washington border and Lake Spokane, are listed as impaired for DO in Washington's 2008 303(d)/305(b) integrated report. The Spokane River is also listed as a "water of concern" (category 2) for pH in Washington.

The Spokane River is not impaired for dissolved oxygen or pH in the State of Idaho. However, the entire length of the Spokane River that is in Idaho (i.e., both above and below the Post Falls Dam) is listed in Idaho's 2010 303(d)/305(b) integrated report as being impaired for TP. See

[1] The fact sheets for the 2007 draft permits for the City of Coeur d'Alene, the City of Post Falls, and HARSB stated the maximum DO decrease in Lake Spokane resulting from currently permitted Idaho discharges as 1.1 mg/L. This was the 95th percentile DO decrease, over the depth of the lake, at the time and location of maximum impact, predicted under the "Permit" modeling scenario (Cope 2006). The Spokane DO TMDL quantifies the DO decrease as the average DO decrease, over the depth of the lake, below 8 meters (see the Spokane DO TMDL at page 36). When this metric is applied to the "Permit" scenario described in the 2006 Cope report and the 2007 fact sheets, the Idaho wastewater treatment plants' potential impact on DO, based on currently-permitted levels of discharge, is 0.57 mg/L.

Table 1, below, for a summary of the applicable water quality criteria for DO, pH, and nutrients or aesthetics for the Spokane River and Lake Spokane in the States of Idaho and Washington.

Table 1: Dissolved Oxygen and pH Criteria for the Spokane River and Lake Spokane

Parameter	Idaho Standards	Washington Standards
Spokane River		
Dissolved Oxygen	**Numeric Criteria:** Below Post Falls Dam, except during August and September: One (1) day minimum of not less than six point zero (6.0) mg/l or ninety percent (90%) of saturation, whichever is greater. Other times and locations: Dissolved Oxygen Concentrations exceeding six (6) mg/l at all times. (IDAPA 58.01.02, Sections 110.12 and 250) **Natural condition provision:** When natural background conditions exceed any applicable water quality criteria set forth in Sections 210, 250, 251, 252, or 253, the applicable water quality criteria shall not apply; instead, there shall be no lowering of water quality from natural background conditions. (IDAPA 58.01.02.200.09.)	**Numeric Criteria:** From Nine Mile Bridge (river mile 58.0) to the Idaho border (river mile 96.5): 1-day minimum of 8.0 mg/L. From Long Lake Dam (river mile 33.9) to Nine Mile Bridge: 1-day minimum of 9.5 mg/L. (WAC 173-201A, Tables 200(1)(d) and 602) **Natural condition provision:** When a waterbody's D.O. is lower than the criteria in Table 200 (1)(d) (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the D.O. of that water body to decrease more than 0.2 mg/L. (WAC 173-201A-200(1)(d)(i))
pH	Within the range of six point five (6.5) to nine point zero (9.0). (IDAPA 58.01.02.250.01.a).	From Nine Mile Bridge (river mile 58.0) to the Idaho border (river mile 96.5): pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units. From Long Lake Dam (river mile 33.9) to Nine Mile Bridge: pH shall be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units. (WAC 173-201A, Tables 200(1)(g) and 602)
Natural Conditions Definition	The physical, chemical, biological, or radiological conditions existing in a water body without human sources of pollution within the watershed. Natural disturbances including, but not limited to, wildfire, geologic disturbance, diseased vegetation, or flow extremes that affect the physical, chemical, and biological integrity of the water are part of natural background conditions. Natural background conditions should be described and evaluated taking into account this inherent variability with time and place. (IDAPA 58.01.02.010.56)	"Natural conditions" or "natural background levels" means surface water quality that was present before any human-caused pollution. When estimating natural conditions in the headwaters of a disturbed watershed it may be necessary to use the less disturbed conditions of a neighboring or similar watershed as a reference condition. (WAC 173-201A-020)
Nutrients / Aesthetics	Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses. (IDAPA 58.01.02.200.06)	Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste (see WAC 173-201A-230 for guidance on establishing lake nutrient standards to protect aesthetics). (WAC 173-201A-260(2)(b))
Lake Spokane (Washington Water Quality Standards)		
Dissolved Oxygen	For lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions. (WAC 173-201A-200(1)(d)(ii))	

Requirement for Cumulative Analysis of Human Actions

Washington's water quality criterion for dissolved oxygen in lakes and reservoirs requires that "*human actions considered cumulatively* may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions" (emphasis added). In order to assure that the Idaho sources meet Washington State standards, the dissolved oxygen impact of discharges from Idaho sources must be considered cumulatively with the impact of the Washington sources.

D. Modeling Supporting the Permit Limits

The Clean Water Act's primary mechanism for addressing water quality impairments on a cumulative basis is the total maximum daily load (TMDL) process. However, TMDLs are generally prepared by the States, and a TMDL prepared by a State cannot establish load and wasteload allocations for pollution sources located outside the boundaries of that State. However, when a State prepares a TMDL, the State may reasonably assume that NPDES permits for point sources in upstream States, which have an effect on water quality in the downstream State that is preparing the TMDL, will include effluent limits that ensure compliance with the downstream State's water quality requirements, including water quality standards, because this is required by federal regulations (40 CFR 122.4(d), 40 CFR 122.44(d)(4)). Furthermore, if the EPA is the NPDES permitting authority for the point source discharges in the upstream State (as it is in this case) the downstream State may object to the issuance of the permits in the upstream state if the federal permits in the upstream State will affect the quality of its waters so as to violate any water quality requirements in the downstream State (CWA Section 401(a)(2)). When the Washington State Department of Ecology (Ecology) prepared the *Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load* (TMDL) Ecology assumed that the NPDES permits for point sources discharging to the Spokane River in Idaho would include limits that would ensure compliance with Washington's water quality standards.

The DO TMDL's Modeling Assumptions for Idaho Point Sources

To ensure that the TMDL's load and wasteload allocations, Avista's DO responsibility, and the loadings from Idaho would cumulatively meet DO WQS in Lake Spokane, when developing the TMDL, Ecology modeled the cumulative impact of both Idaho and Washington pollution sources upon the lake.

The TMDL states: "The dissolved oxygen depletion predicted to result from these assumed Idaho pollutant loads is shown in Tables 14 and 15 of PSU (2010) (the Idaho only source assessment scenario results). The EPA will incorporate permit limits into the NPDES permits for Idaho point source dischargers that ensure that the total dissolved oxygen depletion resulting from those dischargers is no greater than that shown in Tables 14 and 15 of (the Spokane River Modeling Final Scenarios Report 2010, the "2010 modeling report," by Portland State University)." Id. at 35.

Thus, when developing the TMDL, Ecology assumed certain loadings of oxygen-demanding pollution would be discharged in Idaho (shown in the 2010 modeling report at Table 2, the "prior modeling assumptions"), and the modeling supporting the TMDL thereby accounts for any dissolved oxygen decrease resulting from sources in Idaho. However, the TMDL does not apply to the Idaho permits, and the prior modeling assumptions are not binding on the EPA when it drafts the Idaho permits. The prior modeling assumptions are not wasteload allocations with

which the effluent limits in the Idaho permits must be consistent (40 CFR 122.44(d)(1)(vii)(B)). The EPA is free to establish any limits in the Idaho permits for $CBOD_5$, ammonia and TP so long as those limits ensure compliance with both Idaho and Washington WQS, when considered cumulatively with other sources of pollution (40 CFR 122.4(d), 122.44(d)(4)).

The language on Page 35 of the TMDL assumed that, in order to determine if the effluent limits in the Idaho permits would meet Washington's DO criteria, the EPA would isolate the impact of the Idaho point sources and then evaluate those results against the DO impact of the Idaho sources as assumed in the TMDL modeling. The limits would then be set to ensure that the DO depletion from Idaho sources, specifically, was no greater than assumed in the TMDL. This approach would ensure compliance with Washington water quality standards for DO on a cumulative basis by ensuring that the DO impact from *both* Idaho and Washington sources (and therefore the cumulative DO impact from sources in both States) was the same or less than predicted by the TMDL modeling.

However, the EPA believes it is more realistic to conduct the modeling supporting effluent limits for Idaho point sources to reflect the cumulative effect of all human actions that influence DO and to then evaluate the modeling results against Washington's water quality standards. This approach more directly ensures compliance with Washington's water quality standards on a cumulative basis. Thus, the effluent limits are based on modeling of all known human sources of nutrient and oxygen-demanding pollution (i.e. point and non-point sources in Washington and Idaho).

Summary of Model Results

The effluent limits in the draft permits are not the same as the loadings that were assumed in the TMDL, for Idaho point sources. However, as explained below, the effluent limits for Idaho point sources ensure compliance with Washington's water quality standards for dissolved oxygen, when considered cumulatively with the Washington NPDES permits' effluent limits, the TMDL's load allocations for oxygen-demanding pollution from non-point sources, and Avista's dissolved oxygen responsibility (LimnoTech 2011, PSU 2011).

The effluent limits meet Washington's DO criteria (WAC 173-201A-200(1)(d)) when the precision of the water quality model is considered (as explained in detail below). The effluent limits in the Washington and Idaho NPDES permits do not decrease the cumulative average dissolved oxygen in the shaded cells in Table 7 of the final TMDL (i.e., when and where Avista has a DO responsibility) relative to the prior modeling assumptions. In fact, the effluent limits *improve* the dissolved oxygen by 0.006 mg/l relative to the prior modeling assumptions and Washington wasteload allocations when averaged over all reservoir segments and all times of Avista responsibility.

<u>Model Precision</u>

With three exceptions, each individual model output result ensures compliance with Washington's DO criteria (WAC 173-201A-200(1)(d)), when considered cumulatively with the load allocations in Table 6 of the TMDL and Avista's DO responsibility as reported in Table 7 of the TMDL, after results are rounded to the nearest 0.1 mg/l. Each of the three exceptions is characterized by a markedly low arithmetic tolerance for any decrease in DO relative to the TMDL modeling. That is to say, in each of these instances, the DO sag resulting from point and non-point controls under the TMDL scenario, after considering Avista's responsibility, was just

slightly less than 0.25 mg/L. Thus, in those instances, a very small additional DO sag (e.g., 0.002 mg/L) would cause the difference, rounded to the nearest 0.1 mg/L, to change from 0.2 mg/L to 0.3 mg/L. The actual DO decreases in the three exceptions, relative to the TMDL, were 0.002 – 0.003 mg/L (see Table 2, below).

Table 2: Increases in Rounded DO Sag to 0.3 mg/L

Segment	Time Period	Tolerance (mg/L)	Modeled DO Change Relative to TMDL (mg/L)
188	July 1-15	0.0008	-0.003
188	September 1-15	0.0001	-0.002
186	September 16-30	0.0014	-0.003

The EPA believes these deviations are within the precision of the CE-QUAL-W2 model. In a memo dated December 28, 2010, LimnoTech described some issues encountered when performing a sensitivity analysis for the Idaho point sources. As stated on Page 2 of the memo, a reduction in Post Falls' $CBOD_5$ discharge (with all other model inputs held constant) actually effected a 0.002 mg/L *decrease* in the average DO in the reservoir, in times and locations where Avista has a DO responsibility. Other inputs being equal, the DO should have *increased* in response to decreased CBOD discharges. Even if the change in $CBOD_5$ loading was too small to have any discernible impact, the DO should have, at a minimum, been unchanged. Thus, it is reasonable to consider the difference between these two results (0.002 mg/L) to be within the precision of the model for the average DO in times and locations where Avista has a DO responsibility.

Because this average DO is computed from 106 individual results, the model is less precise than 0.002 mg/L for any individual result. Therefore, the EPA believes that the 0.002 – 0.003 mg/L deviations from the TMDL scenario, which resulted in a 0.3 mg/L rounded DO sag in three instances, are within the precision of the CE-QUAL-W2 model. Two results that vary by less than the precision of the model are functionally the same result.

Improvements in DO Relative to the TMDL

Under the proposed effluent limits for Idaho and Washington point sources, the cumulative DO sag, rounded to the nearest tenth of a milligram per liter, would actually decrease to 0.1 mg/L from 0.2 mg/L in five instances, as shown in Table 3, below. Also, as stated above, the alternative improves the dissolved oxygen by 0.006 mg/l (relative to the TMDL) when averaged over all segments and times of Avista responsibility. This means that any decreases in DO concentrations relative to the TDML scenario, at specific times and locations, are balanced by DO improvements at other times and in other locations.

Table 3: Decreases in Rounded DO Sag to 0.1 mg/L		
Segment	**Time Period**	**Modeled Change Relative to TMDL (mg/L)**
172	August 1-15	+0.007
177	September 1-15	+0.018
185	September 1-15	+0.001
175	September 16-30	+0.025
180	September 16-30	+0.018

The Exceptions are Very Infrequent

The three instances where the cumulative DO sag increased to 0.3 mg/L, when rounded to the tenths place, comprise less than 3% of the times and locations where Avista has a DO responsibility (106 total), and 0.7% of all of the times and locations that were evaluated in Table 7 of the TMDL (448 total). Since Table 7 of the Spokane River DO TMDL only provides DO results for June 1st - December 31st, and modeling indicates no violations of DO WQS prior to June 1st, this percentage would be even smaller than 0.7% on a year-round basis.

The TMDL's Margin of Safety

The TMDL has an implicit margin of safety comprised of several conservative assumptions (see the TMDL at Page 51). Some of these will tend to exaggerate the impact of nutrients and oxygen demand discharged by point sources. Specifically:

- Low flows (year 2001) were used as the baseline hydrologic condition.
- All TP is assumed to be bioavailable.[2]
- The top eight meters of the reservoir are not included in the vertical averaging because of amplified algal activity which increases daytime dissolved oxygen levels.

Therefore, the actual DO impact of the point source discharges may be somewhat less than that predicted by the model.

Conclusion

Because the effluent limits in the Idaho and Washington NPDES permits are equivalent to the scenario used to develop the Spokane River TMDL for the reasons described above, the EPA believes that these effluent limits will ensure compliance with Washington's water quality standards for DO, when considered cumulatively with other actions taking place under the TMDL.

Effluent Flow Rates used in the Model Inputs

In 2009, the EPA asked the City of Coeur d'Alene, the City of Post Falls, and HARSB to provide effluent flow rate projections for the year 2027, for use in developing the Spokane River TMDL and those facilities' NPDES permits. The flow projections provided by the utilities at that time were between 6.4 and 7.9 mgd for the City of Coeur d'Alene, 5.0 mgd for the City of Post Falls, and 3.2 mgd for HARSB. After further discussion between the EPA, the City of Coeur d'Alene and IDEQ, a flow projection of 7.6 mgd was established for the City of Coeur d'Alene.

[2] The model partitions point source phosphorus into two fractions: One which is immediately bioavailable and another that is not immediately bioavailable but becomes bioavailable over time according to first-order kinetics.

These flows are similar to projections made in 2005 (for the year 2028) as part of the Spokane River TMDL collaboration process. The 2005 flow projections were 7.0 mgd for the City of Coeur d'Alene, 5.7 mgd for the City of Post Falls, and 3.2 mgd for HARSB (Spokane River DO TMDL Collaboration Flows and Loadings Workgroup 2005). For Idaho point sources, the modeling supporting the TMDL was based on the effluent flow rates projected in 2009 and effluent concentrations described in the 2010 modeling report at Table 2 (PSU 2010). For the City of Coeur d'Alene and HARSB, these flow projections were also used to determine calculate the effluent limits in the draft permits, as described below.

In March 2010, JUB Engineers completed a revised flow projection for the City of Post Falls, which was 7.65 mgd (JUB 2010). The projection considered projected population growth within the service area, and a 25% addition for wastewater from non-municipal uses. For the City of Post Falls, the increased pollutant loads resulting from this increased flow rate (relative to the 2005 and 2009 projections) were represented in the model using proportionally increased effluent concentrations, instead of an increased effluent flow (see Table 4 below).

Basis for Loads

The model input effluent concentrations of TP, $CBOD_5$, and ammonia for each of the Idaho point sources are summarized in Table 4, below. The seasonal average loads of TP, ammonia, and $CBOD_5$ that are necessary to meet Washington's water quality criterion for DO in Lake Spokane, based on the modeling, are calculated by multiplying the projected flow rates for each facility, which were used in the modeling, by the modeled concentrations and the density of water (8.34 lb/gallon). The resulting seasonal average loads are shown in Table 4, below.

Table 4: Idaho Loads used in Modeling Supporting the Permit Limits

Point Source Discharge	Modeled Flow Rate (mgd)	Seasonal Average Modeled Concentrations, February – October Unless Otherwise Noted (mg/L)			Seasonal Average Modeled Loads, February – October Unless Otherwise Noted (lb/day)		
		Ammonia	TP	$CBOD_5$	Ammonia	TP	$CBOD_5$
City of Coeur d'Alene WWTP	7.6	4.29 (Mar. – Oct.)	0.05	3.56 (Feb. – Mar.)	**272 (Mar. – Oct.)**	**3.17**	**226 (Feb. – Mar.)**
				3.2 (Apr. – Oct.)			**203 (Apr. – Oct.)**
HARSB WWTP	3.2	2.9	0.05	2.9	**77.4**	**1.33**	**77.4**
City of Post Falls WWTP[1]	5.0	6.1	0.0765	6.1	**255**	**3.19**	**255**

Notes:
1. Effluent loads for the City of Post Falls are equivalent to a discharge of 0.05 mg/L TP, 4.0 mg/L $CBOD_5$, and 4.0 mg/L ammonia at a flow rate of 7.65 mgd.

E. Translating the Modeled Loads to Effluent Limits

The modeled loads in Table 4 are seasonal average values. However, 40 CFR 122.45(d)(2) states that "(f)or continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as…(a)verage weekly and average monthly discharge limitations for POTWs."

In some cases, it is impracticable to express effluent limits as average monthly limits and average weekly limits. In the draft permits for the City of Coeur d'Alene, City of Post Falls, and

HARSB, the effluent limits for E. coli, chlorine, metals, ammonia, TP, and, in some cases, CBOD are not expressed as average monthly limits and average weekly limits. The basis for expressing effluent limits for E. coli, chlorine and metals using averaging periods other than monthly and weekly is explained in Appendices C and E.

The EPA has determined that it is impracticable to express the water quality-based effluent limits for TP, ammonia, and CBOD that are necessary to meet Washington's water quality criteria for dissolved oxygen as monthly average and weekly average limits, in this case, for the reasons discussed below. The water quality-based effluent limits for TP, ammonia and CBOD are expressed as seasonal average loading limits that are identical to the loads of TP simulated in the modeling.

Basis for Expressing Effluent Limits for TP, ammonia and CBOD as Seasonal Average Limits

In a memorandum dated March 3, 2004 (the Chesapeake Bay Memo), James A. Hanlon, the director of the EPA's Office of Wastewater Management, stated that, for the protection of Chesapeake Bay and its tidal tributaries from excess nutrient loading, it was impracticable to express permit effluent limitations for nutrients (total nitrogen and TP) as daily maximum, weekly average, or monthly average effluent limitations.

The Chesapeake Bay Memo states that:

> *"Establishing appropriate permit limits (for nitrogen and TP) for Chesapeake Bay and its tidal tributaries is different from setting limits for other parameters such as toxic pollutants because: the exposure period of concern for nutrients loading to Chesapeake Bay and its tidal tributaries is very long; the area of concern is far-field (as opposed to the immediate vicinity of the discharge); and the average pollutant load rather than the maximum pollutant load is of concern"* (Page 2).

The Chesapeake Bay Memo further states that:

> *"The nutrient dynamics of (Chesapeake) Bay may not be unique. The establishment of an annual limit with a similar finding of 'impracticability' pursuant to 40 CFR 122.45(d) may be appropriate for the implementation of nutrient criteria in other watersheds when: attainment of the criteria is dependent on long-term average loadings rather than short-term maximum loadings; the circumstances match those outlined in this memo for Chesapeake Bay and its tidal tributaries; annual limits are technically supportable with robust data and modeling as they are in the Chesapeake Bay context; and appropriate safeguards to protect all other applicable water quality standards are employed"* (Pages 2-3).

Similar to Chesapeake Bay, the EPA believes that a finding of impracticability is appropriate in this case as well, under 40 CFR 122.45(d).

Modeling and Hydrology Supports the use of Seasonal Average Limits

As stated in the TMDL (Page 33), the wasteload allocations for Washington point sources and the loading assumptions for the Idaho point sources are seasonal average values. Thus, attainment of dissolved oxygen criteria in Lake Spokane is based on long-term average loadings rather than short-term maximum loadings.

Modeling has shown that highly variable TP discharges from Spokane River point sources, which have an average of 50 µg/L TP, have a very similar impact upon DO in Lake Spokane relative to constant discharges from those sources of exactly 50 µg/L TP each day (HDR 2009). At times and in locations where Avista had a dissolved oxygen responsibility in the TMDL (see TMDL at Table 7, Pages 49-50), on average, the variable discharge scenario resulted in a 0.003 mg/L *improvement* in DO relative to constant discharges. The variable TP discharges increased DO by as much as 0.09 mg/L relative to constant discharges in some segments, and the maximum decrease in DO in any reservoir segment at any time was only 0.05 mg/L. Therefore, dissolved oxygen in Lake Spokane is insensitive to short-term increases in TP loading, as long as the seasonal average TP load remains unchanged.

In addition, the retention time of Lake Spokane, in a low-flow year, ranges from about 20 days to more than 100 days during the critical summer period (Cusimano 2004). The water quality in Lake Spokane during the critical summer period would therefore be affected by average pollutant loading from upstream sources as opposed to short-term maximum loading.

Because of the long residence time of Lake Spokane, the EPA expects that dissolved oxygen in Lake Spokane would be insensitive to short-term increases in CBOD or ammonia loading, as long as the seasonal average load remains unchanged, similar to the effects of TP.

The TP, Ammonia and CBOD Limits are intended to Control Far Field Effects

Similar to Chesapeake Bay, the TP, ammonia and CBOD effluent limits are intended to control far-field effects. Lake Spokane is a 24-mile-long reservoir, the upstream end of which is 42.5 miles downstream from the closest Idaho POTW (the City of Post Falls).

The Permits Include Additional Requirements to Ensure Water Quality Standards are Met with the use of Seasonal Limits

The draft permits include additional requirements to ensure that water quality standards are met. These requirements include required reporting of monthly average TP, ammonia, and CBOD loadings. In addition, if, at the end of any month from February through September, the average TP, ammonia and CBOD discharge measured to date is greater than the seasonal average loading limit, the permittee must submit a report explaining how it will lower the loading of the relevant pollutant(s)in order to comply with the seasonal average effluent limitations.

As explained below, when necessary, the EPA has established average monthly and maximum daily limits for ammonia, whenever this was necessary to ensure compliance with Idaho's water quality criteria for ammonia or with the anti-backsliding provisions of the Clean Water Act.

The Future Effluent Variability is Unknown

In order to calculate average monthly and average weekly limits that are consistent with a seasonal average load, the effluent variability must be known. Effluent variability may be quantified by the coefficient of variation (CV), which is the ratio of the standard deviation to the mean of the effluent data (also called the relative standard deviation).

Because the TP effluent limits require levels of discharge much lower than current levels, the treatment systems must be upgraded in order to achieve compliance with the TP limits. In some cases, upgrades will be necessary to meet new water quality-based effluent limits for ammonia as well. Furthermore, even though the facilities can comply with the new water quality-based effluent limits for CBOD immediately, the variability of the effluent CBOD loads for the upgraded facilities may be different from the historical variability.

While historical monitoring data are available, which could be used to quantify the variability of TP, ammonia and CBOD in the effluents of the *existing* treatment facilities, the variability of these parameters in the effluent, after these upgrades are completed, is unknown.

On Page E-3, the TSD states that "typical values for the CV range from 0.2 to 1.2." Because the loading levels in the TMDL and modeling are long-term (e.g., February – October or March – October) average values, the value of the CV can have a significant impact on the value of the average monthly limit. For example, according to Table 5-2 of the TSD, if a facility that sampled 10 times per month had a CV of 0.2 for a given pollutant, its 95th percentile probability basis average monthly limit should be set at 1.12 times the long-term average. If that facility's CV were equal to 1.2, that facility's average monthly limit should be set at 1.80 times the long-term average. This means that the facility with a CV of 1.2 would have an average monthly limit 60% greater than a facility with a CV of 0.2. If the limits are set at the 99th percentile probability basis, the difference between limits based on a CV of 1.2 as opposed to a CV of 0.2 becomes even larger.

In some cases, if the CV is not known, an estimate can be made. In fact, it is common practice in the calculation of effluent limits for toxic parameters to assume that the CV is equal to 0.6, if the actual CV is unknown (see the TSD at Pages 53 and E-3). However, in the context of calculating average monthly and average weekly limits from a fixed long-term average, if the estimated CV is less than the actual CV, the effluent limits will be artificially stringent. Conversely, if the estimated CV is greater than the actual CV, the permittee may be able to consistently discharge at levels greater than those modeled, yet maintain compliance with the average monthly effluent limits. This possibility is recognized in the Chesapeake Bay Memo (see Page 4). The Chesapeake Bay Memo also points out that "the effluent loading of nutrients is not constant due to seasonal temperature fluctuations in northern climates" because biological nutrient removal is less effective at lower temperatures (Page 5). The TSD does not provide a means to account for this additional variability in the effectiveness of biological nutrient removal due to temperature.

In contrast, as stated on Page E-3 of the TSD, when calculating effluent limits for toxic parameters, "in many cases, changes in the CV will have little impact on the final permit limit." This is because the averaging periods for water quality criteria for toxic parameters are very short (generally 4 days for chronic aquatic life criteria and 1 hour for acute aquatic life criteria, see IDAPA 58.01.02.010). Effluent limits for toxic parameters must therefore control short-term peak concentrations. This constrains the effluent limit calculations, making the final effluent limits relatively insensitive to effluent variability.

In addition to the CV, it is unknown whether individual measurements of TP, CBOD or ammonia will be independent, or whether they will be correlated to one another (i.e. autocorrelated). Autocorrelation can be important in the derivation of average monthly permit limits (see TSD at Page E-15).

Seasonal Average Limit Summary

In summary, modeling and the hydrology of Lake Spokane show that, similar to Chesapeake Bay, DO concentrations in Lake Spokane are related not to maximum TP, ammonia and CBOD loading but to the seasonal average loadings of these pollutants. That is to say, Lake Spokane is insensitive to short-term increases in loading of oxygen-demanding pollutants from Idaho point sources, as long as the seasonal average loadings are less than or equal to the modeled loads. The effluent limits for TP, ammonia and CBOD, in this case, are based on far-field, as opposed to near-field, water quality concerns. Because the future variability of TP, ammonia and CBOD concentrations and loadings in these effluents is unknown, the EPA cannot calculate appropriate monthly average and weekly average effluent limits for these pollutants with any degree of certainty. If the EPA were to assume a CV, this could result in effluent limits for TP, ammonia, and CBOD that are artificially stringent, or which could allow the loading of TP, ammonia and/or CBOD to exceed that simulated in the modeling supporting the permits and the TMDL.

For these reasons, the EPA believes that it is impracticable to calculate appropriate average monthly and average weekly limits for TP, ammonia, and CBOD, in this case. The effluent limits for TP, ammonia, and CBOD that are necessary to meet Washington's water quality standards are therefore stated as seasonal average effluent limits. The seasonal average TP, CBOD, and ammonia effluent limits are identical to the seasonal average loads simulated in the modeling supporting the permits and the TMDL (see Table 4, above).

Reporting Requirements for Seasonal Average Limits

The permits include additional reporting requirements to ensure that water quality standards are attained. These include reporting the monthly average and maximum weekly or daily loads and concentrations on the monthly DMR, reporting the partial seasonal average load partial seasonal average loads through the last day of the monitoring month, and, if the partial seasonal average load of a given pollutant is greater than the seasonal average effluent limit, the permittee must submit a written report with the DMR, explaining the steps that the permittee will take to reduce its discharge of the relevant pollutant(s) in order to achieve compliance with the seasonal average effluent limit by the end of the season (October 31st in most cases).

If the permittee ceases discharge to the river for at least three days during the season(s) during which seasonal average limits apply, the permittee may include zero pounds per day values in the calculation of the seasonal average loads (and the partial seasonal average loads) as specified in Attachment A of the draft permit. The purpose of Attachment A is to ensure that periods of zero discharge are given the same weight as the periods of time when the permittee is discharging, in the calculation of the seasonal average discharge. The number of zeros allowed for averaging is equal to the required sampling frequency of three times per week (0.429 samples per day), multiplied by the number of days of zero discharge, and rounded down to the nearest whole number.

Ammonia Toxicity

In addition to exhibiting an oxygen demand, ammonia can be directly toxic to aquatic life at high concentrations. In order to prevent acute toxicity to aquatic life, the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) or TSD recommends that effluent limits for pollutants which may be toxic to aquatic life be expressed as average

monthly and maximum daily limits, because even an average weekly limit has an averaging period that is too long to ensure that acute toxicity is prevented (see TSD at section 5.2.3).

Maximum daily limits are not necessary for HARSB because, as described in Appendix D, the EPA has determined, based on effluent data, that HARSB does not have the reasonable potential to cause or contribute to excursions above Idaho's water quality criteria for ammonia, for toxicity (IDAPA 58.01.02.283). Therefore the new water quality-based effluent limits for ammonia, for HARSB, have been established exclusively for the purpose of ensuring compliance with Washington's water quality criteria for DO, as opposed to preventing toxicity near the outfall, in waters of the State of Idaho. Therefore, the effluent limits for ammonia, for HARSB are expressed exclusively as seasonal average limits.

Effluent limits for ammonia, for the City of Coeur d'Alene and the City of Post Falls are expressed as a combination of seasonal average, average monthly, and maximum daily effluent limits. The seasonal average limit is based on meeting water quality standards for dissolved oxygen in the State of Washington, downstream from the point of discharge and is identical to the seasonal average modeled loading of ammonia in Table 4, above.

For Coeur d'Alene, the average monthly and maximum daily limits are based on Idaho water quality standards that are intended to prevent acute and chronic toxicity from ammonia, near the point of discharge. The use of average monthly limits in combination with maximum daily limits, when effluent limits are based on preventing toxicity to aquatic life, is consistent with the recommendations of the TSD (Section 5.2.3). It is impracticable to prevent acute toxicity using an average weekly limit. Therefore, the structure of City of Coeur d'Alene's effluent limits for ammonia is consistent with 40 CFR 122.45(d)(2) and with EPA guidance. The calculation of the toxicity-based ammonia limits for the City of Coeur d'Alene is explained in the City of Coeur d'Alene's fact sheet.

For Post Falls, Average monthly and maximum daily limits for ammonia are retained for July - September in order to ensure compliance with the anti-backsliding provisions of the Clean Water Act. These effluent limits will also ensure compliance with Idaho's water quality criteria for ammonia.

Basis for Mass Limits

The federal regulation 40 CFR 122.45(f)(1) requires that effluent limits be expressed in terms of mass, except for pollutants that cannot be properly expressed as mass (e.g. pH and temperature). Effluent limits for TP, ammonia, and $CBOD_5$ can be properly expressed as mass. Therefore, effluent limits for these parameters are, at a minimum, expressed in terms of mass.

Effluent limits for TP are expressed exclusively in terms of mass because there are no applicable technology-based standards or numeric in-stream water quality standards for TP, the effluent limitations for TP are intended to meet Washington water quality standards, which apply several miles downstream from the discharges after complete mixing has occurred, and phosphate phosphorus is neither directly toxic to aquatic life nor directly hazardous to human health. Therefore, there is no basis to express the water quality-based TP limits in units other than mass.

As explained below, $CBOD_5$ and, in some cases, ammonia, are additionally limited in terms of other units of measurement.

Basis for Concentration and Removal Rate Limits for $CBOD_5$ and Ammonia

Pollutants which are limited in terms of mass may be additionally limited in terms of other units of measurement, and the permit shall require the permittee to comply with both limitations (40 CFR 122.45(f)(2)).

Applicable technology-based standards for $CBOD_5$ are expressed in terms of concentration and removal rate (40 CFR 133.102(a)(4)). Therefore, in addition to the water quality-based mass limits described above, the permits include additional technology-based effluent limits for $CBOD_5$, which are expressed in terms of concentration (25 mg/L monthly average and 40 mg/L weekly average, 40 CFR 133.102(a)(4)(i – ii)) and a minimum removal rate of 85% (40 CFR 133.102(a)(4)(iii)).

The proposed concentration and removal rate limits for $CBOD_5$ are technology-based limits. The proposed mass limits for $CBOD_5$ are water quality-based limits.

For parameters which may be directly toxic to aquatic life, the TSD recommends that effluent limitations be expressed in terms of both concentration and mass for effluents discharging to waters with less than 100-fold dilution (see TSD at Section 5.7.1).

The average monthly and maximum daily limits for ammonia, for the City of Coeur d'Alene, are based on Idaho's water quality criteria, for toxicity. From July – September, the complete-mix dilution ratio, based on the FERC-mandated minimum river flow rate and the current treatment plant design flow rate, is less than 100:1. Therefore, the average monthly and maximum daily limits for ammonia, for Coeur d'Alene, for July – September, are expressed in terms of both mass and concentration.

In addition, for HARSB and Post Falls, concentration limits are included in the draft reissued permits from November – January, to ensure compliance with the anti-backsliding provisions of the Clean Water Act. For Post Falls, concentration limits are also necessary to ensure compliance with the anti-backsliding provisions of the Clean Water Act from July – September.

Effluent limits for POTWs must generally be calculated based on design flow (40 CFR 122.45(b)(1)). The relationship between the concentration and mass limits is therefore calculated using the following equation:

Concentration limit (mg/L or parts per million) = mass limit (lb/day) ÷ [8.34 lb/gallon × design flow (mgd)]

Proposed Effluent Limits Summary

The effluent limits for TP, $CBOD_5$, and ammonia that are derived from and comply with the applicable water quality standards of Idaho and Washington are as follows:

Table 5: Proposed Effluent Limits for TP, $CBOD_5$ and ammonia				
Parameter	**Units**	**Effluent Limits**		
		Average Monthly Limit	**Average Weekly Limit**	**Maximum Daily Limit**
Proposed Effluent Limits for the City of Coeur d'Alene				
TP as P (Feb. – Oct.)	lb/day	3.17 seasonal average		
TP as P (Nov. – Jan.)	lb/day	Phosphorus management plan. See permit at Part II.C.		
$CBOD_5$ (November – January)	mg/L	25	40	—
	lb/day	1251	2002	—
	% removal	85% min.	—	—
$CBOD_5$ (February – March)	mg/L	25	40	—
	lb/day	226 seasonal average		
	% removal	85% min.	—	—
$CBOD_5$ (April – October)	mg/L	25	40	—
	lb/day	203 seasonal average		
	% removal	85% min.	—	—
Ammonia (March – June)	lb/day	649	—	1547
Ammonia (July – September)	mg/L	6.59	—	15.7
	lb/day	330	—	786
Ammonia (October)	lb/day	525	—	1252
Ammonia (March - October)	lb/day	272 seasonal average		
Ammonia (November – February)	No limits. Monitor and report only.			
Proposed Effluent Limits for the City of Post Falls				
TP as P (Feb – Oct.)	lb/day	3.19 seasonal average		
TP as P (Nov. – Jan.)	lb/day	Phosphorus management plan. See permit at Part II.C.		
$CBOD_5$ (November – January)	mg/L	25	40	—
	lb/day	1043	1668	—
	% removal	85% min.	—	—
$CBOD_5$ (February – October)	mg/L	25	40	—
	lb/day	255 seasonal average		
	% removal	85% min.	—	—
Ammonia (February –October)	lb/day	255 seasonal average		
Ammonia (July – September)	mg/L	8.2	—	29.5
	lb/day	342	—	1230
Ammonia (November – January)	mg/L	25.4	—	91.7
	lb/day	1059	—	3824
Proposed Effluent Limits for the HARSB				
TP as P (Feb. – Oct.)	lb/day	1.33 seasonal average		
TP as P (Nov. – Jan.)	lb/day	Phosphorus management plan. See permit at Part II.C.		
$CBOD_5$ (November – January)	mg/L	25	40	—
	lb/day	500	801	—
	% removal	85% min.	—	—

Table 5: Proposed Effluent Limits for TP, $CBOD_5$ and ammonia				
Parameter	**Units**	**Effluent Limits**		
		Average Monthly Limit	**Average Weekly Limit**	**Maximum Daily Limit**
$CBOD_5$ (February – October)	mg/L	25	40	—
	lb/day	77.4 seasonal average		
	% removal	85% min.	—	—
Ammonia (February – October)	lb/day	77.4 seasonal average		
Ammonia (November – January)	mg/L	78.7	—	250
	lb/day	1575	—	5004

Comparison of Proposed Effluent Limits to the Corresponding Limits in the 2007 Draft Permits

The following nine figures provide a comparison of the phosphorus, ammonia, and $CBOD_5$ limits in the current draft permits to the corresponding effluent limits in the 2007 draft permits. Note that the 2007 draft permits did not propose effluent limits for TP in February, whereas the current draft permits do propose such limits.

Figure 1

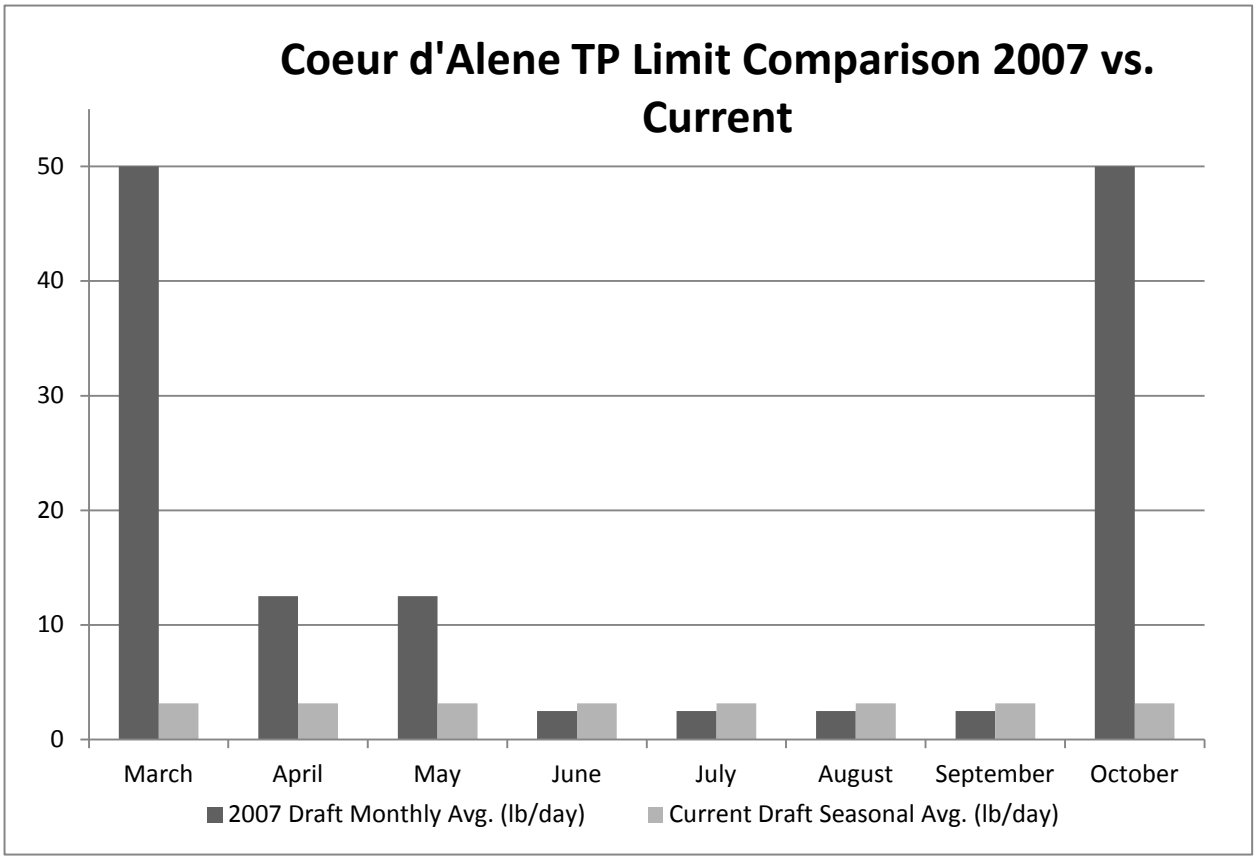


Figure 2

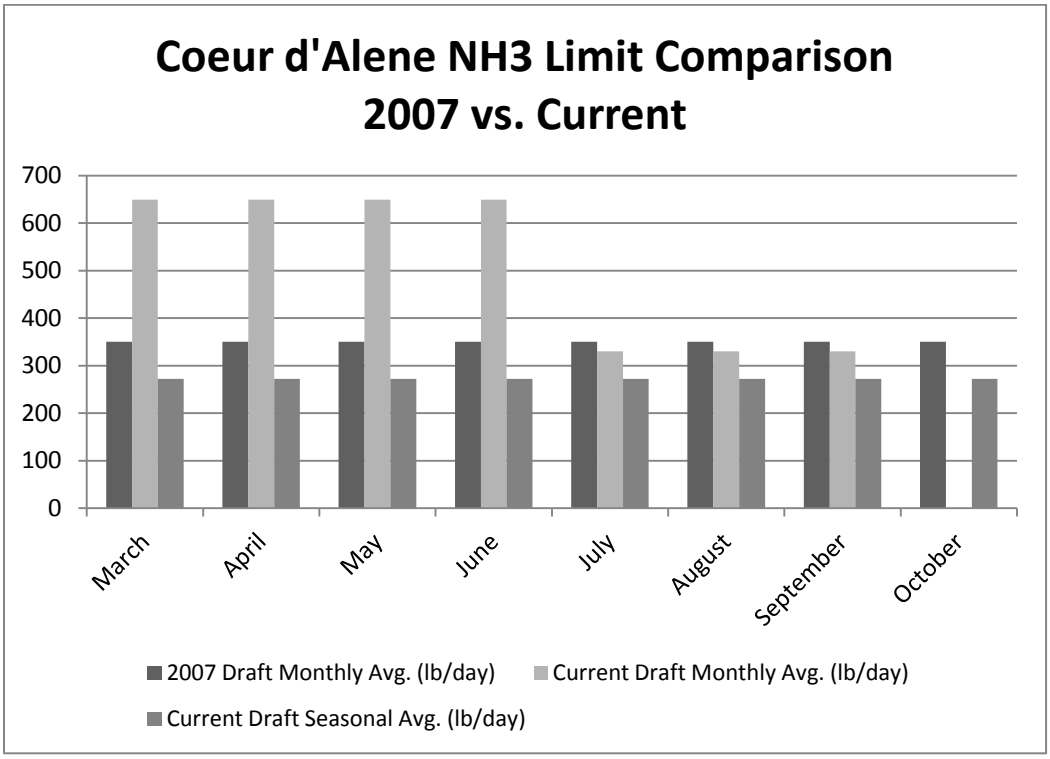
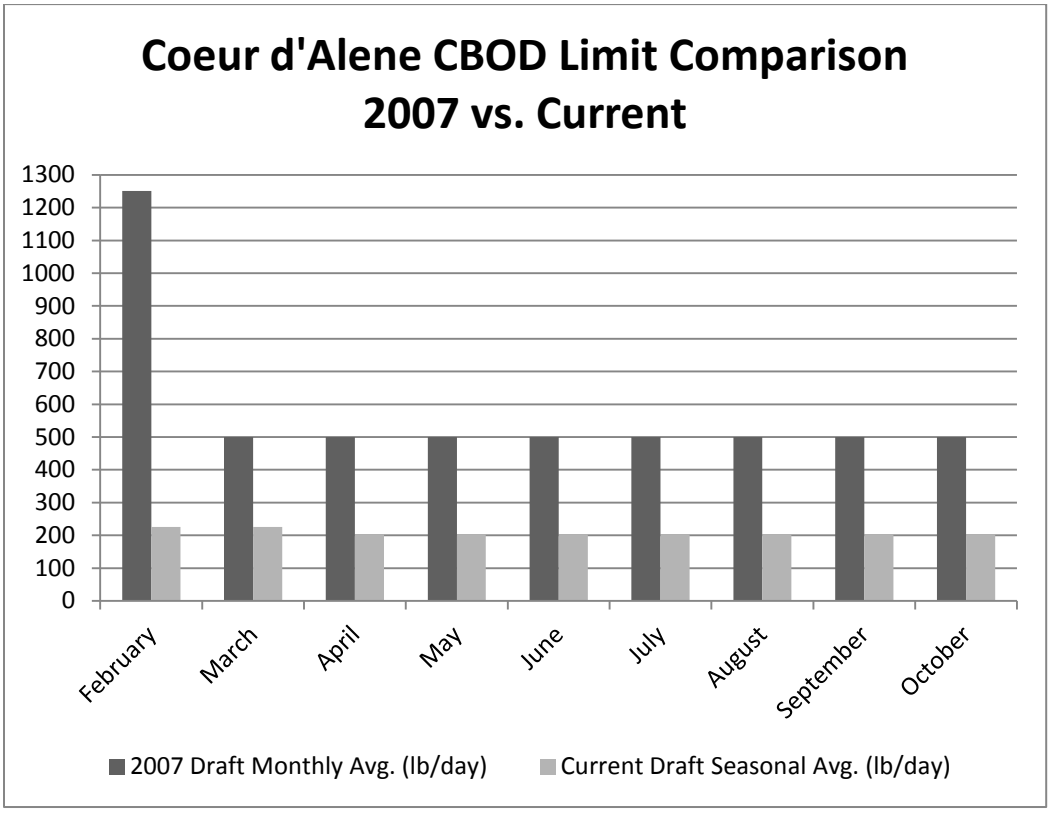


Figure 3



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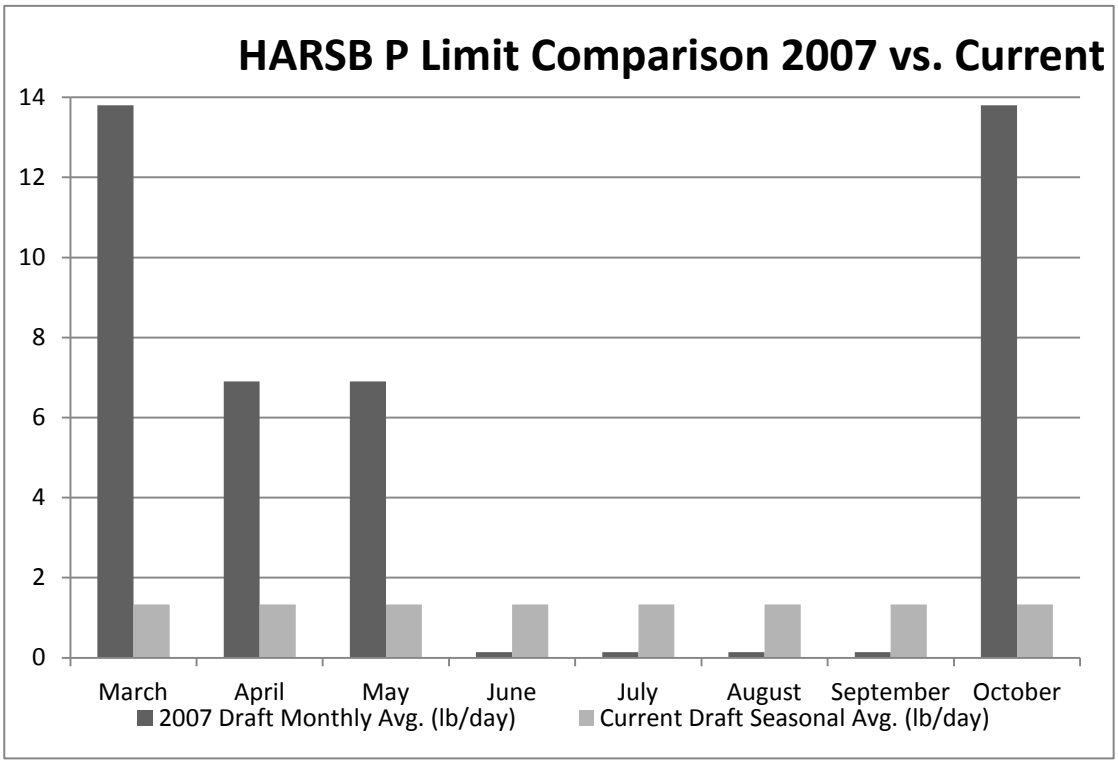

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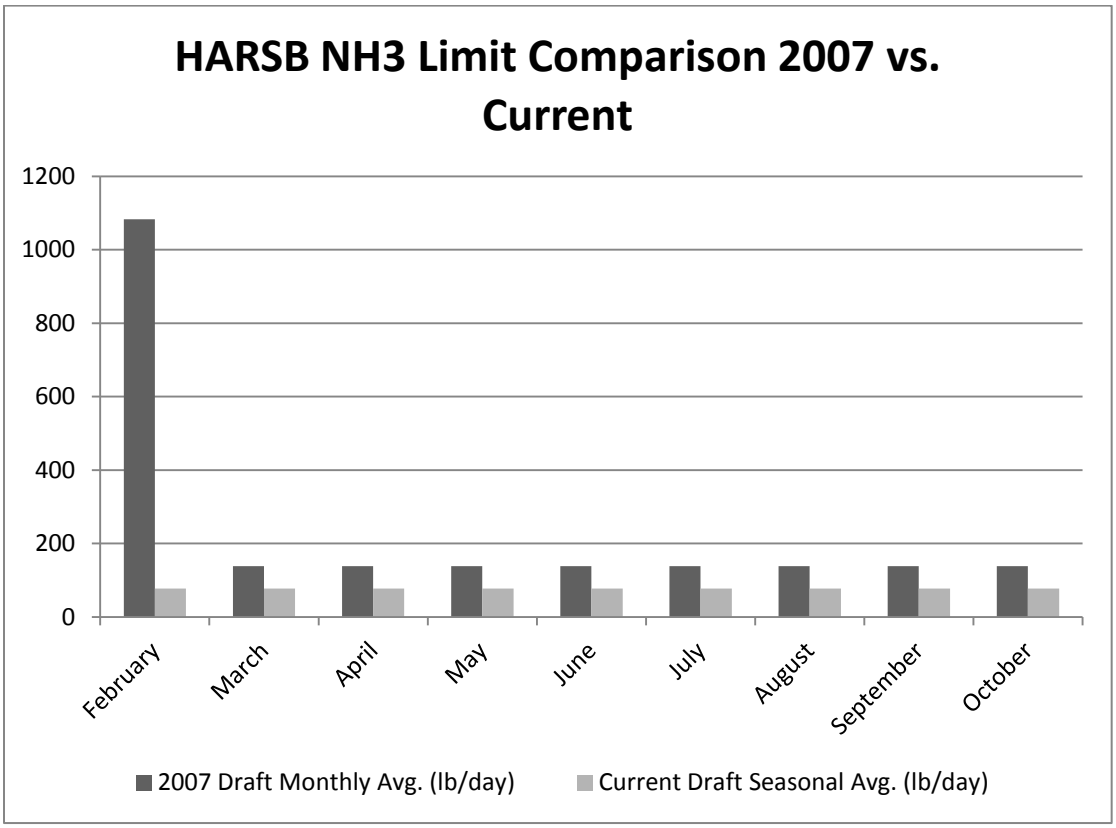

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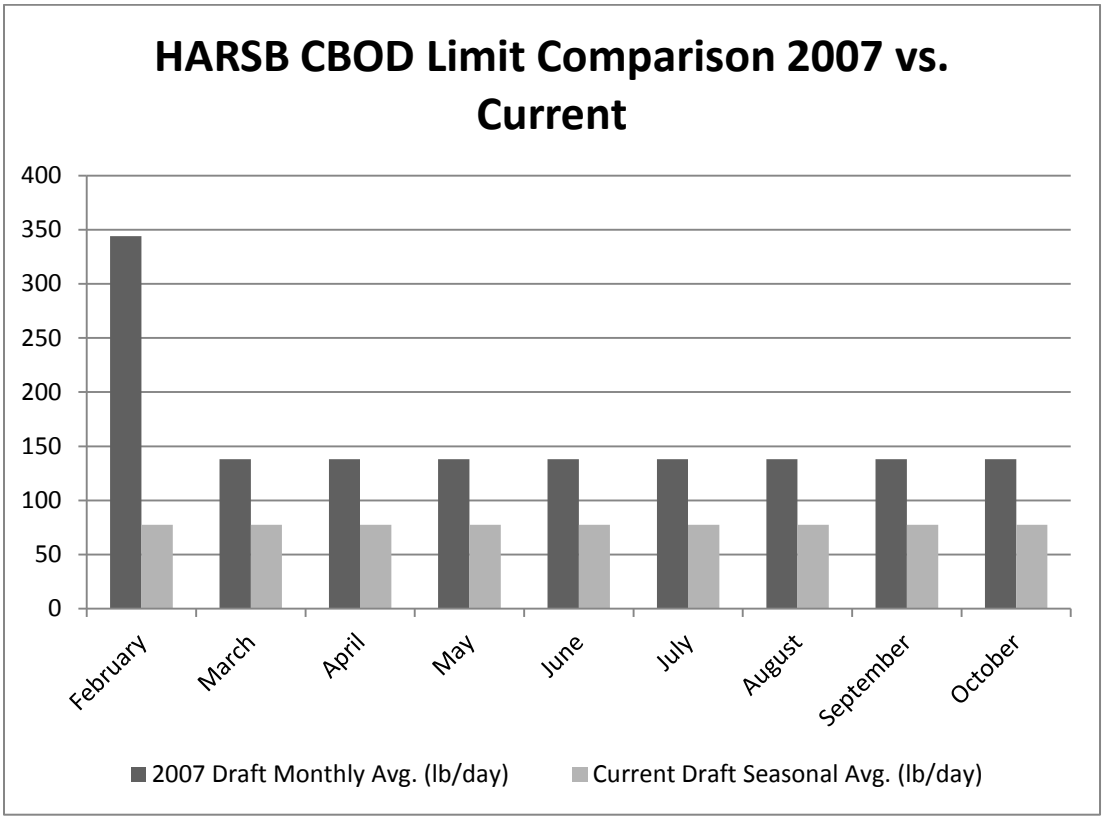

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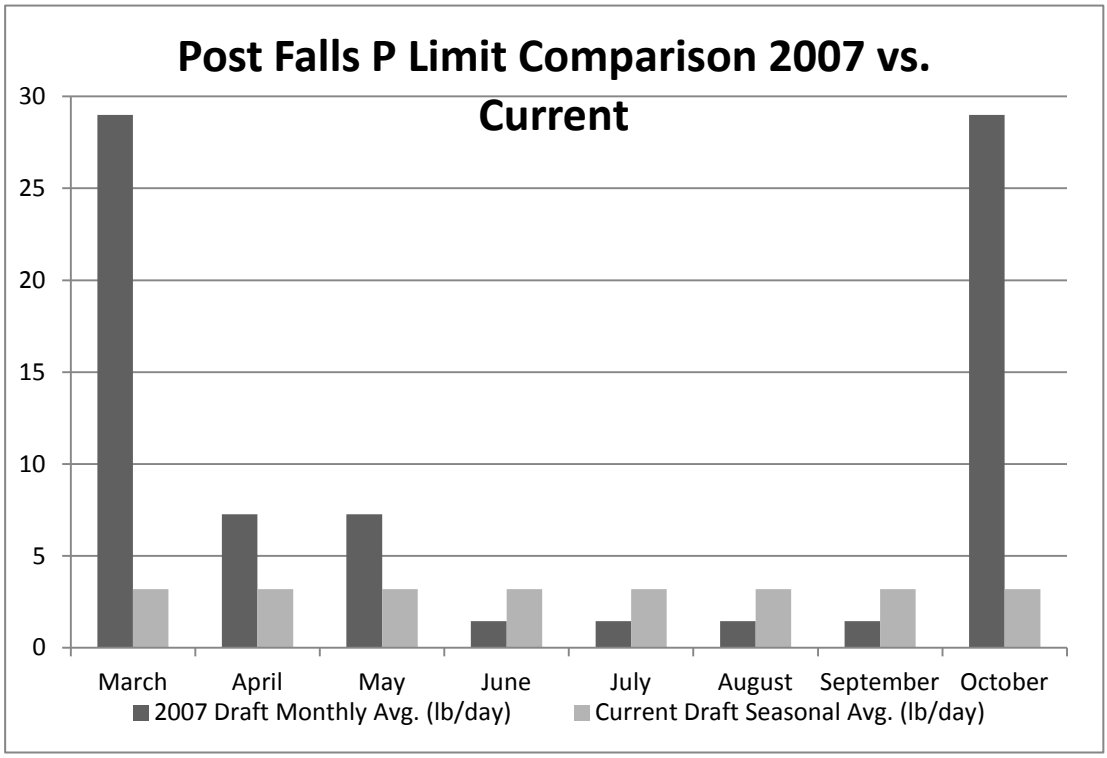

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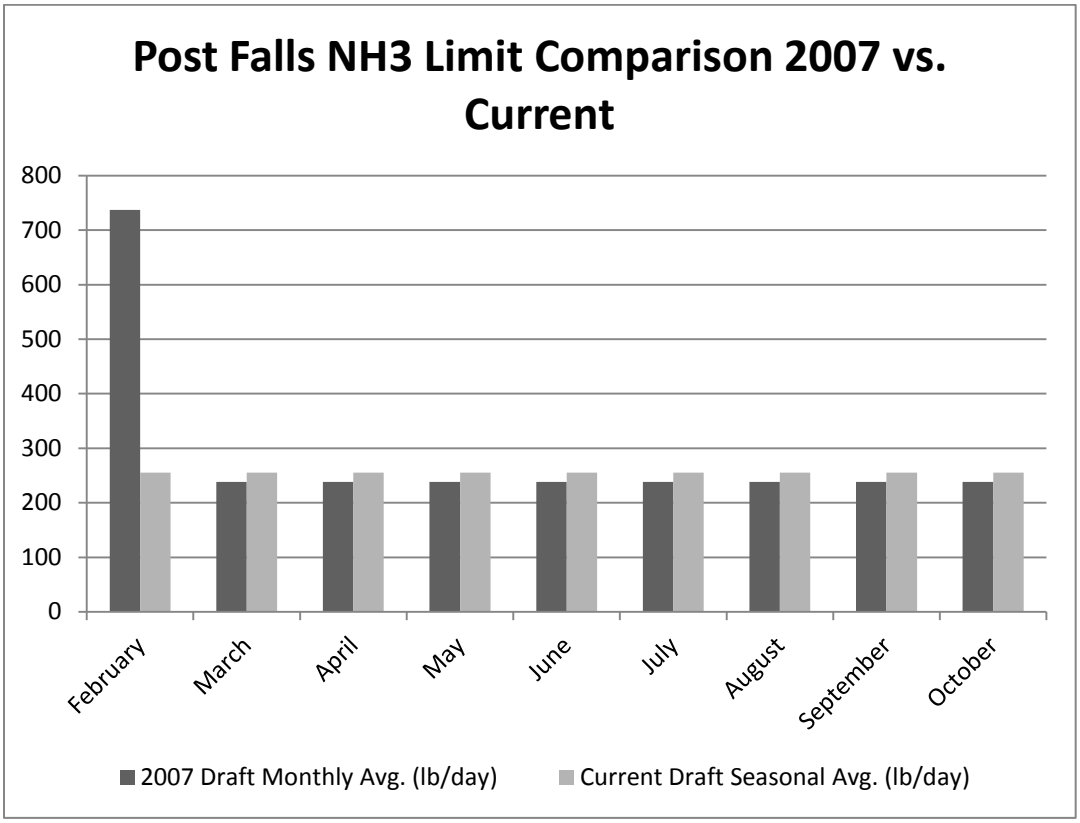
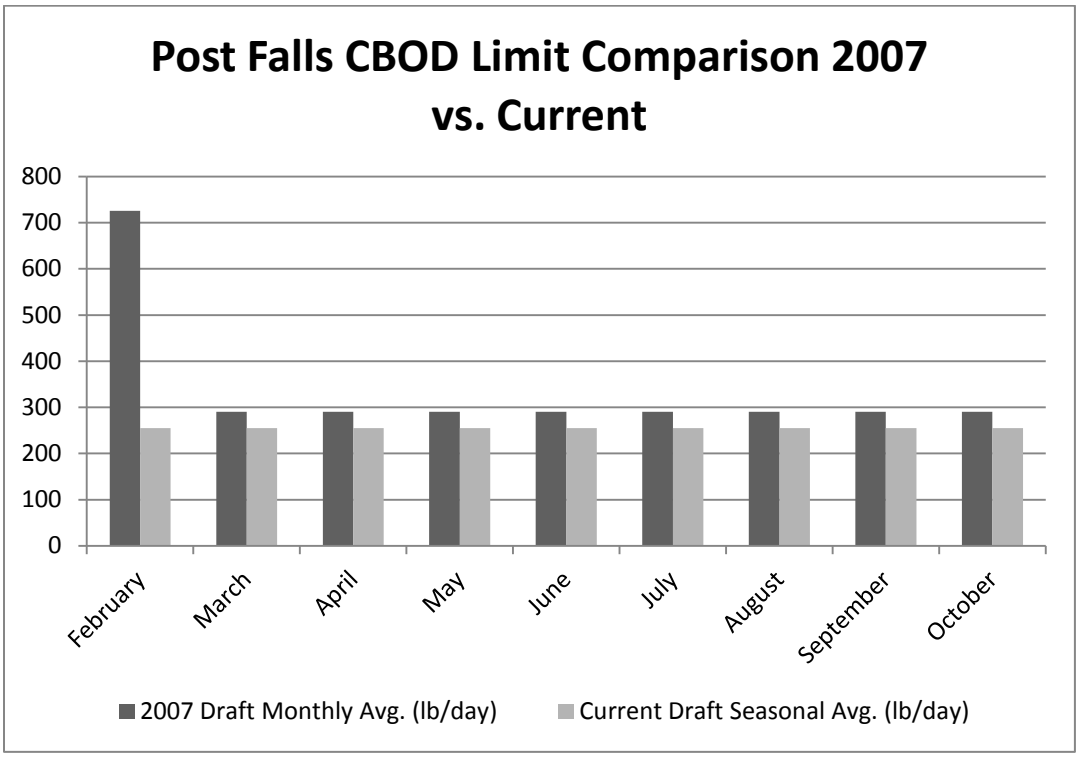


Figure 9



F. Effect of the Proposed Effluent Limits

Lake Spokane

As explained above, modeling shows that the proposed effluent limits for TP, $CBOD_5$ and ammonia, considered cumulatively with the effluent limits for Washington point sources in their NPDES permits and the load allocations for Washington non-point sources and the DO improvements required of Avista in the DO TMDL, will ensure compliance with Washington's water quality criterion for DO in Lake Spokane.

State Line

The memoranda from Portland State University and LimnoTech do not specifically analyze the effect of the proposed effluent limits at the state line. Therefore, as explained below, the EPA has analyzed the model output and determined that, in compliance with 40 CFR 122.4(d) and 40 CFR 122.44(d)(4), the proposed effluent limits for the Idaho point sources will ensure that Washington's and Idaho's water quality standards are met at the state line.

Dissolved Oxygen

Even with zero discharge of human-caused pollution in Idaho, Washington's numeric criterion for dissolved oxygen (8.0 mg/L) would only be attained at the state line about 96% of the time. That is to say, the remaining 4% of the time, the natural background DO concentration at the state line is less than 8.0 mg/L. However, this does not mean that Washington's water quality standards would not be attained. Washington's water quality standards state that, "when a water body's DO is lower than the (numeric) criteria…(or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the DO of that water body to decrease more than 0.2 mg/L" (WAC 173-201A-200(1)(d)(i)).

At times when the model predicts that DO is less than 8.2 mg/L (i.e., within 0.2 mg/L of the numeric criterion), with zero discharge of human-caused pollution in Idaho, the maximum DO decrease attributable to the Idaho dischargers, including stormwater discharges, at the state line, is 0.13 mg/L below natural conditions, which is less than the decrease allowed by the standards (0.2 mg/L). Therefore, the effluent limits will ensure compliance with Washington's water quality standards for dissolved oxygen at the state line.

In Idaho, in waters designated for salmonid spawning, the applicable numeric dissolved oxygen criterion is 6.0 mg/L or 90% of saturation, whichever is greater. Modeling predicts that, under the proposed effluent limits, the DO concentration at the state line will be greater than 6.0 mg/L at all times (the minimum DO is 7.65 mg/L). The dissolved oxygen concentration will be greater than 90% of saturation, 99.96% of the time, under both the no source and effluent limit scenarios. Therefore, the effluent limits will ensure compliance with Idaho's numeric DO criteria 99.96% of the time, and the very infrequent excursions below the numeric criteria (0.04% of the time) occur due to natural background conditions and do not violate Idaho's water quality standards (see IDAPA 58.01.02.200.09).

pH

The Washington pH criterion for the Spokane River at the state line is "pH shall be within the range of 6.5 to 8.5 with a human-caused variation within the above range of less than 0.5 units"

(WAC 173-201A, Table 200(1)(g)). Idaho's water quality standard is "within the range of six point five (6.5) to nine point zero (9.0)" (IDAPA 58.01.02.250.01.a).

Under the proposed effluent limits, the predicted minimum and maximum pH at the state line are 7.12 and 7.96 standard units, respectively, which complies with the criteria for pH range for both Idaho and Washington. The maximum human-caused pH changes are an increase of 0.21 standard units, and a decrease of 0.26 standard units, which are less than the 0.5 unit human-caused variation allowed by the Washington standards. Therefore, the proposed effluent limits ensure compliance with both Washington's and Idaho's water quality standards for pH, at the state line.

Phosphorus

Neither Idaho nor Washington has statewide numeric water quality criteria for TP. However, Idaho does have a narrative criterion for nutrients (IDAPA 58.01.02.200.06), and the Spokane River is 303(d) listed for TP in Idaho. The EPA has a Clean Water Act Section 304(a) recommended water quality criterion for TP, for the western forested mountains ecoregion, which is 10 µg/L (EPA 822-B-00-015, Table 2). The criteria document recommends that nutrient criteria be applied using a seasonal or annual averaging period (Page 6).

The model predicts that, with the proposed effluent limits in place, the median TP concentration at the state line, from February through October, will be 9.1 µg/L. This is less than the EPA-recommended criterion for TP, for this ecoregion, which is 10.0 µg/L (EPA 2000). The model predicts that the proposed effluent limits will result in only a 0.8 µg/L increase relative to the February – October median TP concentration predicted under the "no source" scenario (i.e., with no discharge from any Idaho point sources, including storm water). The concentration of TP at the State line, from February through October, will be less than 10 µg/L 55% of the time, with the proposed effluent limits in place. Therefore, the effluent limits proposed in the draft permits will ensure compliance with Idaho's and Washington's narrative criteria for nutrients and aesthetics (IDAPA 58.01.02.200.06, WAC 173-201A-260(2)(b)).

Temperature

The Washington water quality standard for temperature in the Spokane River at the state line is: "Temperature shall not exceed a 1-DMax of 20.0°C due to human activities. When natural conditions exceed a 1-DMax of 20.0°C no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time exceed t=34/(T+9)" (WAC 173-201A-602).

The capital "T" represents the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge (WAC 173-201A-200(1)(c)(ii)(A)). The maximum "no source" temperature (i.e. the temperature with no discharge from any Idaho point sources) at the state line is 26.4 ºC; the value of 34/(T + 9) therefore equals 0.96 ºC. The maximum temperature increase attributable to the Idaho dischargers, at any time, is 0.27 °C, which is much less than the allowable increase (0.96 °C). At times when the predicted temperature, under the "no source" scenario, is greater than or equal to 20 ºC, the maximum temperature increase attributable to the Idaho point sources is 0.13 ºC, less than half the increase allowed by the criterion (0.3 °C).

Therefore, the Idaho dischargers do not have the reasonable potential to cause or contribute to excursions above water quality standards for temperature in the State of Washington, and it is not

necessary to include effluent limits for temperature in these permits, in order to ensure compliance with Washington's water quality criteria for temperature.

Furthermore, the EPA has determined that the Idaho dischargers do not have the reasonable potential to cause or contribute to excursions above water quality standards for temperature, in waters of the State of Idaho (Nickel 2007, 2012). Therefore, the permits do not require water quality-based effluent limits for temperature.

Ammonia

The model predicts that, under the proposed ammonia effluent limits, the maximum instantaneous concentration of ammonia at the state line will be 0.42 mg/L, which is less than either State's chronic numeric water quality criteria for ammonia, under critical conditions for temperature and pH. Thus, the effluent limits in the draft permits will ensure compliance with both States' numeric water quality criteria for ammonia, at the state line.

The State of Washington's Antidegradation Policy

In addition to ensuring compliance with the State of Washington's water quality criteria, the draft permits for the City of Coeur d'Alene, City of Post Falls, and HARSB ensure compliance with the State of Washington's antidegradation requirements (WAC 173-201A-300 – 330).

In the State of Washington, the Spokane River is currently 303(d) listed for dissolved oxygen, lead, temperature, total dissolved gas, 2,3,7,8 TCDD, and PCBs. The Spokane River is therefore not of higher quality than the applicable water quality criteria for these parameters. Therefore, the affected waters of the State of Washington are not afforded "Tier II" antidegradation protection under WAC 173-201A-320, for these parameters.

The Spokane River and Lake Spokane are 303(d)-listed for DO in the State of Washington. Washington's antidegradation policy states that "for waters that do not meet assigned criteria, or protect existing or designated uses, the department will take appropriate and definitive steps to bring the water quality back into compliance with the water quality standards." As explained above, the effluent limits for TP, $CBOD_5$, and ammonia ensure compliance with Washington's water quality criteria for dissolved oxygen. The permits contain effluent limits that ensure compliance with Idaho's water quality criteria for lead (which are more stringent than Washington's criteria) at the end-of-pipe. Thus, the lead limits are also stringent enough to ensure compliance with Washington's water quality criteria for lead. Furthermore, as explained above, these discharges do not have the reasonable potential to cause or contribute to excursions above Washington's water quality criteria for temperature. Washington's EPA-approved water quality criteria for these parameters ensure that existing and designated uses are maintained and protected, thereby ensuring compliance with Washington's Tier I antidegradation requirements (WAC 173-201A-310).

No antidegradation analysis is necessary for PCBs or 2,3,7,8 TCDD because the Idaho permits do not contain effluent limits for these parameters and there is no information demonstrating that the Idaho permittees discharge these parameters. Therefore the discharges do not allow lower water quality due to these pollutants. The permits include monitoring requirements for PCBs and 2,3,7,8 TCDD. The monitoring data will be used to determine if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs

or 2,3,7,8 TCDD. Available data indicate that the Spokane River does not exceed either State's Clean Water Act effective PCB criterion at the State line (Serdar et al. 2011).[3]

For other parameters, in general, the effluent limits in the draft permits are as stringent as or more stringent than the corresponding effluent limits in the previous permits. In those cases, the permits are not new or expanded relative to the 1999 permits, thus they will not cause a lowering of water quality under Washington's Tier II antidegradation provisions (WAC 173-201A-320).

The Spokane River has not been designated an outstanding resource water. Therefore, the Tier III antidegradation protections of WAC 173-201A-330 do not apply to the Spokane River.

Summary

The effluent limits that the EPA is proposing for TP, ammonia and $CBOD_5$ ensure a level of water quality that is derived from and complies with the applicable water quality standards of the States of Idaho and Washington, for dissolved oxygen, pH, ammonia, and nutrients, based on the cumulative impact of all human actions. Therefore, the level of water quality to be achieved by these effluent limits is derived from and complies with the applicable water quality standards of the States of Washington and Idaho, in compliance with federal regulations (40 CFR 122.4(d), 122.44(d)(1)(vii)(A), 122.44(d)(4)).

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[3] Washington's PCB criterion is identical to the criterion that is in effect for Clean Water Act purposes in Idaho.

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Appendix C: General Basis for Effluent Limits

The following discussion explains in more detail the statutory and regulatory bases for the technology and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits in general, and Part C discusses facility specific effluent limits.

A. Technology-Based Effluent Limits

Federal Secondary Treatment Effluent Limits

In sections 301(b)(1)(B) and 304(d)(1), the CWA established a performance level, referred to as "secondary treatment," which all POTWs are required to meet. The EPA developed and promulgated "secondary treatment" regulations that are found in 40 CFR 133.102. These technology-based limits identify the minimum level of effluent quality attainable by secondary treatment in terms of five-day biochemical oxygen demand (BOD_5) or five-day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), and pH.

The regulations allow effluent limits for oxygen demanding material to be expressed as either BOD_5 or $CBOD_5$, at the option of the permitting authority. The EPA has chosen to express the effluent limits in terms of $CBOD_5$ in this case. The federally promulgated secondary treatment effluent limits are listed in Table C-1.

Table C-1: Secondary Treatment Effluent Limits (40 CFR 133.102)

Parameter	Average Monthly Limit	Average Weekly Limit	Range
$CBOD_5$	25 mg/L	40 mg/L	—
TSS	30 mg/L	45 mg/L	—
Removal Rates for $CBOD_5$ and TSS	85% (minimum)	—	—
pH	—	—	6.0 – 9.0 s.u.

The EPA has determined that the secondary treatment $CBOD_5$ effluent limits are adequately stringent to protect water quality in the States of Idaho and Washington from November through January. From February through October, more stringent water quality-based $CBOD_5$ effluent limits apply (see Appendix B).

The EPA has determined that the secondary treatment TSS limits are adequately stringent to protect water quality in the Spokane River at all times, therefore, the TSS limits in the draft permit are the secondary treatment limits.

The EPA has determined that the secondary treatment pH effluent limits are not stringent enough to protect water quality in the Spokane River. Therefore, more stringent water quality-based pH effluent limits apply.

Chlorine

The Post Falls facility generally uses ultraviolet disinfection in lieu of chlorine. Therefore, there are no technology-based chlorine limits that are applicable to the discharge.

Mass-Based Limits

Effluent limits are generally calculated on a concentration basis. The federal regulation at 40 CFR 122.45(f) generally requires that effluent limits be expressed in terms of mass. The regulation at 40 CFR 122.45(b)(1) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass based limits are expressed in pounds per day and are generally calculated from the corresponding concentration limits as follows:

Mass based limit (lb/day) = concentration limit (mg/L or ppm) × design flow (mgd) × 8.34[1]

For example, the technology-based mass limits for $CBOD_5$ are as follows:

<u>Average Monthly Limit:</u>

25 mg/L × 5 mgd × 8.34 lb/gallon = 1043 lb/day

<u>Average Weekly limit:</u>

40 mg/L × 5 mgd × 8.34 lb/gallon = 1668 lb/day

One exception to this method of calculating mass effluent limits is for lead and zinc. For these pollutants, there are two sets of mass limits. One set of mass limits are identical to the mass limits in the prior permit, even though the design flow of the POTW has increased from 3.48 mgd at the time the prior permit was issued, to 5 mgd. This is based on a stipulation of Idaho DEQ's draft Clean Water Act Section 401 certification, which requires that the total mass of cadmium, lead and zinc remain constant or decrease within the watershed, consistent with IDAPA 58.01.02.055.04 (see the draft permit at Table 3). The other set of mass effluent limits for lead and zinc are based on the CWA and federal regulations and are calculated from the concentration limits, based on the design flow of the POTW, as described above (see the draft permit at Table 4). The effluent limits for lead and zinc are discussed in more detail below.

From February – October, the mass limits for CBOD are calculated independently of the concentration limits. The concentration limits are technology-based at all times. The mass limits for $CBOD_5$ are water quality-based from February – October and technology-based from November – January.

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. The NPDES regulation 40 CFR 122.44(d)(1) implementing Section 301(b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality. Effluent limits must also meet the applicable water quality requirements of affected States other than the State in which the discharge originates, which may include downstream States (40 CFR 122.4(d), 122.44(d)(4), see also CWA Section 401(a)(2)).

[1] 8.34 is the density of water, in units of pounds per gallon.

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation for the discharge in an approved TMDL. There are no approved TMDLs that specify wasteload allocations for this discharge; all of the water quality-based effluent limits are calculated directly from the applicable water quality standards.

Reasonable Potential Analysis

When evaluating the effluent to determine if water quality-based effluent limits are needed based on numeric criteria, the EPA projects the receiving water concentration for each pollutant of concern. The EPA uses the concentration of the pollutant in the effluent and receiving water and, if appropriate, the dilution available from the receiving water, to project the receiving water concentration. Dilution is considered in the reasonable potential analysis if and only if the State authorizes a mixing zone in its draft CWA Section 401 certification. If the projected concentration of the pollutant in the receiving water exceeds the numeric criterion for that specific chemical, then the discharge has the reasonable potential to cause or contribute to an excursion above the applicable water quality standard, and a water quality-based effluent limit is required.

Mixing Zones

Sometimes it is appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body, and decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and the receiving water meets the criteria necessary to protect the designated uses of the water body. Mixing zones are authorized by the Idaho Department of Environmental Quality (IDEQ). Based on IDEQ's draft Clean Water Act Section 401 certification, some of the water quality-based effluent limits in this permit have been calculated using a mixing zone. Effluent limit and reasonable potential calculations for cadmium, lead, and zinc did not use mixing zones because the receiving water does not meet water quality standards for those pollutants. If IDEQ does not authorize mixing zones in the final Clean Water Act Section 401 certification for certain parameters, the water quality-based effluent limits for those parameters will be recalculated such that the criteria are met before the effluent is discharged to the receiving water.

Procedure for Deriving Water Quality-based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an excursion above water quality standards in the receiving water.

In cases where a mixing zone is not authorized (for lead and zinc, in this case), either because the receiving water already exceeds the criterion, the receiving water flow is too low to provide dilution, or the State does not authorize one, the criterion becomes the WLA. Establishing the

criterion as the wasteload allocation ensures that the permittee will not cause or contribute to an excursion above the criterion. The following discussion details the specific water quality-based effluent limits in the draft permit.

Once a WLA is developed, the EPA calculates effluent limits which are protective of the WLA using statistical procedures described in Appendix E.

C. Facility-Specific Limits

pH

The most stringent water quality criteria for pH are for the protection of aquatic life uses. The "aquatic life" pH criteria state that the pH must be no less than 6.5 and no greater than 9.0 standard units.

The permittee has collected pH and alkalinity data for the effluent. The EPA obtained pH and alkalinity data for the receiving water from the USGS. The EPA has used these data to determine the discharge's effects on the pH of the receiving water. The EPA believes that a mixing zone for pH is appropriate.

The proposed pH limits are 6.3 to 9.0 from October through June and 6.4 to 9.0 from July through September. If IDEQ does not grant a mixing zone for pH in its final CWA Section 401 certification, the EPA will change the pH limits to a range of 6.5 to 9.0 standard units year round, thus requiring that the pH criteria are met before the effluent is discharged to the receiving water. See Appendix F for effluent limit calculations for pH.

Total Phosphorus

The EPA has determined that the phosphorus in the permitted discharge, together with the discharges of phosphorus from HARSB and the City of Coeur d'Alene as well as municipal stormwater discharged to the Spokane River in Idaho, has the reasonable potential to cause or contribute to excursions above water quality criteria dissolved oxygen in the State of Washington, downstream of the discharge. The EPA has calculated water quality-based effluent limits for total phosphorus which ensure a level of water quality that is derived from and complies with the applicable water quality requirements of both Washington and Idaho. See Appendix B for a complete discussion of the calculation of water quality-based effluent limits for total phosphorus.

Ammonia

As explained in Appendix B, the EPA has determined that, independent of any concerns about the Post Falls facility's discharge of ammonia causing or contributing to excursions above water quality standards for ammonia in waters of the State of Idaho, the Post Falls facility's discharge of ammonia, in combination with other sources of oxygen-demanding pollution, has the reasonable potential cause or contribute to nonattainment of Washington's water quality standards for dissolved oxygen (DO), from February – October. Therefore effluent limits are necessary for ammonia, from February – October, in order to ensure compliance with Washington's water quality standards for DO.

During the winter (i.e., November – January), the EPA has determined that the ammonia effluent concentration (i.e., mg/L) limits that were in the 1999 permit will ensure compliance with Idaho's numeric water quality criteria for ammonia, even if the facility is discharging at its new, higher design flow rate of 5 mgd. Similarly, from July – September, the ammonia effluent concentration (i.e., mg/L) limits that were in the 1999 permit will ensure compliance with Idaho's numeric water quality criteria for ammonia. Therefore, the ammonia concentration limits for November – January and from July – September have been carried forward in the draft permit, consistent with the anti-backsliding provisions of the Clean Water Act (§§ 303(d)(4) and 402(o)).

The EPA has re-calculated the mass effluent limits for ammonia, for July – September November – January, based on the increased design flow of the POTW, consistent with 40 CFR 122.45(b)(1). The revised mass limits are less stringent than those in the prior permit, in proportion to the increased design flow of the POTW. The increased design flow of the POTW is a material and substantial alteration or addition to the permitted facility, which provides an exception to the anti-backsliding provisions of the Clean Water Act (Section 402(o)(2)(A)).

The seasonal average effluent limit for ammonia (which applies from February – October) is much more stringent than the effluent limits that had applied from October – June in the prior (1999) permit. Therefore, it is not necessary to retain the prior permit's ammonia effluent limits from February – June or during October in order to comply with the anti-backsliding provisions of the CWA. In addition, the EPA has determined that it is not necessary to establish shorter term (e.g. maximum daily and average monthly) limits for ammonia, from February – June or during October, in order to ensure compliance with Idaho's water quality criteria for ammonia.

Five-Day Carbonaceous Biochemical Oxygen Demand

As stated above, the EPA has promulgated technology-based effluent limits for $CBOD_5$. The technology-based limits apply from November through January.

However, the EPA has determined that, from February through October, more stringent mass effluent limits are necessary for $CBOD_5$, in order to ensure compliance with water quality criteria for dissolved oxygen in the State of Washington. The concentration and removal rate limits remain technology-based, year-round. See Appendix B for a complete discussion of the basis for the water quality-based mass effluent limits for $CBOD_5$ for February – October.

Metals

In the 1999 permit, the EPA established "criteria end-of-pipe" water quality-based effluent limits for lead and zinc. Since the Spokane River is 303(d) listed for cadmium, lead, and zinc, the river has no assimilative capacity to dilute these metals in an effluent. Therefore, no mixing zone may be authorized for cadmium, lead, or zinc.

The numeric values of the acute and chronic water quality criteria for cadmium, lead, zinc, and certain other metals are dependent upon the hardness of the water. For the criteria end-of-pipe reasonable potential and effluent limit calculations for cadmium, lead and zinc, the effluent hardness was used to calculate the water quality criteria. As long as the concentrations of cadmium, lead, and zinc in the effluent are below the water quality criteria (calculated at the

effluent hardness) the effluent will not cause or contribute to an in-stream excursion above water quality standards as it mixes with the receiving water.[2]

Concentration Limits for Lead and Zinc

The EPA has determined that the concentration (i.e., µg/L) effluent limits for lead and zinc in the 1999 permit are stringent enough to ensure compliance with water quality criteria, with no mixing zone. Therefore, the 1999 permit's concentration effluent limits have been continued forward in the draft reissued permit, consistent with the antibacksliding provisions of the CWA (Section 402(o)).

A reasonable potential analysis, which did not consider the dilution of the effluent in the receiving water, showed that the discharge does not have the reasonable potential to cause or contribute to excursions above water quality criteria for cadmium. Therefore, the permit does not include any concentration effluent limits for cadmium.

The concentration limits for lead and zinc appear in Table 1 of the draft permit, and they are not subject to the offset plan provision in Part I.C.1 of the draft permit. The offset plan provision applies only to the loading effluent limits specified by the State of Idaho in its draft CWA Section 401 certification, as discussed below. The permittee must comply with the concentration limits for lead and zinc at the point of discharge regardless of any offset plan.

Loading Limits Necessary to Comply with the State's Draft CWA Section 401 Certification

One set of effluent loading limits for cadmium, lead, and zinc in the draft permit are those that are necessary to ensure compliance with Idaho State law, as specified in the draft CWA Section 401 certification. These limits are shown in Table 3 of the draft permit.

IDAPA 58.01.02.055.04 requires that the total load of pollutants causing water quality limited listings must remain constant or decrease within the watershed until a TMDL or equivalent process is completed. Therefore, the lead and zinc loading limits must be at least as stringent as those in the 1999 permit (i.e., they must be based on the design flow of the POTW as it existed in 1999, even though the design flow has increased) in order to ensure compliance with IDAPA 58.01.02.055.04. In addition, even though the 1999 permit did not include effluent limits for cadmium and the discharge does not have the reasonable potential to cause or contribute to excursions above water quality criteria for cadmium, the facility does discharge cadmium. To ensure that the total loading of cadmium does not increase, the State of Idaho specified effluent limits for cadmium in its CWA Section 401 certification. These effluent limits must be incorporated into the permit (40 CFR 122.44(d)(3), 124.53(e), 124.55(a)(2)).

The State of Idaho's CWA Section 401 certification provides that the permittee may increase its loading of cadmium, lead and zinc above the loading limits that are based on the certification (shown in Table 3 of the draft permit), if and only if prior to the discharge of an increased load, an offset plan developed by the permittee and approved by DEQ is in place. The offset plan must demonstrate that the additional metals loading from the increased discharge will be offset by

[2] Because the shape of the lead criteria curves, when plotted against hardness, are "concave up," (i.e., the second derivative is always positive), calculating criteria end-of-pipe water quality-based effluent limits for lead, using the hardness of the effluent, can contribute to excursions above water quality criteria as the discharge mixes with a receiving water that is softer than the effluent. This was addressed in this case by calculating a tangent line to the water quality criteria at the State of Idaho's hardness "floor" of 25 mg/L as $CaCO_3$ and calculating water quality-based effluent limits based on the tangent line.

other actions or projects in the watershed and will otherwise meet concentration limits of this permit. Once approved by DEQ, Post Falls must implement the approved offset plan in order to increase its load of cadmium, lead and zinc.

The offset plan cannot be used to demonstrate compliance with any of the effluent limits in Table 1 or Table 4 of the draft permit; it may only be used to demonstrate compliance with effluent limits in Table 3 of the draft permit.

Loading Limits Necessary to Ensure Compliance with the CWA and Federal Regulations

The other effluent loading (i.e., lb/day) limits for lead and zinc are those that are necessary to ensure compliance with water quality criteria, which is a requirement of the CWA (40 CFR 122.44(d)(1)(vii)(A)). These loading limits are shown in Table 4 of the draft permit. If any approved offset plan for the lead and zinc limits in Table 3 effectively results in loading limits less stringent than the lead and zinc limits in Table 4, then the limits in Table 4 are the loading limits that the permittee must meet. In other words, the permittee must comply with the effluent limits for lead and zinc in Table 4 at the point of discharge, regardless of any offset plan.

As stated above, the discharge does not have the reasonable potential to cause or contribute to excursions above water quality criteria for cadmium. Therefore effluent limits are not necessary to ensure compliance with water quality criteria for cadmium, and there are therefore no loading effluent limits for cadmium in Table 4.

The loading effluent limits for lead and zinc in Table 4 are less stringent than those in the 1999 permit. This is because the design flow of the facility has increased, from 3.48 mgd at the time the 1999 permit was issued, to 5.0 mgd. Loading effluent limits for POTWs are generally calculated from the concentration limits, based on the design flow rate of the POTW (40 CFR 122.45(b)(1)). The physical expansion of the POTW to a larger design capacity is a material and substantial alteration which justifies less stringent loading effluent limits for lead and zinc, relative to the 1999 permit (CWA Section 402(o)(2)(A)). Thus, for the purposes of complying with the CWA (as distinct from Idaho state law) the lead and zinc loading limits may be less stringent than the corresponding limits in the 1999 permit.

The EPA is specifically requesting public comments on the effluent loading (i.e. lb/day) limits for cadmium, lead and zinc.

Copper

The EPA has determined that the prior permit's concentration effluent limits for copper will ensure compliance with water quality standards for copper, even when discharging at the new, higher design flow rate of 5 mgd. Therefore the prior permit's concentration effluent limits, which were applicable from July – September, have been continued forward under the anti-backsliding provisions of the Clean Water Act. The EPA has re-calculated the mass effluent limits for copper, for July – September, based on the increased design flow of the POTW (40 CFR 122.45(b)(1)). The revised mass limits are less stringent than those in the prior permit, in proportion to the increased design flow of the POTW. The increased design flow of the POTW is a material and substantial alteration or addition to the permitted facility, which provides an exception to the anti-backsliding provisions of the Clean Water Act (Section 402(o)(2)(A)).

The EPA has determined that the discharge does not have the reasonable potential to cause or contribute to excursions above water quality standards for copper from October – June. Therefore, no effluent limits are proposed for copper for October – June.

E. Coli

The Idaho water quality standards state that waters of the State of Idaho that are designated for recreation are not to contain E. coli bacteria in concentrations exceeding a geometric mean of 126 organisms per 100 ml based on a minimum of five samples taken every three to seven days over a thirty day period. Therefore, the draft permit contains a monthly geometric mean effluent limit for E. coli of 126 organisms per 100 ml, and a minimum sampling frequency of five grab samples per month (IDAPA 58.01.02.251.01.a.).

The Idaho water quality standards also state that a water sample that exceeds certain "single sample maximum" values indicates a likely exceedance of the geometric mean criterion, although it is not, in and of itself, a violation of water quality standards. For waters designated for primary contact recreation, the "single sample maximum" value is 406 organisms per 100 ml (IDAPA 58.01.02.251.01.b.ii.).

The goal of a water quality-based effluent limit is to ensure a low probability that water quality standards will be exceeded in the receiving water as a result of a discharge, while considering the variability of the pollutant in the effluent (see TSD at Section 5.3.1). Because a single sample value exceeding 406 organisms per 100 ml indicates a likely exceedance of the geometric mean criterion, the EPA has imposed an instantaneous (single grab sample) maximum effluent limit for E. coli of 406 organisms per 100 ml, in addition to a monthly geometric mean limit of 126 organisms per 100 ml, which directly implements the water quality criterion for E. coli. This will ensure that the discharge will have a low probability of exceeding water quality standards for E. coli.

Regulations at 40 CFR 122.45(d)(2) require that effluent limitations for continuous discharges from POTWs be expressed as average monthly and average weekly limits, unless impracticable. The terms "average monthly limit" and "average weekly limit" are defined in 40 CFR 122.2 as arithmetic (as opposed to geometric) averages.

It is impracticable to properly implement a 30-day geometric mean criterion in a permit using monthly and weekly arithmetic average limits. The geometric mean of a given data set is equal to the arithmetic mean of that data set if and only if all of the values in that data set are equal. Otherwise, the geometric mean is always less than the arithmetic mean. In order to ensure that the effluent limits are "derived from and comply with" the geometric mean water quality criterion, as required by 40 CFR 122.44(d)(1)(vii)(A), it is necessary to express the effluent limits as a monthly geometric mean and an instantaneous maximum limit.

Chlorine

Although the Post Falls facility uses ultraviolet disinfection, the City has continued to monitor the effluent for chlorine, as required by its 1999 permit. The effluent data indicate that the facility has the reasonable potential to cause or contribute to excursions above water quality standards for chlorine if and only if chlorine is used in the treatment process. Therefore, the draft permit proposes water quality-based effluent limits for chlorine when chlorine is used in the treatment process. The facility does not have the reasonable potential to cause or contribute to excursions above water quality standards for chlorine when chlorine is not used in the treatment process, so no effluent limits are proposed when chlorine is not used in the treatment process.

D. Summary of Limits and Bases

The following table summarizes the general statutory and regulatory bases for the limits in the draft permit.

Table C-3 Summary of Bases for Effluent Limits and BMP Requirements	
Limited Parameter	**Basis for Limit**
$CBOD_5$ (concentration & removal rate)	Clean Water Act (CWA) Section 301(b)(1)(B), 40 CFR 133 (technology-based)
$CBOD_5$ (mass, November – January)	Clean Water Act (CWA) Section 301(b)(1)(B), 40 CFR 133, 40 CFR 122.45(b)(1), 122.45(f) (technology-based, mass limits)
$CBOD_5$ (mass, February – October)	CWA Section 301(b)(1)(C), 40 CFR 122.4(d), 40 CFR 122.44(d), WAC 173-201A-200(1)(d)(ii) (water quality-based, all affected States)
TSS	CWA Section 301(b)(1)(B), 40 CFR 133 , 40 CFR 122.45(b)(1), 122.45(f) (technology-based, mass limits)
pH	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.250.01.a, IDAPA 58.01.02.060 (water quality-based, with mixing zone)
Phosphorus (February – October)	CWA Section 301(b)(1)(C), 40 CFR 122.4(d), 40 CFR 122.44(d), WAC 173-201A-200(1)(d)(ii) (water quality-based, all affected States)
Phosphorus Management Plan	40 CFR 122.44(k) (best management practices)
Floating, Suspended or Submerged Matter	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.200.05 (water quality-based)
E. Coli	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.251.01 (water quality-based)
Chlorine	CWA 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.210, IDAPA 58.01.02.060 (water quality-based, with mixing zone)
Ammonia (February – October)	CWA Section 301(b)(1)(C), 40 CFR 122.4(d), 40 CFR 122.44(d), WAC 173-201A-200(1)(d)(ii) (water quality-based, all affected States)
Ammonia (concentration, November – January and July – September)	CWA Section 402(o) (anti-backsliding)
Ammonia (mass, November – January, and average monthly and maximum daily mass from July – September)	40 CFR 122.45(f), 40 CFR 122.45(b)(1) (mass limits)
Cadmium	40 CFR 122.44(d)(3), 124.53(e), 124.55(a)(2), IDAPA 58.01.02.055.04 (conforming to the conditions of a CWA Section 401 certification)
Lead	CWA Section 301(b)(1)(C), 40 CFR 122.4(d), 40 CFR 122.44(d), 122.44(d)(3), 124.53(e), 124.55(a)(2) IDAPA 58.01.02.055.04, IDAPA 58.01.02.210 (water quality-based, conforming to the conditions of a CWA Section 401 certification)
Zinc	CWA Section 301(b)(1)(C), 40 CFR 122.4(d), 40 CFR 122.44(d), 122.44(d)(3), 124.53(e), 124.55(a)(2) IDAPA 58.01.02.055.04, IDAPA 58.01.02.210 (water quality-based, conforming to the conditions of a CWA Section 401 certification)
Toxics Management Plan	40 CFR 122.44(k) (best management practices)

Appendix D: Reasonable Potential Calculations

The following describes the process the EPA has used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to an excursion above Idaho's federally approved water quality standards for certain pollutants. The EPA generally uses the process described in Section 3.3 of the *Technical Support Document for Water Quality-based Toxics Control* (EPA 1991) to determine reasonable potential.

To determine if there is reasonable potential for the discharge to cause or contribute to an excursion above water quality criteria for a given pollutant, the EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, then the discharge has the reasonable potential to cause or contribute to excursions above water quality standards, and a water quality-based effluent limit must be included in the permit. This section discusses how the maximum projected receiving water concentration is determined.

A. Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_dQ_d = C_eQ_e + C_uQ_u \quad \text{(Equation D-1)}$$

where,

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = Maximum projected effluent concentration
C_u = 95th percentile measured receiving water upstream concentration
Q_d = Receiving water flow rate downstream of the effluent discharge = $Q_e + Q_u$
Q_e = Effluent flow rate (generally set equal to the design flow of the treatment plant per 40 CFR 122.45(b)(1)).
Q_u = Receiving water low flow rate upstream of the discharge (e.g. 1Q10, 7Q10)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_eQ_e + C_uQ_u}{Q_e + Q_u} \quad \text{(Equation D-2)}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving stream and that 100% of the stream flow is available for mixing. However, the Idaho water quality standards generally restrict the percentage of the stream flow that may be allowed for dilution of the effluent. When the mixing zone uses less than 100% of the stream flow, the equation becomes:

$$C_d = \frac{C_eQ_e + C_u(Q_u \times MZ)}{Q_e + (Q_u \times MZ)} \quad \text{(Equation D-3)}$$

In the above equation, MZ is the fraction of the receiving water flow available for dilution. The Idaho water quality standards generally limit mixing zones to 25% of the volume of the stream

flow (IDAPA 58.01.02.060). The MZ was generally set equal to 0.25 (25%) for the reasonable potential analysis. Exceptions include cadmium, lead, and zinc (because the receiving water is impaired for those parameters and cannot provide dilution of the effluent, therefore no mixing zone may be authorized for those parameters).

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \text{(Equation D-4)}$$

The criteria for the metals of concern are expressed as dissolved metal. However, effluent limits for metals in NPDES permits must be expressed as total recoverable metal. The dissolved criterion must be converted to an equivalent total recoverable concentration by using a conversion factor, as shown in Equation D-5:

$$C_d = CF \times C_e \qquad \text{(Equation D-5)}$$

Equation D-3 can be simplified by introducing a "dilution factor,"

$$D = \frac{Q_e + 0.25 \times Q_u}{Q_e} \qquad \text{(Equation D-6)}$$

The dilution factors for the various seasons for the reasonable potential analysis are shown in Table D-1, below:

Table D-1: Dilution Factors

Season or Parameter	**Mixing Zone** (% of critical flow)	**Acute Dilution Factor** (1Q10)	**Chronic Dilution Factor** (7Q10)	**Chronic Ammonia Criterion Dilution Factor** (30Q10)	**Human Health Non-Carcinogen Dilution Factor** (30Q5)	**Human Health Carcinogen Dilution Factor** (Harmonic Mean)
Full Year	25%	N/A	N/A	N/A	17.2	67.2
July – September	25%	17.2	17.2	17.2	N/A	N/A
October – June	25%	12.8	34.3	42.0	N/A	N/A
Cadmium, lead, and zinc	No mixing zone (receiving water is impaired)					

After the dilution factor simplification, Equation D-2 becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation D-7)}$$

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as shown in Equation D-8, which applies when a mixing zone may be granted for a metal with criteria expressed as dissolved metal.

$$C_d = \left[\frac{CF \times C_e - C_u}{D}\right] + C_u \qquad \text{(Equation D-8)}$$

In equation D-8, C_e is expressed as total recoverable metal and C_d and C_u are expressed as dissolved metal.

Equations D-5, D-7, and D-8 are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.

B. Maximum Projected Effluent Concentration

Total Suspended Solids

This facility is subject to technology-based effluent limits for TSS. In order to determine if the technology-based effluent limits are stringent enough to ensure compliance with water quality standards, the EPA has used the average weekly technology-based effluent limits as the maximum projected effluent concentration.

Parameters with Water Quality-based Effluent Limits in the 1999 Permit

For parameters that were subject to water quality-based effluent limits in the 1999 permit and for which effluent are not necessary to meet Washington's water quality standards (copper, lead, zinc, and ammonia from November – January and July – September) the EPA has used the maximum daily effluent limits in the 1999 permit as the maximum projected effluent concentrations. This allows the EPA to determine if the effluent limits in the 1999 permit are stringent enough to prevent the discharge from causing or contributing to excursions above water quality standards for these pollutants. If a discharge at the maximum daily limits in the 1999 permit did not have the reasonable potential to cause or contribute to excursions above water quality standards, the EPA retained the 1999 effluent limits under the anti-backsliding provisions of the Act (Section 402(o)). Similarly, if a discharge at the maximum daily limits in the 1999 permit appeared to have the reasonable potential to cause or contribute to excursions above water quality standards, but re-calculated effluent limits were less stringent than the 1999 effluent limits, the EPA retained the 1999 effluent limits under the anti-backsliding provisions of the Act.

Although chlorine was subject to water quality-based effluent limits in the 1999 permit, the EPA has used effluent data to calculate a maximum projected effluent concentration for chlorine, because the facility now uses ultraviolet disinfection, and the effluent limits in the 1999 permit therefore may not be representative of the current concentrations of chlorine in the discharge. The use of actual effluent data also allows the EPA to determine if the effluent concentrations of chlorine change based on whether chlorine is used in the treatment process, and, if so, if that change affects the reasonable potential determination. Also, an exception to the anti-backsliding provisions of the Act is applicable to chlorine, because of the switch to ultraviolet disinfection (material and substantial alterations or additions, CWA Section 402(o)(2)(A)).

As shown in Table 2, below, the Post Falls facility has the reasonable potential to cause or contribute to excursions above water quality standards if and only if chlorine is used in the treatment process.

Ammonia Limits Necessary to Meet Washington Water Quality Standards

The EPA has determined that, independent of Idaho's water quality standards, effluent limits for ammonia are necessary from February – October to ensure compliance with Washington's water quality standards for DO (see Appendix B).

The ammonia effluent limit that is necessary to meet Washington's water quality standards for DO is expressed as a seasonal average loading limit. This limit allows for significant variability in the effluent ammonia loading and, by itself, would not necessarily ensure compliance with acute and chronic water quality criteria for ammonia, which have much shorter averaging periods (i.e., 30 days for the chronic criterion and 1 hour for the acute criterion).

Therefore, for February – October, instead of using the seasonal average effluent limit to calculate the maximum projected effluent ammonia concentration, the EPA has used the procedure described in section 3.3 of the TSD, and under "Other Parameters," below, to determine if short-term effluent limits were necessary to ensure compliance with Idaho's water quality criteria for ammonia, based on the historical effluent data.

Other Parameters

To calculate the maximum projected effluent concentration for parameters not specifically discussed above, the EPA has used the procedure described in section 3.3 of the TSD, "Determining the Need for Permit Limits with Effluent Monitoring Data." In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration in the mass balance equation.

Since there are a limited number of data points available in most cases, the 99th percentile is calculated by multiplying the maximum reported effluent concentration by a "reasonable potential multiplier" (RPM). The RPM is the ratio of the 99th percentile concentration to the maximum reported effluent concentration. The RPM is calculated from the coefficient of variation (CV) of the data and the number of data points. The CV is defined as the ratio of the standard deviation of the data set to the mean, but when fewer than 10 data points are available, the TSD recommends making the assumption that the CV is equal to 0.6.

In addition to Section 3.3 of the TSD, the procedures for calculating a maximum projected effluent concentration from effluent data are described in detail in Appendix D of the fact sheet dated February 16, 2007. The results of the reasonable potential analysis are described below.

<u>Cadmium</u>

The EPA used the 95th percentile effluent concentration for cadmium, instead of the more conservative 99th percentile, which was used for other parameters. The EPA believes this is appropriate for the following reasons.

First, the maximum measured effluent concentration of cadmium (0.79 µg/L, measured in July 2010) is more than twice the next-highest concentration (0.35 µg/L, measured in April 2011), is eight standard deviations above the mean, and is a statistical outlier at a significance level of 1%. Therefore, an effluent cadmium concentration of similar magnitude is unlikely to be observed again in the future. Furthermore, effluent cadmium concentrations measured after April 2010 are statistically significantly higher than those measured before April 2010. The highest effluent cadmium concentration measured between January 2004 and April 2010 is only 0.12 µg/L (measured in May 2008).

In order to investigate the recent apparent increase on cadmium concentrations, the City of Post Falls sent split effluent samples to two alternative laboratories in addition to the laboratory that the City had been using for cadmium measurements for the past several years, in August 2011. In these split samples, the median cadmium concentration measured by the City's usual

laboratory was 0.18 µg/L, which is six times the median concentration measured in the split samples by the two alternative laboratories (0.03 µg/L). The median concentration measured by the two alternative laboratories in August 2011 was close to the median concentration measured from January 2004 through April 2010 (0.017 µg/L). The difference between the measurements of the August 2011 split samples from the usual laboratory and the two alternative laboratories is statistically significant (P = 0.0385). This information suggests that cadmium results measured by the City's usual lab after April 2010 may be artificially high.

In Section 3.3.2, the TSD states that, "although (the 99th percentile) does represent a measure of the upper bound of an effluent distribution, other percentiles could be selected by a regulatory agency." As explained above, the cadmium concentrations measured after April 2010 may be artificially high. Although there is not enough information to justify discarding the cadmium results measured after April 2010 from the reasonable potential analysis, the EPA believes it is appropriate to use a lower (i.e., less conservative) effluent percentile value in the reasonable potential analysis for cadmium, because there is conservatism inherent in including the statistical outlier (0.79 µg/L) as well as other high values measured after April 2010 in the reasonable potential analysis. The TSD provides a table of reasonable potential multipliers for both the 95th and 99th percentiles (Tables 3-1 and 3-2). Therefore, the EPA believes, in this case, it is appropriate to use the 95th percentile effluent concentration as the maximum projected effluent concentration for cadmium, instead of the 99th percentile.

C. Results

Tables 2 and 3, below, summarize the reasonable potential calculations.

Table 2: Reasonable Potential Calculations (Except Cadmium)

Effluent Percentile value	99%																
				State Water Quality Standard		Max concentration at edge of...											
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	Acute ug/L	Chronic ug/L	Acute Mixing Zone ug/L	Chronic Mixing Zone ug/L	LIMIT REQ'D?	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
Ammonia, Prev. Lim. (Oct - June)	1.00	1.00	0.1000	6.75	2.38	3.18	2.28	NO	N/A	91.7	N/A	N/A	N/A	1.00	29.8	42.0	25% MZ
Ammonia, Prev. Lim. (Jul-Sep)	1.00	1.00	0.1000	6.75	1.42	1.81	1.81	YES	N/A	29.5	N/A	N/A	N/A	1.00	17.2	17.2	25% MZ
Ammonia, Effluent (July - Sept)	1.00	1.00	0.1000	6.75	1.42	2.87	0.52	NO	0.992	8.40	3.59	1.62	575	0.87	2.62	17.16	2.5 MZ Acute, 25% MZ Chronic
Ammonia, Effluent (Oct - June)	1.00	1.00	0.1000	6.75	2.38	1.97	0.27	NO	0.992	8.40	3.59	1.62	575	0.87	3.88	42.04	2.5 MZ Acute, 25% MZ Chronic
Butylbenzyl phthalate	1.00	1.00			1500		1.08	NO	0.010	1.40	0.60	0.55	1	13.20		17.16	25% MZ
Chlorine (July - Sept)	1.00	1.00		19.0000	11.0000	4.57	4.57	NO	0.997	100	0.56	0.52	1749.00	0.78	17.16	17.16	25% MZ, Cl not used
Chlorine (Oct - June)	1.00	1.00		19.0000	11.0000	2.64	2.29	NO	0.997	100	0.56	0.52	1749.00	0.78	29.76	34.29	25% MZ, Cl not used
Chlorine (July - Sept)	1.00	1.00		19.0000	11.0000	22.85	22.85	YES	0.957	295	0.50	0.47	106.00	1.33	17.16	17.16	25% MZ, Cl used
Chlorine (Oct - June)	1.00	1.00		19.0000	11.0000	13.17	11.43	YES	0.957	295	0.50	0.47	106.00	1.33	29.76	34.29	25% MZ, Cl used
Copper (July - Sept. Prev. Conc. Lim)	0.96	0.96		4.6090	3.4719	1.55	1.55	NO	N/A	27.70	N/A	N/A	N/A	1.00	17.16	17.16	25% MZ
Copper (Oct - June)	0.96	0.96		4.6090	3.4719	0.29	0.25	NO	0.936	7.34	0.26	0.25	70	1.23	29.76	34.29	25% MZ
Diethyl phthalate	1.00	1.00			17000		1.08	NO	0.010	1.40	0.60	0.55	1	13.20		17.16	25% MZ
Di-N-butyl phthalate	1.00	1.00			2000		1.23	NO	0.010	1.60	0.60	0.55	1	13.20		17.16	25% MZ
Lead (EOP, Prev. Lim.)	0.79	0.79		59.3	2.3	3.01	3.01	YES	N/A	3.79	N/A	N/A	N/A	1.00	1	1	RW Impaired; no MZ
Nitrate + Nitrite	1.00	1.00	0.0760		10		1.55	NO	0.924	23.56	0.08	0.08	58	1.07		17.16	25% MZ
Phenol	1.00	1.00			21000		6.92	NO	0.010	9.00	0.60	0.55	1	13.20		17.16	25% MZ
TSS (TBEL)	1.00	1.00	4.0000	25.0000	25.0000	6.39	6.39	NO	N/A	45.00	0.60	0.55	N/A	1.00	17.16	17.16	25% MZ
WET	1.00	1.00		3.0000	1.0000	0.19	0.19	NO	0.750	2.00	0.31	0.30	16	1.64	17.16	17.16	25% MZ
Zinc (EOP, prev. lim.)	0.98	0.99		115	116	112	113	NO	N/A	115	N/A	N/A	N/A	1.00	1	1	RW Impaired; no MZ

Table 3: Reasonable Potential Calculations for Cadmium

Effluent Percentile value	95%																
				State Water Quality Standard		Max concentration at edge of...											
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	Acute ug/L	Chronic ug/L	Acute Mixing Zone ug/L	Chronic Mixing Zone ug/L	LIMIT REQ'D?	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
Cadmium (EOP)	0.95	0.91		1.31	0.56	0.53	0.51	NO	0.973	0.79	1.75	1.19	110	0.71	1	1	RW Impaired; no MZ

D. References

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

Appendix E: WQBEL Calculations – Acute and Chronic Numeric Aquatic Life Criteria

The discussion explains how water quality-based effluent limits (WQBELs) in the draft permit were calculated based on Idaho's numeric water quality criteria for aquatic life uses. The calculations for all WQBELs based on aquatic life criteria are summarized in Table 1, below.

A. Calculate the Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis. These equations are explained in Appendix D. To calculate the wasteload allocations, the downstream concentration (C_d) is set equal to the acute or chronic water quality criterion and the equation is solved for the effluent concentration (C_e). The calculated C_e is the acute or chronic WLA. Equation D-6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u \qquad \text{(Equation E-1)}$$

Idaho's water quality criteria for some metals are expressed as the dissolved fraction, but the Federal regulation at 40 CFR 122.45(c) requires that effluent limits be expressed as total recoverable metal. Therefore, the EPA must calculate a wasteload allocation in total recoverable metal that will be protective of the dissolved criterion. This is accomplished by dividing the WLA expressed as dissolved by the criteria translator (CT), as shown in equation E-2.

$$C_e = WLA = \frac{D \times (C_d - C_u) + C_u}{CT} \qquad \text{(Equation E-2)}$$

Or, if no mixing zone is allowed, for metals with criteria expressed as the dissolved fraction:

$$C_e = WLA = C_d \div CT \qquad \text{(Equation E-3)}$$

Mixing Zones

Mixing zones for effluent limit calculations are the same as those used for the reasonable potential analysis and described in Appendix D.

B. Basis for Expressing Effluent Limits for Toxic Parameters as Average Monthly and Maximum Daily Limits

In general, effluent limits for POTWs must be expressed as average monthly and average weekly limits (40 CFR 122.45(d)(2)). In order to prevent acute toxicity to aquatic life, the Technical Support Document for Water Quality-based Toxics Control ("TSD") recommends that effluent limits for pollutants which may be toxic to aquatic life be expressed as average monthly and maximum daily limits, because an average weekly limit has an averaging period that is too long to ensure that acute toxicity is prevented (see TSD at section 5.2.3). Therefore, effluent limits for total residual chlorine, silver, zinc and winter ammonia are therefore expressed as average monthly and maximum daily limits, based on the recommendations of Section 5.2.3 of the TSD.

C. Calculating the Average Monthly and Maximum Daily Effluent Limits

The statistical procedures for calculating of average monthly and maximum daily effluent limits from the wasteload allocations are described in Section 5.4 of the TSD and in Appendix G of the fact sheet dated February 16, 2007.

D. Results

The results of the effluent limit calculations are summarized in Table 1, on the following page.

Although the reasonable potential analysis showed that a discharge at the 1999 permit's maximum daily limits for lead and for ammonia from July – September could cause or contribute to excursions above water quality standards for those parameters, when the EPA re-calculated the effluent limits for lead and July – September ammonia, the re-calculated effluent limits for lead and July – September ammonia were less stringent than the corresponding limits in the 1999 permit. Therefore, the lead concentration limist and the July – September ammonia concentration limits in the 1999 permit have been continued forward in accordance with the anti-backsliding provisions of the Clean Water Act and the State of Idaho's antidegradation policy.

Table 1: Effluent Limit Calculations

Statistical variables for permit limit calculation		
LTA Probability Basis	99%	
MDL Probability Basis	99%	
AML Probability Basis	95%	

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

	Permit Limit Calculation Summary										Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							
	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments	WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	Limiting LTA	Coeff. Var. (CV)	# of Samples per Month	
PARAMETER			Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	ug/L	ug/L		*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*decimal*	*n*	
Chlorine (July-Sep)	17.16	17.16	1.00	1.00		19.00	11.00	**127**	**294**	**25% MZ**	326	189	122	110	110	0.498	30.00	1.00
Chlorine (Oct-June)	29.76	34.29	1.00	1.00		19.00	11.00	**244**	**565**	**25% MZ**	565	377	211.3	219.6	211.3	0.498	30.00	1.00
Lead (EOP)	1.00	1.00	0.79	0.79		59.29	2.31	**2.32**	**4.95**	**End-of-pipe**	74.6	2.91	21.3	1.41	1.41	0.69	4.00	1.00
Ammonia	17.16	17.16	1.00	1.00	0.10	6.75	1.42	**15.18**	**79.29**	**25% MZ**	114	23	9.8	6.8	6.8	3.59	30.00	1.00

E. References

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control*. US Environmental Protection Agency, Office of Water, EPA/505/2-90-001. http://www.epa.gov/npdes/pubs/owm0264.pdf

Appendix F: Effluent Limit Calculations for pH

The following table demonstrates how appropriate effluent limitations were determined for pH.

Table F-1: Effluent Limit Calculations for the Low pH Critical Condition

INPUT	Oct. – June	July – Sept.
DILUTION FACTOR AT MIXING ZONE BOUNDARY	29.8	17.2
UPSTREAM/BACKGROUND CHARACTERISTICS		
Temperature (deg C):	14.5	25.0
pH:	6.60	6.60
Alkalinity (mg CaCO3/L):	19.2	19.2
EFFLUENT CHARACTERISTICS		
Temperature (deg C):	16.0	16.0
pH:	**6.3**	**6.4**
Alkalinity (mg CaCO3/L):	133	133
OUTPUT		
1. IONIZATION CONSTANTS		
Upstream/Background pKa:	6.42	6.35
Effluent pKa:	6.41	6.41
2. IONIZATION FRACTIONS		
Upstream/Background Ionization Fraction:	0.60	0.64
Effluent Ionization Fraction:	0.44	0.49
3. TOTAL INORGANIC CARBON		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	32.01	30.00
Effluent Total Inorganic Carbon (mg CaCO3/L):	305.10	269.70
CONDITIONS AT MIXING ZONE BOUNDARY		
Temperature (deg C):	14.55	24.48
Alkalinity (mg CaCO3/L):	23.02	25.83
Total Inorganic Carbon (mg CaCO3/L):	41.18	43.97
pKa:	6.42	6.35
pH at Mixing Zone Boundary:	**6.53**	**6.51**

Appendix G: Compliance Schedules and Interim Limits for New Water Quality-based Effluent Limits

A. Overview

In order to establish a compliance schedule in an NPDES permit, the permitting authority must make a reasonable finding that the permittee cannot comply with the new water quality-based effluent limit immediately upon the effective date of the final permit (see memorandum from Jim Hanlon to Alexis Strauss dated May 10, 2007). Compliance schedules may only be allowed if the State's water quality standards or implementing regulations allow for compliance schedules (see *In The Matter of Star-Kist Caribe, Inc*., 3 E.A.D. 172, 175, 177 (1990)). The State of Idaho has a compliance schedule authorizing provision which reads, "discharge permits for point sources may incorporate compliance schedules which allow a discharger to phase in, over time, compliance with water quality-based effluent limitations when new limitations are in the permit for the first time" (IDAPA 58.01.02.400.03). The State of Idaho has authorized compliance schedules for the new water quality-based effluent limits for total phosphorus in the City of Post Falls permit in its draft Clean Water Act Section 401 certification of this permit.

The EPA has evaluated the historic performance of the Post Falls water reclamation facility to determine if the City could immediately comply with the new water quality-based effluent limits proposed in the draft permit. For those effluent limits that cannot be achieved immediately on the effective date of the final permit, the compliance schedule must comply with the regulatory requirement that compliance be achieved as soon as possible (40 CFR 122.47(a)(1)). The EPA has determined that the compliance schedules proposed in the draft permit require compliance as soon as possible, as explained below.

B. Immediate Achievability

In general, for each parameter for which a new water quality-based effluent limit is proposed, the EPA quantified the facility's current performance. The current performance was compared to the proposed new water quality-based effluent limits to determine if the facility could comply with the new water quality-based effluent limits immediately upon the effective date of the final permit. The methods used to evaluate the facility's current performance are described below.

In general, if the facility's current performance, as quantified by the methods described below, showed that the facility could comply with the new water quality-based effluent limits immediately upon the effective date of the final permit, then no compliance schedule has been proposed in the draft permit. In addition to the facility's current performance, the EPA has also considered the treatment plant's design characteristics and the performance of other facilities of similar design. If the Post Falls facility's treatment processes would allow for immediate compliance with new water quality-based effluent limits, then no compliance schedule has been proposed in the draft permit, even if historical effluent data do not indicate immediate achievability.

If effluent data and the facility's current design both demonstrate that the facility cannot comply with the effluent limits immediately upon the effective date of the final permit, then a schedule of compliance is appropriate and has been proposed in the draft permit.

Average Monthly and Average Weekly or Maximum Daily Limits

Performance-based Effluent Limit Spreadsheet Method

This spreadsheet calculates performance-based effluent limits based on historical effluent data and the required sampling frequency. The spreadsheet is based upon the procedures of Appendix E of the *Technical Support Document for Water Quality-based Toxics Control* (EPA 1991).

Percentile Method

When individual sample results are available, the expected maximum monthly, weekly, and daily loadings or concentrations can be represented by percentiles. The expected maximum monthly average concentration or loading is that which can be achieved 11/12ths (92%) of the time, and the expected maximum weekly average and maximum daily concentration or loading is that which can be achieved 51/52nds (98%) and 364/365ths (99.7%) of the time, respectively. The EPA used this method of quantifying treatment plant performance in the *Municipal Nutrient Removal Technologies Reference Document* (EPA 2008). If less than 365 data points were available, the maximum individual sample was used for comparison with a proposed water quality-based maximum daily limit.

Seasonal Average Limits

For effluent limits expressed as seasonal averages, the EPA calculated the average loadings measured during the seasons during which the proposed seasonal average limits would apply, for past several years, and compared the to the historical loadings to the proposed effluent limits.

Results of Effluent Data Analysis

The results of the analysis are summarized in Table 1, below.

Table 1: Comparison of New Water Quality-based Effluent Limits to Historic Performance

New Water Quality-based Effluent Limit Parameter, Season, and Units	Proposed Limits		Current Performance				EPA Evaluation of Oxidation Ditches for Nutrient Removal	Limits Achievable Immediately?
	Avg. Monthly Limit	Max. Daily or Avg. Weekly Limit	PERFORMLIM Spreadsheet		Percentiles		Max. Month	
			Max. Month	Max. Day/ Week	Max. Month	Max. Day/Week		
Cadmium (lb/day)	0.0078	0.011	0.0029	0.0066	0.0019	0.0056	N/A	**YES**
Chlorine, July – September (µg/L)	127	294	120	382	145	295	N/A	**YES (see below)**
Chlorine, October – June (µg/L)	244	565					N/A	**YES**

Notes:
1. The maximum daily effluent limits for lead and the average monthly loading (lb/day) limits are identical to those in the prior (1999) permit. Thus they are not new limits and thus no compliance schedule may be authorized for the maximum daily lead effluent limits or the average monthly lead loading limits.

Discussion of Results

CBOD$_5$

The new water quality-based CBOD$_5$ mass effluent limit is expressed as a seasonal average limit in lieu of average monthly and average weekly limits (see Appendix B). The seasonal average effluent limit is 255 lb/day.

The February – October average CBOD$_5$ loads were 138 lb/day in 2006, 78 lb/day in 2007, 84 lb/day in 2008, 83 lb/day in 2009, and 109 lb/day in 2010. Thus, from 2006-2010 the seasonal average CBOD$_5$ loads were less than the proposed seasonal average load limit of 255 lb/day.

Therefore, the Post Falls facility can comply with the new water quality-based effluent limits for CBOD$_5$ immediately upon the effective date of the final permit, and no compliance schedule may be authorized for the new water quality-based CBOD$_5$ effluent limits.

Ammonia

The new water quality-based ammonia mass effluent limits are expressed as a seasonal average limit in lieu of average monthly and average weekly limits (see Appendix B). The seasonal average effluent limit is 255 lb/day.

The February – October average ammonia loads were 2.55 lb/day in 2006, 3.89 lb/day in 2007, 1.68 lb/day in 2008, 1.16 lb/day in 2009, and 1.63 lb/day in 2010. Thus, from 2006-2010 the seasonal average ammonia loads were less than the proposed seasonal average load limit of 255 lb/day.

Therefore, the Post Falls facility can comply with the new water quality-based effluent limits for ammonia immediately upon the effective date of the final permit, and no compliance schedule may be authorized for the new water quality-based ammonia effluent limits.

Chlorine

No compliance schedule is proposed for the new water quality-based effluent limits for total residual chlorine. While effluent data alone indicate that the facility may have difficulty meeting the new water quality-based effluent limits from July – September, the facility is equipped with ultraviolet disinfection, with chlorination and dechlorination as a backup. The effluent limits apply only when chlorine is used within the treatment facility. Dechlorination will allow the City to meet the new water quality-based effluent limits for chlorine year-round immediately upon the effective date of the final permit. In addition, the chlorine limits are generally less stringent than the effluent limits in the prior permit. Therefore, no compliance schedule is necessary for chlorine.

Cadmium

As shown in Table 1, above, effluent data indicate that the HARSB facility can comply with the new water quality-based effluent limits for cadmium immediately upon the effective date of the final permit. Therefore no compliance schedule is proposed for the HARSB facility's new cadmium limits.

Phosphorus

The effluent limit for total phosphorus is a seasonal average of 3.19 lb/day. The current average phosphorus loading is 10.8 lb/day. Therefore the City cannot comply with the new water

quality-based seasonal average effluent limit for total phosphorus immediately upon the effective date of the final permit and a compliance schedule is appropriate for this effluent limit.

Summary

The permittee can comply with all of the new water quality-based effluent limits in the draft permit, except for the new phosphorus limits. Therefore, a compliance schedule is proposed for the new water quality-based phosphorus limits.

Interim Limits

Basis for Interim Limits

The federal regulation 40 CFR 122.47 states that "…if a permit establishes a schedule of compliance which exceeds 1 year from the date of permit issuance, the schedule shall set forth interim requirements and the dates for their achievement." The federal regulation 40 CFR 122.44(l)(1) states that "…when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit."

Therefore, the EPA has proposed interim effluent limits in the draft permit, which apply during the term of the compliance schedule, in order to ensure that the reissued permit does not authorize the discharge phosphorus in greater amounts than authorized by the previous permit, during the term of the compliance schedule.

Total Phosphorus

The prior permit includes a 70% minimum average monthly removal rate effluent limit for total phosphorus. Thus, the prior permit has average monthly limits expressed in terms of removal rate, but it lacks average weekly limits and limits expressed in terms of mass, both of which are required by federal regulations (40 CFR 122.45(d)(2), 122.45(f)). Thus, the EPA has established mass limits and average weekly limits in order to comply with federal regulations.

The interim average monthly mass limit was calculated as follows. First, the removal rate was converted to an equivalent effluent concentration. The 92nd percentile influent total phosphorus concentration (which is an estimate of the maximum monthly average influent concentration) from 2006 – 2011 was 7.87 mg/L. The prior permit would have allowed an effluent concentration that was 30% of the influent concentration; 30% of 7.87 mg/L is 2.36 mg/L. The design flow of the City of Post Falls POTW at the time the prior permit was issued was 3.48 mgd. A discharge of phosphorus at 2.36 mg/L, at 3.48 mgd, is equivalent to a load of 68.5 lb/day. This is the load of phosphorus that was authorized to be discharged under the 1999 permit.

In order to ensure compliance with federal regulations requiring that, in general, effluent limits for POTWs are stated as average monthly and average weekly limits, the EPA has also established interim average weekly TP limits based on the average monthly limits, and a ratio that accounts for effluent variability within a month. The EPA has used the same ratio as the ratio between the technology-based average monthly and average weekly $CBOD_5$ limits (1.6:1). The EPA believes this ratio is representative of typical effluent variability for POTWs. Thus, the average weekly TP limit is 110 lb/day.

The prior permit's phosphorus limits applied from March 1st through October 31st each year. The interim effluent limits for total phosphorus apply from February 1st through October 31st each year, which is the same season during which the final TP effluent limits will apply. Modeling has shown that discharges of TP throughout this season can affect dissolved oxygen concentrations in Lake Spokane.

C. As Soon as Possible

In its draft CWA Section 401 certification, the State of Idaho authorized a schedule of compliance which requires compliance with the draft permit's new total phosphorus limits not later than 10 years after the effective date of the final permit.

Federal regulations require that compliance schedules in NPDES permits "shall require compliance as soon as possible." The draft certification states that the authorized compliance schedule "provides the permittee a reasonable amount of time to achieve the final effluent limitations as specified in the permit. At the same time, the schedule ensures that compliance with the final effluent limits is accomplished as soon as possible."

The EPA agrees with the State of Idaho's finding that the 10-year schedule of compliance requires compliance with the new water quality-based effluent limits for total phosphorus as soon as possible. The City's planned schedule for completion of the necessary plant upgrades to ensure compliance with effluent limits is provided in a letter from the City to the Idaho Department of Environmental Quality, dated August 29, 2012. The letter explains that the City must undertake several subtasks before it is able to comply with the new water quality-based phosphorus limits in the draft permit, including: funding via election or judicial validation, phosphorus treatment design, pilot testing, design updates, new technology equipment construction as well as operation testing. Specific milestones in the process of upgrading the facility to achieve compliance with the new water quality-based effluent limits for total phosphorus include the following:

- **Within 1 year after the effective date of the final permit:** A preliminary engineering report outlining estimated costs and schedules for completing capacity expansion and implementation of technologies to achieve final effluent limitations. This schedule must include a time line for fully scalable pilot testing and results of any
- **Within 5 years of the effective date of the final permit:** Completion of fully scalable pilot testing of the technology that will be employed to achieve the final limits.
- **Within 6 years of the effective date of the final permit:** Completion of design and awarding of bids to begin construction.
- **Within 8 years of the effective date of the final permit:** Completion of construction.
- **Within 10 years of the effective date of the final permit:** Complete start-up and optimization of the upgraded facilities and achieve compliance with the final water quality-based effluent limits.

D. References

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control*. US Environmental Protection Agency, Office of Water, EPA/505/2-90-001. March 1991. http://www.epa.gov/npdes/pubs/owm0264.pdf

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EPA. 2008. *Municipal Nutrient Removal Technologies Reference Document*. US Environmental Protection Agency. Office of Wastewater Management, Municipal Support Division, Municipal Technology Branch. EPA 832-R-08-006. September 2008.
http://water.epa.gov/scitech/wastetech/upload/mnrt-volume1.pdf

Appendix H: Draft Clean Water Act Section 401 Certification

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway • Coeur d'Alene, Idaho 83814 • (208) 769-1422

C.L. "Butch" Otter, Governor
Toni Hardesty, Director

April 18, 2013

Mr. Michael Lidgard
US Environmental Protection Agency, Region 10
1200 6th Avenue, OW-130
Seattle, WA 98101

RE: Second Revision Draft §401 Water Quality Certification for the Draft NPDES Permit No. ID-0025852 for the City of Post Falls Water Reclamation Facility

Dear Mr. Lidgard:

On February 4, 2013, the State of Idaho Department of Environmental Quality (DEQ) received a revised preliminary draft NPDES permit for the City of Post Falls to discharge from their existing wastewater treatment plant. DEQ submitted draft certifications for an earlier version of this draft permit to EPA on September 4, 2012 and a revised certification on September 18, 2012. The first revision was due to an error in the mixing zone portion of the certification. This second revision is at the request of EPA due to a change in the ammonia and CBOD limits. We have revised both limits and are resubmitting the draft certification to you in its entirety.

Please direct any questions to June Bergquist at 208.666.4605 or june.bergquist@deq.idaho.gov .

Sincerely,

Daniel Redline
Regional Administrator
Coeur d'Alene Regional Office

Enclosure

C: Miranda Adams, DEQ Boise
Brian Nickel, EPA Region 10, Seattle
Mike Neher, City of Post Falls

Idaho Department of Environmental Quality

Revised Draft §401 Water Quality Certification

April 18, 2013

NPDES Permit Number(s): ID0025852 City of Post Falls Wastewater Treatment Plant

Receiving Water Body: Spokane River

Pursuant to the provisions of Section 401(a)(1) of the Federal Water Pollution Control Act (Clean Water Act), as amended; 33 U.S.C. Section 1341(a)(1); and Idaho Code §§ 39-101 et seq. and 39-3601 et seq., the Idaho Department of Environmental Quality (DEQ) has authority to review National Pollutant Discharge Elimination System (NPDES) permits and issue water quality certification decisions.

Based upon its review of the above-referenced permit and associated fact sheet, DEQ certifies that if the permittee complies with the terms and conditions imposed by the permit along with the conditions set forth in this water quality certification, then there is reasonable assurance the discharge will comply with the applicable requirements of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, the Idaho Water Quality Standards (WQS) (IDAPA 58.01.02), and other appropriate water quality requirements of state law.

This certification does not constitute authorization of the permitted activities by any other state or federal agency or private person or entity. This certification does not excuse the permit holder from the obligation to obtain any other necessary approvals, authorizations, or permits.

Antidegradation Review

In March 2011, Idaho incorporated new provisions in Idaho Code § 39-3603 addressing antidegradation implementation. At the same time, Idaho adopted antidegradation implementation procedures in the Idaho WQS. DEQ submitted the antidegradation implementation procedures to the US Environmental Protection Agency (EPA) for approval on April 15, 2011. On August 18, 2011, EPA approved the implementation procedures.

The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051).

- Tier 1 Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.05).
- Tier 2 Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed

necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.06).

- Tier 3 Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.07).

DEQ is employing a water body by water body approach to implementing Idaho's antidegradation policy. This approach means that any water body fully supporting its beneficial uses will be considered high quality (Idaho Code § 39-3603(2)(b)(i)). Any water body not fully supporting its beneficial uses will be provided Tier 1 protection for that use, unless specific circumstances warranting Tier 2 protection are met (Idaho Code § 39-3603(2)(b)(iii)). The most recent federally approved Integrated Report and supporting data are used to determine support status and the tier of protection (Idaho Code § 39-3603(2)(b)).

Pollutants of Concern

The City of Post Falls discharges the following pollutants of concern: carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), pH, E. coli, chlorine, ammonia, phosphorus, copper, lead, cadmium and zinc. Effluent limits have been developed for these pollutants of concern. Butyl benzyl phthalate, di-N-butyl phthalate, nitrate + nitrite, phenol and whole effluent toxicity are additional pollutants of concern for which a reasonable potential analysis was performed. No effluent limits were established for these pollutants because results of the analysis indicated they had no reasonable potential to exceed water quality standards.

Receiving Water Body Level of Protection

The City of Post Falls discharges to the Spokane River assessment unit (AU) ID17010305PN003_04 (Post Falls Dam to Idaho/Washington border). This AU has the following designated beneficial uses: cold water aquatic life, salmonid spawning, primary contact recreation, domestic, agricultural and industrial water supply, wildlife habitat, and aesthetics. There is no available information indicating the presence of any existing beneficial aside from those that are already designated.

The cold water aquatic life use in the Spokane River AU is not fully supported due to excess phosphorus, cadmium, lead and zinc (2010 Integrated Report). The primary contact recreation beneficial use has not been assessed; however E. coli data collected in 2007 indicate that recreation uses are fully supported. As such, DEQ will provide Tier 1 protection only for the aquatic life use and Tier 2 protection, in addition to Tier 1, for the recreation beneficial use (Idaho Code §39-3603(2)(b)).

Protection and Maintenance of Existing Uses (Tier 1 Protection)

As noted above, a Tier 1 review is performed for all new or reissued permits or licenses, applies to all waters subject to the jurisdiction of the Clean Water Act, and requires demonstration that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. In order to protect and maintain designated and existing beneficial uses, a permitted discharge must comply with narrative and numeric criteria of the Idaho WQS, as well as other provisions of the WQS such as Section 055, which addresses water quality limited

waters. The numeric and narrative criteria in the WQS are set at levels that ensure protection of designated beneficial uses. The effluent limitations and associated requirements contained in the City of Post Falls permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS.

Water bodies not supporting existing or designated beneficial uses must be identified as water quality limited, and a total maximum daily load (TMDL) must be prepared for those pollutants causing impairment. A central purpose of TMDLs is to establish wasteload allocations for point source discharges, which are set at levels designed to help restore the water body to a condition that supports existing and designated beneficial uses. Discharge permits must contain limitations that are consistent with wasteload allocations in the approved TMDL.

The WQS provide that until a TMDL or equivalent process is completed for a high priority water quality limited waterbody, the total load of the impairing pollutant must remain constant or decrease within the watershed. (IDAPA58.01.02.055.04). The cold water aquatic life use in the Spokane River AU is not fully supported due to excess cadmium, lead, zinc and phosphorus (2010 Integrated Report). In addition, the 2010 Integrated Report lists the Spokane River as high priority for TMDL development. Therefore, section 055.04 is applicable to the discharges of phosphorus, lead, zinc and cadmium.

Phosphorus

The restrictions on loading set forth in section 055.04 are only applicable until a TMDL or equivalent process is completed. DEQ believes a process equivalent to a TMDL has been completed for phosphorus. In order to meet Washington and Idaho WQS, EPA modeled the cumulative impact of all sources of nutrients and oxygen-demanding pollutants, both point and non-point sources, in Idaho and Washington. The limits EPA has set in the draft permits for the point sources in Idaho, including the Post Falls permit, are based upon this loading analysis. The proposed effluent limits will result in a concentration of 9.1 μg/L of TP in the Idaho portion of the Spokane River. This level meets or exceeds Idaho's narrative criteria for excess nutrients. (See IDAPA 58.01.02.200.06). In summary, equivalent to a TMDL, EPA has calculated the loading from point and non-point sources, and set limits that will attain WQS for phosphorus in Idaho. Therefore, the effluent limits in the draft permit are consistent with section 055.04.

Cadmium, Zinc and Lead

In August 2000, EPA approved a TMDL prepared by DEQ for cadmium, lead and zinc in the CDA River Basin, which included the Spokane River. The TMDL included allocations for the point source dischargers to the Spokane River, including Post Falls. However, this TMDL was invalidated by the Idaho Supreme Court in 2003. There has been no more recent effort by DEQ to develop a TMDL for metals in the Spokane River, and therefore, the river is still on the state's 303d list for metals and is identified as a high priority water body for TMDL development. Thus, the load restrictions in section 055.04 apply to the metals discharged to the Spokane River.

The intent of section 055.04 is to ensure that water quality is at least maintained at current levels, until DEQ can make a determination, through a TMDL or equivalent process, regarding reductions necessary to attain WQS. To achieve this goal, Section 055.04 requires that the "load" of the impairing pollutant remain constant or decrease in the watershed. "Load" is not defined in the Idaho WQS. In the context of a TMDL, however, load is typically defined as an

amount of matter, and usually expressed as mass per time (see 40CFR 130.2(e) (definition of "load") and 40CFR 130.2(i) (definition of "TMDL")). Loading is expressed in a NPDES permit as a mass-based limit (40CFR 122.45(f)). Therefore, the mass-based limits for the applicable metals in the reissued Spokane River NPDES permits must kept constant in order to comply with section 055.04.

In the draft NPDES permit for Post Falls, EPA has retained the loading limits for lead and zinc that were in the 1999 permit. These limits ensure compliance with section 055.04. However, the draft permit does not contain cadmium limits. In order to ensure compliance with section 055.04, DEQ has included in the draft certification cadmium limits that reflect Post Falls' current cadmium loading using the 1999 design flow. Table 1 provides a summary of the existing permit limits and the proposed reissued permit limits, including effluent limitations for cadmium specified in the draft 401 certification.

Section 055.04 provides that once a TMDL or equivalent process is completed, the discharge of causative pollutants must be consistent with the TMDL or equivalent process. Therefore, once a TMDL for metals is completed by DEQ and approved by EPA, the limits for metals in the permit, including the loading limits discussed herein, should be adjusted to reflect the approved TMDL.

In summary, the effluent limitations and associated requirements contained in the Post Falls permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS. Therefore, DEQ has determined the permit will protect and maintain existing and designated beneficial uses in the Spokane River.

Table 1. Comparison of current and proposed permit limits.

		Proposed Permit			Current Permit			Change[1]
Parameter	Units	Average Monthly Limit	Average Weekly Limit	Maximum Daily	Average Monthly Limit	Average Weekly Limit	Maximum Daily	
Pollutants with limits in both the current and proposed permit								
$CBOD_5$ November-January	*mg/L*	*25*	*40*	-	*30*	*45*	-	*I*[2]
	lb/day	*1043*	*1668*	-	*871*	*1306*	-	
	% removal	*85%*	-	-	*85%*	-	-	
$CBOD_5$ February-October interim limit	*mg/L*	*25*	*40*	-	*30*	*45*	-	*nc*[3]
	lb/day	*726*	*1161*	-	*871*	*1306*	-	
	% removal	*85%*	-	-	*85%*	-	-	
$CBOD_5$ (February-October)	*mg/L*	*25*	*40*	-	*30*	*45*	-	*D*
	lb/day	*seasonal average 255 lb/day*		-	*871*	*1306*	-	
	% removal	*85%*	-	-	-	-	-	
TSS	*mg/L*	*30*	*45*	-	*30*	*45*	-	*I*[2]
	lb/day	*1251*	*1877*	-	*871*	*1306*	-	
	% removal	*85%*	-	-	*85%*	-	-	
pH October-June	*s.u.*	*6.3 – 9.0 all times*			*6.2 – 9.0 all times*			*D*
pH July-September	*s.u.*	*6.4 – 9.0 all times*			*6.3 – 9.0 all times*			*D*
E. coli	*#/100 mL*	*126*	-	*406*	-	-	-	*nc*[4]
Fecal coliform[4] *May-Sept*	*#/100 mL*	-	-	-	*50*	*200*	*500*	*nc*[4]
Fecal coliform[4] *October-April*	*#/100 mL*	-	-	-	-	*200*	*800*	*nc*[4]
Total Residual Chlorine July-September	*µg/L*	*127*	-	*294*	*36*	-	*161*	*I*[2]
	lb/day	*5.3*	-	*13.6*	*1.04*	-	*4.67*	
Total Residual Chlorine October-June if used	*µg/L*	*244*	-	*565*	*147*	-	*662*	*I*[2]
	lb/day	*10.2*	-	*23.6*	*4.27*	-	*19.2*	
Ammonia (July-Sept)	*mg/L*	*8.2*	*29.5*	-	*8.2*	-	*29.5*	*I*[2]
	lb/day	*342*	*1230*	-	*238*	-	*856*	
Ammonia (October-June)	-	-	-	-	*25.4*	-	*91.7*	*D*
	-	-	-	-	*737*	-	*2661*	
Ammonia (Feb- October)	*mg/L*	-	-	-	-	-	-	*D*
	lb/day	*seasonal average 255 lb/day*		-	-	-	-	
Ammonia (Nov-Jan)	*mg/L*	*25.4*		*91.7*	*25.4*	-	*91.7*	*nc*
	lb/day	*1059*		*3824*	*737*	-	*2661*	*I*[2]
Zinc	*µg/L*	*84.3*		*115*	*84.3*	-	*115*	*nc*
	lb/day	*2.45*		*3.34*	*2.45*	-	*3.34*	
Lead	*µg/L*	*2.05*	-	*3.79*	*2.05*	-	*3.79*	*nc*
	lb/day	*0.059*	-	*0.110*	*0.059*	-	*0.110*	
Copper (July-September)	*µg/L*	*13.8*	-	*27.7*	*13.8*	-	*27.7*	*nc*
	lb/day	*0.58*	-	*1.16*	*0.40*	-	*0.80*	*I*[2]

Table 1 Continued…

		Proposed Permit			***Current Permit***			***Change***[1]
Parameter	*Units*	*Average Monthly Limit*	*Average Weekly Limit*	*Maximum Daily Limit*	*Average Monthly Limit*	*Average Weekly Limit*	*Maximum Daily Limit*	
Pollutants with limits in both the current and proposed permit (continued)								
Phosphorus (March-Oct)	***percent removal***	-	-	-	***70%***			***D***
Phosphorus[5] ***(Feb-Oct)*** ***interim limits***	***lbs/day***	***68.5 70% removal***	***110***	-				***nc***[5]
Phosphorus February-October	***µg/L***	***Report***	***Report***	-	-	-	-	***D***
	lb/day	***3.19 seasonal average***		-	-	-	-	***D***
Pollutants with limits only in the proposed permit								
Cadmium[6]	***lb/day***	***0.0078***	***0.011***	-	-	-	-	***nc***[6]

Table 1 Continued…		***Proposed Permit***			***Current Permit***			***Change***[1]
Parameter	*Units*	*Average Monthly Limit*	*Average Weekly Limit*	*Maximum Daily Limit*	*Average Monthly Limit*	*Average Weekly Limit*	*Maxi-mum Daily Limit*	
Pollutants with no limits in either the current and proposed permit								
Temperature	***°C***	***Report***	-	***Report***	-	-	***Report***	***nc***
PCB	***pg/L***	***Report***		***Report***	-	-	-	***nc***
Mercury	***ng/L***	-	-	-	-	-	-	***nc***
TCDD	***pg/L***	***Report***	-	***Report***	-	-	-	***nc***
Silver	***µg/L***	***Report***	-	***Report***	-	-	-	***nc***
	lb/day	-	-	-	-	-	-	
Alkalinity	***mg/L as $CaCO_3$***	***Report***	-	***Report***	-	-	-	***nc***
Hardness	***mg/L as $CaCO_3$***	***Report***	-	***Report***	-	-	-	***nc***
Oil and Grease	***mg/L***	***Report***	-	***Report***	-	-	-	***nc***
TDS	***mg/L***	***Report***	-	***Report***	-	-	-	***nc***
Ortho-phosphate	***µg/L***	***Report***	-	***Report***	-	-	-	***nc***
Kjeldahl Nitrogen	***mg/L***	***Report***	-	***Report***	-	-	-	***nc***
Nitrate-Nitrite	***mg/L***	***Report***	-	***Report***	-	-	-	***nc***
Dissolved Oxygen	***mg/L***	***Report minimum and average***			-	-	-	***nc***

[1] ***nc*** = no change in effluent limit from current permit; ***I*** = increase of pollutants from current permit; ***D*** = decrease of pollutants from current permit;

[2] The increased loads of these pollutants in the draft permit do not exceed narrative or numeric criteria in the Idaho WQS which meets the requirements for Tier 1 protection.

[3] The interim concentration and removal rate limits for $CBOD_5$ are federal technology-based effluent limits (40 CFR 133.102(a)(4)). The interim $CBOD_5$ load limits are calculated from the concentration limits using the same design flow that was used to calculate the BOD_5 loading limits for the prior permit (3.48 mgd), which ensures that the interim $CBOD_5$ loading limits are as stringent as the final BOD_5 loading limits in the prior permit, as required by federal regulations (40 CFR 122.44(l)(1)).

[4] DEQ requested EPA replace the fecal coliform limits with *E. coli* effluent limits. See discussion under High Quality Waters section (below).

[5] Interim effluent limits for phosphorus were established based on Post Falls' current design flow and treatment levels authorized by their current permit. See discussion on page 3 regarding the use of an equivalent process.

[6]Effluent limits for cadmium have been added by the 401 certification to ensure that the load of cadmium remain constant in the watershed to meet the requirements of IDAPA 58.01.02.055.04. This limit was based on the actual concentrations of cadmium currently discharged, in combination with the 1999 design flow. Similarly, the zinc and lead limits established in 1999 are the same in the draft permits to comply with anti-backsliding provisions of the Clean Water Act and WQS Section 055.04. This certification allows an increased load of cadmium, lead and zinc if an offset is provided to meet conditions of Section 055.04 (see page 10).

High-Quality Waters (Tier 2 Protection)

The Spokane River is not assessed for recreational use. Monitoring data for E. coli collected in 2007 within the subject assessment unit, indicates that the Spokane River is high quality for the primary contact recreation beneficial use. As such, the water quality relevant to recreational uses of the Spokane River must be maintained and protected, unless a lowering of water quality is deemed necessary to accommodate important social or economic development.

To determine whether degradation will occur, DEQ must evaluate how the permit issuance will affect water quality for each pollutant that is relevant to recreational uses of the Spokane River (IDAPA 58.01.02.052.04). These include the following: E. coli bacteria, phosphorus and mercury. Effluent limits are set in the proposed and existing permit for all these pollutants except mercury.

For a reissued permit or license, the effect on water quality is determined by looking at the difference in water quality that would result from the activity or discharge as authorized in the current permit and the water quality that would result from the activity or discharge as proposed in the reissued permit or license (IDAPA 58.01.02.052.04.a). For a new permit or license, the effect on water quality is determined by reviewing the difference between the existing receiving water quality and the water quality that would result from the activity or discharge as proposed in the new permit or license (IDAPA 58.01.02.052.04.a).

Pollutants with Limits in the Current and Proposed Permit: E. coli, Phosphorus

For Tier 2 related pollutants that are currently limited (have effluent limits) and will have limits under the reissued permit, the current discharge quality is based on the limits in the current permit or license (IDAPA 58.01.02.052.04.a.i), and the future discharge quality is based on the proposed permit limits (IDAPA 58.01.02.052.04.a.ii). For the City of Post Falls permit, this means determining the permit's effect on water quality based upon the limits for E. coli and phosphorus in the current and proposed permits. Table 1 provides a summary of the current permit limits and the proposed or reissued limits.

E. coli

The existing permit for the City of Post Falls contains effluent limits for fecal coliform and *E. coli*. In 1986, EPA updated its criteria to protect recreational use of water by recommending an *E. coli* criterion as a better indicator than fecal coliform of bacteria levels that may cause gastrointestinal distress in swimmers. In 2000, DEQ changed its bacteria criterion from fecal coliform to *E. coli.* The *E. coli* limits are in the existing permit to reflect the bacteria criterion that DEQ adopted to protect the contact recreation beneficial use (IDAPA 58.01.02.251.01). The

fecal coliform limits are in the current permit because at the time the permit was issued, IDAPA 58.01.02.420.05 established a disinfection requirement for sewage wastewater treatment plant effluent. This requirement specified that fecal coliform concentrations not exceed a geometric mean of 200/100 mL based on a minimum of five samples in one week. This section of the Idaho WQS was revised in 2002 to reflect the change in the bacteria criterion from fecal coliform to *E. coli*. The *E. coli* limits are as or more protective of water quality than the old fecal coliform limits. The proposed final permit contains both fecal coliform and *E. coli* effluent limits that comply with previous and current numeric "end-of-pipe" criteria.

Because the fecal coliform criterion has been replaced with an *E. coli* criterion, DEQ has requested that EPA remove the fecal coliform effluent limits, consistent with how EPA has handled other NPDES permits for wastewater treatment plants in Idaho. Retaining the *E. coli* limits will ensure that the receiving water quality will not be degraded even when the fecal coliform limits are removed. Even with the omission of fecal coliform limits, DEQ believes the discharge will not cause or contribute to a violation of the bacteria criteria because the permit incorporates "end-of-pipe" limits for *E. coli*. Thus, removal of the fecal coliform limits complies with both the Tier 1 and Tier 2 components of Idaho's antidegradation policy.

The proposed increased design flow (3.48mgd to 5mgd) will theoretically increase the concentration of *E. coli* bacteria at the edge of a mixing zone. A Tier 2 analysis, however, is only required if the degradation is determined to be significant (Idaho Code §39-3603(2)(c)). Degradation is determined to be significant when the discharge of the pollutant will cumulatively decrease the remaining assimilative capacity by more than ten percent (Idaho Code §39-3603(2)(c)(i)). Post Falls new design flow will increase E. coli by 0.44% over the currently permitted amount. Since this value is less than 10% of the remaining assimilative capacity, Post Falls new design flow is an insignificant increase (see Appendix A for the analysis).

Phosphorus

The proposed permit for Post Falls includes new final effluent limits for phosphorus (draft permit Table 1). Tier 2 waters are waters in which the quality of the water is better than necessary to support beneficial uses. The tier 2 antidegradation policy provides that pollutants relevant to recreational uses may be significantly increased only if socially or economically justified. However, while the Spokane River is tier 2 for recreational uses, it is also impaired for aquatic life uses due to excess total phosphorous (TP). Because TP is relevant to both uses, and the water quality standards require both uses be protected, the use with the more stringent requirement limits the TP levels. Thus, the phosphorus levels must be reduced to get the River back into compliance with criteria for support of aquatic life uses. This needed reduction is reflected in the proposed permit limits. Because the River is impaired for phosphorus in Idaho, and because the Post Falls permit must ensure compliance with Washington WQS, the limits in the permit require a significant reduction in phosphorus. Specifically, the draft permit final effluent limits for the three Idaho dischargers will reduce phosphorus concentrations in the Idaho portion of the Spokane River to approximately 9.1 µg/L at the state line. These limits meet the Tier 2 requirement under the antidegradation policy because there will be no degradation in water quality, but rather an improvement in TP levels.

Pollutants with No Limits: Mercury

Mercury is a pollutant relevant to Tier 2 protection of recreation that currently is not limited and for which the proposed permit also contains no limit (Table 1). For such pollutants, a change in water quality is determined by reviewing whether changes in production, treatment, or operation that will increase the discharge of these pollutants are likely (IDAPA 58.01.02.052.04.a.ii). With respect to mercury, there is no reason to believe this pollutant will be discharged in quantities greater than those discharged under the current permit. This conclusion is based upon the fact that there have been no changes in the influent quality or treatment processes that would likely result in an increased discharge of this pollutant. Additionally, whole effluent toxicity testing using three different organisms will be required twice per year to detect toxics in toxic amounts. A toxicity reduction evaluation is required in the event of an excursion above a trigger value. Mercury monitoring will be required three times over a five year period as part of the expanded effluent testing requirements in Part D of NPDES application Form 2A (EPA Form 3510-2A, revised 1-99). Mercury levels in Post Fall's effluent were tested in 2004 and reported in Part D of Form 2A as "no detection". Because of these provisions, the proposed permit does not allow for any increased water quality impact from this pollutant and DEQ concludes that the proposed permit should not cause a lowering of water quality for mercury. As such, the proposed permit should maintain the existing high water quality in the Spokane River.

Conditions Necessary to Ensure Compliance with Water Quality Standards or Other Appropriate Water Quality Requirements of State Law

The 2010 Integrated Report lists the Spokane River as high priority for TMDL development. Pursuant to IDAPA 58.01.02.055.04, DEQ must ensure that discharges of pollutants of concern remain constant or decrease within the watershed. Pollutants of concerns for which a TMDL is to be developed are cadmium, lead, zinc and total phosphorus. The draft permit retains the previously permitted limits for lead and zinc which meets the requirements of Section 055.04. The draft permit, however, lacks effluent limits for cadmium because the discharge didn't have reasonable potential to exceed WQS criteria for this pollutant. Therefore, to meet Section 055.04 requirements, this 401 certification adds effluent limits as specified in Table 2, below.

Table 2: Final Effluent Limit Requirements for Outfall 001

Parameter	Units	Average Monthly Limit	Average Weekly Limit
Cadmium	lbs/day	0.0078	0.011

In order to meet the requirements of Section 055.04, the effluent limits for cadmium, lead and zinc are all based upon the design flow used to develop the 1999 permit. Post Fall's application for a reissuance of the permit, however, specifies a new increased design flow for the facility. Post Falls may increase its loading of cadmium, lead and zinc only if prior to the discharge of an increased load, an Offset Plan developed by Post Falls and approved by DEQ is in place. The Offset Plan must demonstrate that the additional metals loading from the increased discharge will be offset by other actions or projects in the watershed and will otherwise meet concentration

limits of this permit. Once approved by DEQ, Post Falls must implement the approved Offset Plan in order to increase its load of cadmium, lead and zinc. Once a TMDL for metals is approved by EPA, the wasteload allocation specified in the TMDL shall replace the above Table 2 effluent limit requirements and the Offset Plan.

Compliance Schedule

Pursuant to IDAPA 58.01.02.400.03, DEQ may authorize compliance schedules for water quality based effluent limits issued in a permit for the first time. City of Post Falls cannot immediately achieve compliance with the effluent limits for phosphorus and under some circumstances $CBOD_5$; therefore, DEQ authorizes a compliance schedule and interim requirements as set forth below.

Table 3. Interim Limits

Parameter	Units	Average Monthly Limit	Average Weekly Limit
$CBOD_5$ (Feb-Oct)	mg/L	25	40
	lb/day	726	1161
	% removal	85% (min)	-
Phosphorus (Feb-Oct)	mg/L	report	report
	lb/day	68.5	110
	% removal	70%	-

Records indicate that since 2001, Post Falls has fallen short of achieving reductions necessary to meet the final effluent limits for CBOD, 30% of the time. Additionally, as this facility transitions to tertiary treatment to meet their final limits, there is also less of an assurance that the current high levels of $CBOD_5$ removal can be maintained until the new treatment system is operational. The $CBOD_5$ interim limits maintain the currently permitted load and concentration (Table 1). The compliance schedule described below provides the permittee a reasonable amount of time to achieve the final effluent limits as specified in the permit. At the same time, the schedule ensures that compliance with the final effluent limits is accomplished as soon as possible (see Appendix B).

1. The permittee must comply with all effluent limitations and monitoring requirements in Part I.B and I.C beginning on the effective date of the permit, except those for which a compliance schedule is specified in Part I.D of the final permit.

2. The permittee must achieve compliance with the final effluent limitations for phosphorus and $CBOD_5$ as set forth in Part I.B. (Table 1) of the permit, not later than ten (10) years after the effective date of the final permit.

3. While the schedules of compliance specified in Part I.D are in effect, the permittee must complete interim requirements and meet interim effluent limits and monitoring requirements as specified in Part I.E of the permit.

4. All other provisions of the permit, except the final effluent limits for phosphorus and $CBOD_5$ as described in Table 3 of this certification, must be met after the effective date of the final permit.

Interim Requirements for Compliance Schedules

1. By one (1) year after the effective date of the final permit, the permittee must provide a preliminary engineering report to EPA and IDEQ outlining estimated costs and schedules for completing capacity expansion and implementation of technologies to achieve final effluent limitations. This schedule must include a timeline for full scale pilot testing and results of any testing conducted to date.

2. By three (3) years after the effective date of the final permit, the permittee must provide written notice to EPA and IDEQ that full scale pilot testing of the technology that will be employed to achieve the final limits has been completed and must submit a summary report of results and plan for implementation.

3. By five (5) years after the effective date of the final permit, the permittee must provide EPA and IDEQ with written notice that design has been completed and bids have been awarded to begin construction to achieve final effluent limitations.

4. By eight (8) years after the effective date of the final permit, the permittee must provide EPA and DEQ with written notice that construction has been completed on the facilities to achieve final effluent limitations.

5. By ten (10) years after the effective date of the final permit, the permittee must provide EPA and DEQ with a written report providing details of a completed start up and optimization phase of the new treatment system and must achieve compliance with the final effluent limitations of Part I.B. The report shall include two years of effluent data demonstrating that final effluent limits can be achieved by year ten (10).

6. By year six (6), seven (7), and eight (8) after the effective date of the final permit, the permittee must submit to EPA and IDEQ progress reports, which outline the progress made toward achieving compliance with the phosphorus and $CBOD_5$ effluent limitations. At a minimum, the reports must include:
   a) An assessment of the previous year of effluent data and comparison to the interim effluent limitations.
   b) A report on progress made toward meeting the final effluent limits.
   c) Further actions and milestones targeted for the upcoming year.

7. When the schedules of compliance specified in Part I.D of the permit are in effect, the permittee must comply with interim effluent limitations and monitoring requirements as specified in Part I.E of the permit.

Mixing Zones

Pursuant to IDAPA 58.01.02.060, DEQ authorizes a mixing zone that utilizes 25% of the critical flow volumes of the Spokane River for pH, ammonia, chlorine, butyl benzyl phthalate, copper, diethyl phthalate, di-N-butyl phthalate, nitrate + nitrite, phenol, TSS and WET.

Pollutant Trading

Pursuant to IDAPA 58.01.02.055.06, DEQ authorizes pollutant trading for phosphorus and other oxygen demanding pollutants. Trading must be conducted in a manner that is consistent with the most recent version of DEQ's *Water Quality Pollutant Trading Guidance*, available at: http://www.deq.idaho.gov/media/488798-water_quality_pollutant_trading_guidance_0710.pdf. The use of pollutant offsets is authorized for purposes of compliance with antidegradation rules and IDAPA 58.01.02.055.

Other Conditions

This certification is conditioned upon the requirement that any material modification of the permit or the permitted activities—including without limitation, any modifications of the permit to reflect new or modified TMDLs, wasteload allocations, site-specific criteria, variances, or other new information—shall first be provided to DEQ for review to determine compliance with Idaho WQS and to provide additional certification pursuant to Section 401.

Right to Appeal Final Certification

The final Section 401 Water Quality Certification may be appealed by submitting a petition to initiate a contested case, pursuant to Idaho Code § 39-107(5) and the "Rules of Administrative Procedure before the Board of Environmental Quality" (IDAPA 58.01.23), within 35 days of the date of the final certification.
Questions regarding the actions taken in this certification should be directed to June Bergquist, Coeur d'Alene Regional Office at 208.666.4605 or via email at june.bergquist@deq.idaho.gov .

DRAFT

Daniel Redline
Regional Administrator
Coeur d'Alene Regional Office

Appendix A
HARSB and Post Falls *E. coli* Significance Tests

Background
The Spokane River is considered a high quality water for recreational uses. To prevent the lowering of water quality with respect to *E. coli*, DEQ must ensure that the Hayden Area Regional Sewer Board (HARSB) and Post Falls (PF) draft permits do not cumulatively decrease the remaining assimilative capacity of the river by more than ten percent to be considered insignificant degradation (Idaho Code §39-3603(2)(c)(i)).

Assimilative capacity is determined by comparing the background (ambient) concentration of a pollutant with the Water Quality Standard. The difference between these two numbers is the remaining assimilative capacity. A ten percent or less decrease of the remaining assimilative capacity is considered to be insignificant degradation. Because no data exists for E. coli in the Spokane River above the three dischargers, data from USGS monitoring station #12419000 located below the Post Falls WWTP (6 samples in 2007) will be used as the upstream background concentration until new data is made available.

Analysis
The following information was used in calculating assimilative capacity in order to determine significance:

- Background concentration upstream of CdA discharge: 11.7 *E. coli* colony forming units/100ml (cfu) (average value of USGS data that was collected monthly from April to September in 2007);
- The increased discharge from current design flow to proposed design flow for all dischargers along the Spokane River: CdA 6.0 mgd (no increase), HARSB 1.5 to 2.4 mgd increase (0.9mgd increase); Post Falls 3.48 to 5 mgd (1.52mgd increase);
- The WQS effluent limit of 126 colony forming units/100ml (cfu) for *E. coli*;
- A river flow of 500cfs as measured at the USGS Station #12419000 located below the Post Falls hydroelectric facility. This minimum flow is required in the 2009 Avista Corporation relicensing agreement for the operation of the Post Falls hydroelectric facility.
- The full river width for mixing.

CdA

current design	new design
6.0 mgd	6.0 mgd=no change (9.3 cfs)

spreadsheet inputs:
500cfs upstream flow
11.7 cfu/L upstream E. coli
126cfu maximum E. coli effluent concentration per current NPDES permit
9.3 cfs effluent flow = 13.79 in-river concentration of *E. coli* downstream of CdA outfall

HARSB

current design	new design
1.5 mgd (2.32 cfs)	2.4 mgd (3.7 cfs)

HARSB Current
spreadsheet inputs:
509.3cfs upstream flow + CdA discharge
13.79 cfu/L upstream E. coli
126 max effluent concentration
2.32 cfs effluent flow=14.3cfu in-river concentration of *E. coli* downstream of HARSB

HARSB Proposed
spreadsheet inputs:
509.3cfs upstream flow + CdA discharge
13.79 cfu/L upstream E. coli
126 max effluent concentration
3.7cfs effluent flow= 14.6cfu in-river concentration of *E. coli* downstream of HARSB

Increase of 0.3cfu

Post Falls

current design	new design
3.48mgd (5.38cfs)	5mgd (7.7cfs)

Post Falls Current
spreadsheet inputs:
513 cfs upstream flow + CdA + HARSB current
14.6 cfu/L upstream E. coli
126 max effluent concentration
5.38cfs effluent flow= 15.8cfu in-river concentration of *E. coli* downstream of Post Falls

Post Falls Proposed
spreadsheet inputs:
513 cfs upstream flow + CdA + HARSB proposed
14.6 cfu/L upstream E. coli
126 max effluent concentration
7.7 cfs effluent flow =16.2cfu in-river concentration of *E. coli* downstream of Post Falls

Increase of 0.5cfu

Assimilative Capacity

The assimilative capacity and the amount of that capacity that is determined to be insignificant degradation is calculated as follows:

126 cfu (Standard) – 13.79 cfu E. coli (background + current design of CdA) = 112.21 X %10 (insignificant amount) = 11.22cfu

Therefore, the dischargers collectively, cannot increase *E. coli* concentrations in the river by more than 11.22cfu as a result of increased design flows.

<u>Currently Permitted</u>
11.7cfu above CdA → 13.8cfu below CdA → 14.3cfu below HARSB → 15.5cfu below Post Falls

<u>Proposed Increases</u>
11.7cfu above CdA → 13.8cfu below CdA → 14.6cfu below HARSB → 16.2cfu below Post Falls

Calculation of Significance
HARSB new design flow increased E. coli by 0.3cfu or
0.3cfu ÷ 112.21cfu = 0.27% increase

Post Falls new design flow increased E. coli by 0.5cfu or
0.5cfu ÷ 111.91cfu =0.44% increase

In total, the two dischargers at their new design flows would decrease assimilative capacity by 0.71%. This increase does not exceed 10% of the remaining assimilative capacity and therefore, is not a significant degradation of river water quality.

Appendix B

Compliance Schedule Justification Letters
dated
April 1, 2013 and April 12, 2013
from
City of Post Falls, Department of Public Services

CITY OF POST FALLS

Department of Public Services

April 1, 2013

Daniel Redline, Regional Administrator
Coeur d'Alene Office
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83815

Re: City of Post Falls NPDES Permit ID-002585-2, 401 Certification – CBOD Compliance Schedule

Dear Mr. Redline:

The City of Post Falls requests a compliance schedule of at least 8 years to meet the seasonal CBOD discharge limit proposed in the latest draft permit from EPA. As with phosphorus, the compliance schedule for CBOD should allow sufficient time to pilot test, design, install and optimize the tertiary treatment facilities required to meet the final waste load allocation. For both parameters, interim requirements for schedules of compliance would be as indicated in the February 2013 draft permit for phosphorus, Section I.E. As explained below, we propose an interim seasonal limit of 348 pounds per day for BOD.

A compliance schedule is allowable for the following reasons.

1. The TMDL allows it. The 2010 WDOE Spokane River and Lake Spokane DO TMDL includes a ten year period in the Managed Implementation Plan to meet final waste load allocations. With the exception of Spokane County (which is a new facility and therefore can comply upon opening), all of the Washington permits provide ten-year compliance schedules for CBOD, phosphorus and ammonia.

2. Federal law allows it. There are two key regulations regarding the CBOD compliance schedule. The first is 40 CFR Section 122.47(a)(1), which states that NPDES permits may include a compliance schedule "when appropriate" and any compliance schedule must require compliance "as soon as possible." The second key regulation is 40 CFR Section 122.45(b)(1), which states that, for POTWs, "effluent limitations, standards, or prohibitions shall be calculated based on design flow." The question is how to read Section 122.45(b)(1) in conjunction with Section 122.47(a)(1) in a situation where a POTW can comply with an effluent mass limit upon issuance of a permit because the discharger is discharging below design flows but later on in the permit cycle cannot comply due to increased flows until new treatment technology is installed.

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As an example, assume that a POTW in a growing community currently discharges 1 lbs/day of CBOD at 10 mg/L. A TMDL is adopted that limits the POTW to 2 lbs/day based on a 5 mg/L CBOD concentration. It will take 4 years to install the technology to reduce the discharge to 5 mg/L. Because of growth, the POTW will discharge 4 lbs/day CBOD (in violation of the mass limit) after 4 years at the point at which the new technology begins operating, and 2 lbs/day (in compliance) after the technology is installed.

Under these circumstances, it is not "possible" within the meaning of Section 122.47(a)(1) for the POTW to comply once flows increase to the point that the mass load exceeds 2 lbs/day. It is only possible to comply after 4 years when the new treatment technology is installed. Therefore, EPA meets the requirements of Section 122.47(a)(1) if the permit includes a 4-year compliance schedule for CBOD. The compliance schedule should include interim limits that ensure that current levels of performance for the treatment system are maintained, without arbitrarily limiting the discharge prior to the installation of the technology needed to meet the TMDL limits.

EPA policy states that, if a compliance schedule is issued, EPA must make a reasonable finding based on evidence in the record that compliance cannot be achieved "immediately" upon issuance of a permit. This is a reasonable general policy, but, of course, it must be read in conjunction with the applicable regulations. It seems to me that Section 122.45(b)(1) becomes meaningless if EPA or DEQ cannot include a compliance schedule that accounts for the fact that flows may increase to design flows before treatment technology necessary to support lower limits can be installed. At that point, the POTW's limits are not "based on design flows" but are based on the happenstance that the facility will discharge below design flows at the beginning of the permit cycle while completely ignoring the facility's higher flows and inability to comply later on.

3. The requested interim limit is needed to ensure the City can remain in compliance during the period before the tertiary treatment facilities are completed and ready to meet the final waste load allocations.

   The City's data indicate that BOD loading to the WRF has been increasing at an average rate of 4.6% per year since 2001. The average influent BOD loading in 2012 was 5,809 pounds per day. In 8 years from permit issuance (2013), the projected influent BOD loading is 8,707 pounds per day. In order to meet the draft permit load limit of 255 pounds per day seasonal average in year 8, the WRF would need to perform at 97% efficiency or better, on a seasonal average. Since 2001, the WRF has not performed at that level 30% of the time. Thus, there is a 1 in 3 chance of violating the draft permit limit before tertiary facilities are up and running.

   The WRF is a secondary treatment facility. Although it has performed remarkably well compared to the minimum level of 85% specified under the Clean Water Act, BOD removal efficiency is variable and not entirely under the control of operations. Conditions that cannot be controlled by the secondary treatment facility are temperature, influent quality, weather and metabolic conditions of the naturally diverse biota that form the basis of secondary treatment. That is why EPA regulation has established 85% as a

reasonable minimum performance criterion for secondary treatment. In spite of that, the interim BOD limit of 348 pounds per day represents a high level of treatment, and the City believes the WRF can achieve a BOD removal efficiency of 96% on a TMDL seasonal basis.

4. Post Falls' requested interim BOD limit will have de minimis effect on Long Lake dissolved oxygen. In aggregate, the Washington permits allow a combined BOD load of over 12,000 pounds per day during the interim ten year period. The City of Spokane, located 11 miles upstream of Long Lake, is allowed 10,759 pounds per day of the aggregate BOD load during the low flow season. Post Falls is asking for an increase of 93 pounds from the draft permit BOD limit. This will increase the aggregate interim load allocation by a fraction of 1 percent.

   Modeling experts have demonstrated that a mass nutrient unit discharged from Post Falls has a fractional effect on dissolved oxygen in Long Lake compared to a unit discharged from Spokane. This is because there are 30 river miles and two impoundments that provide assimilation of nutrients from Post Falls, above and beyond what is available to Spokane.

5. The requested interim BOD limit represents a significant reduction in allowable BOD load compared to the current permit. The City's administratively extended discharge permit allows up to 871 pounds per day of effluent BOD. The requested interim load limit of 348 pounds per day is 60% less than the current allowable amount, which represents a significant improvement.

Thank you for this opportunity to comment on EPA's proposed seasonal CBOD limit, and for considering our request for a compliance schedule and interim seasonal BOD limit in your revision of the 401 certification.

Sincerely,

Terry Werner, Director
Department of Public Services

c: Mike Neher, Environmental Manager
June Bergquist, IDEQ
Gary Allen, Givens Pursley
Paul Klatt, JUB ENGINEERS

Attachments: BOD charts

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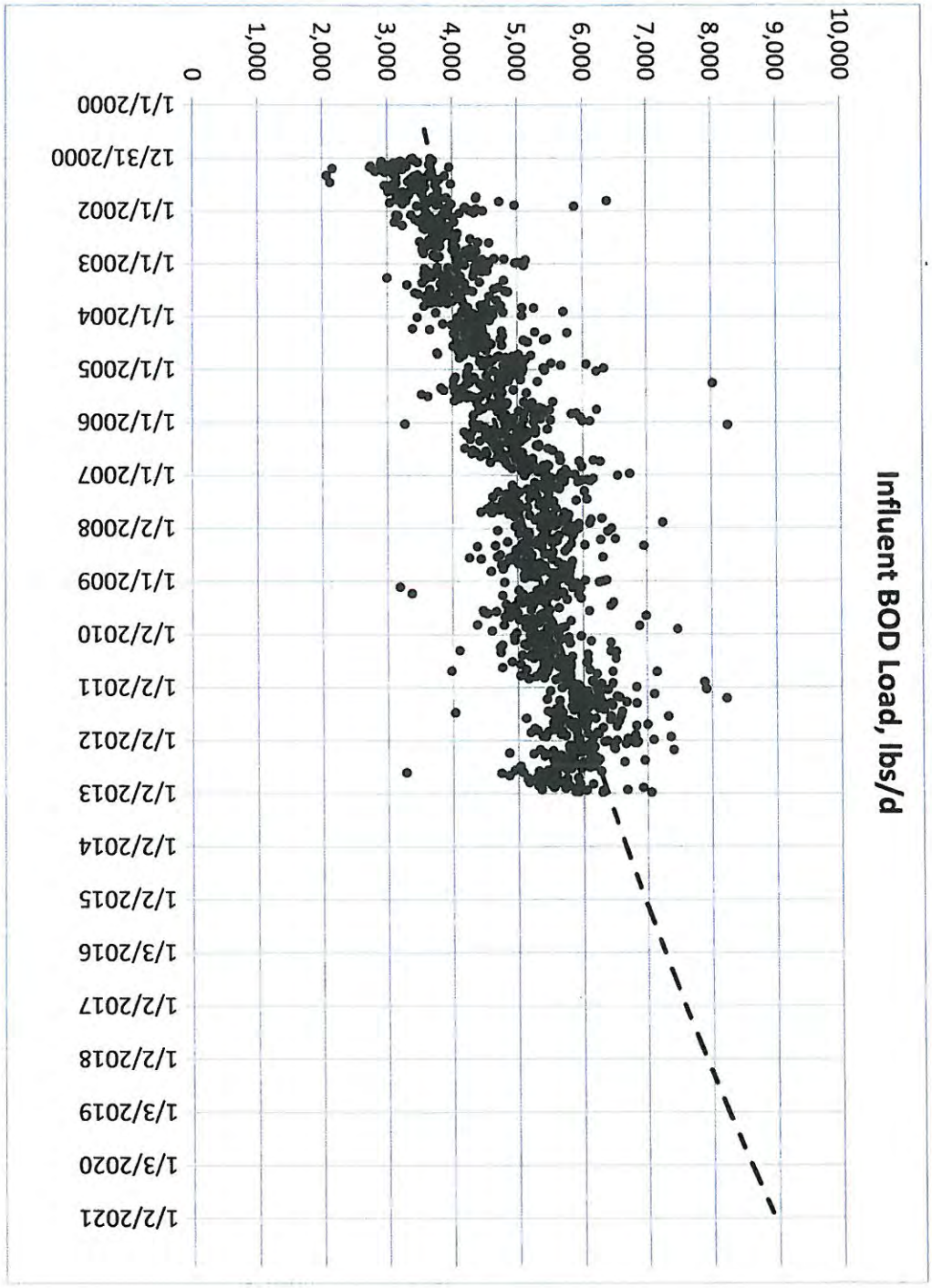
Influent BOD Load, lbs/d
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1/1/2000
12/31/2000
1/1/2002
1/1/2003
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/2/2008
1/1/2009
1/2/2010
1/2/2011
1/2/2012
1/2/2013
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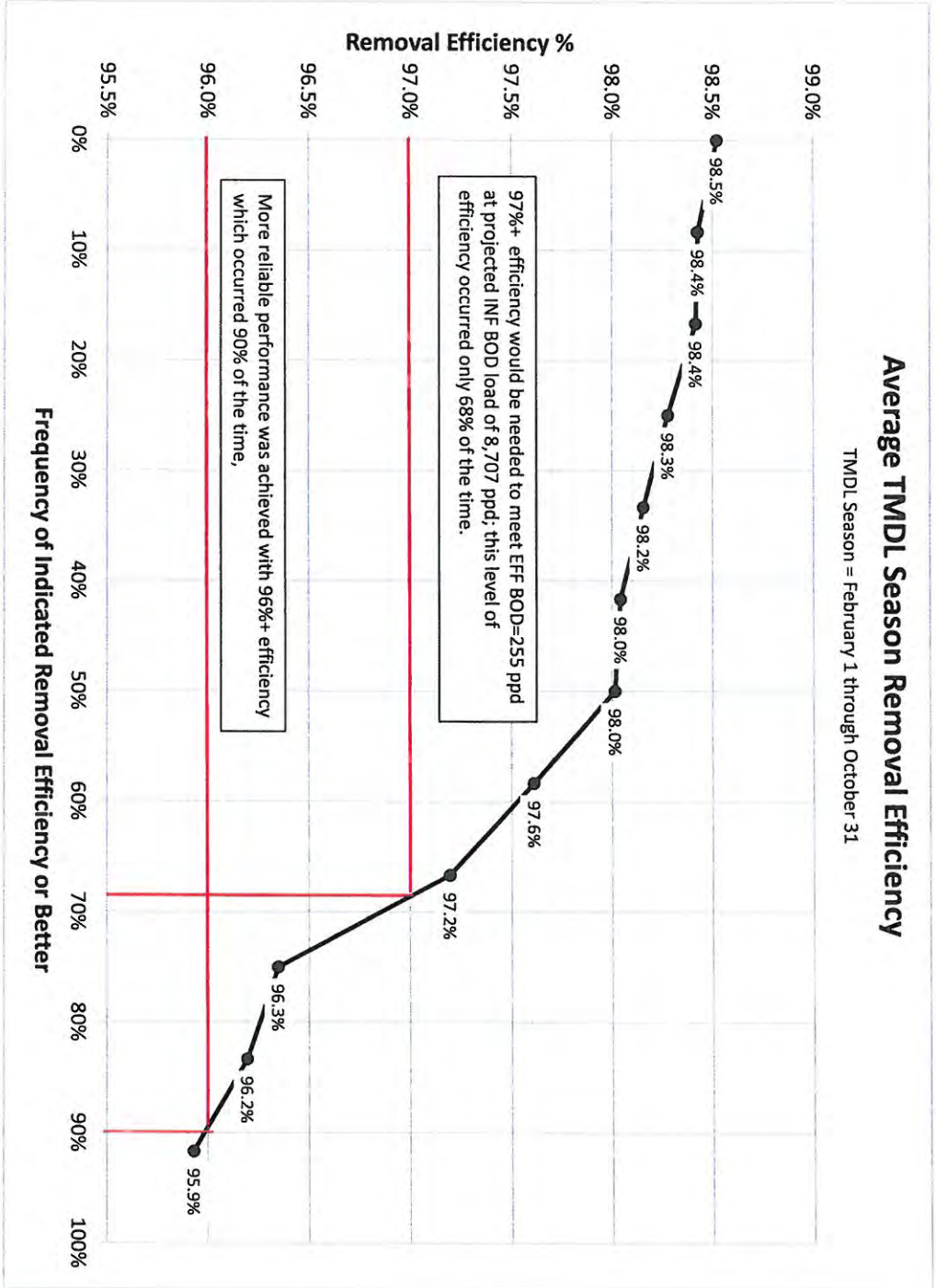
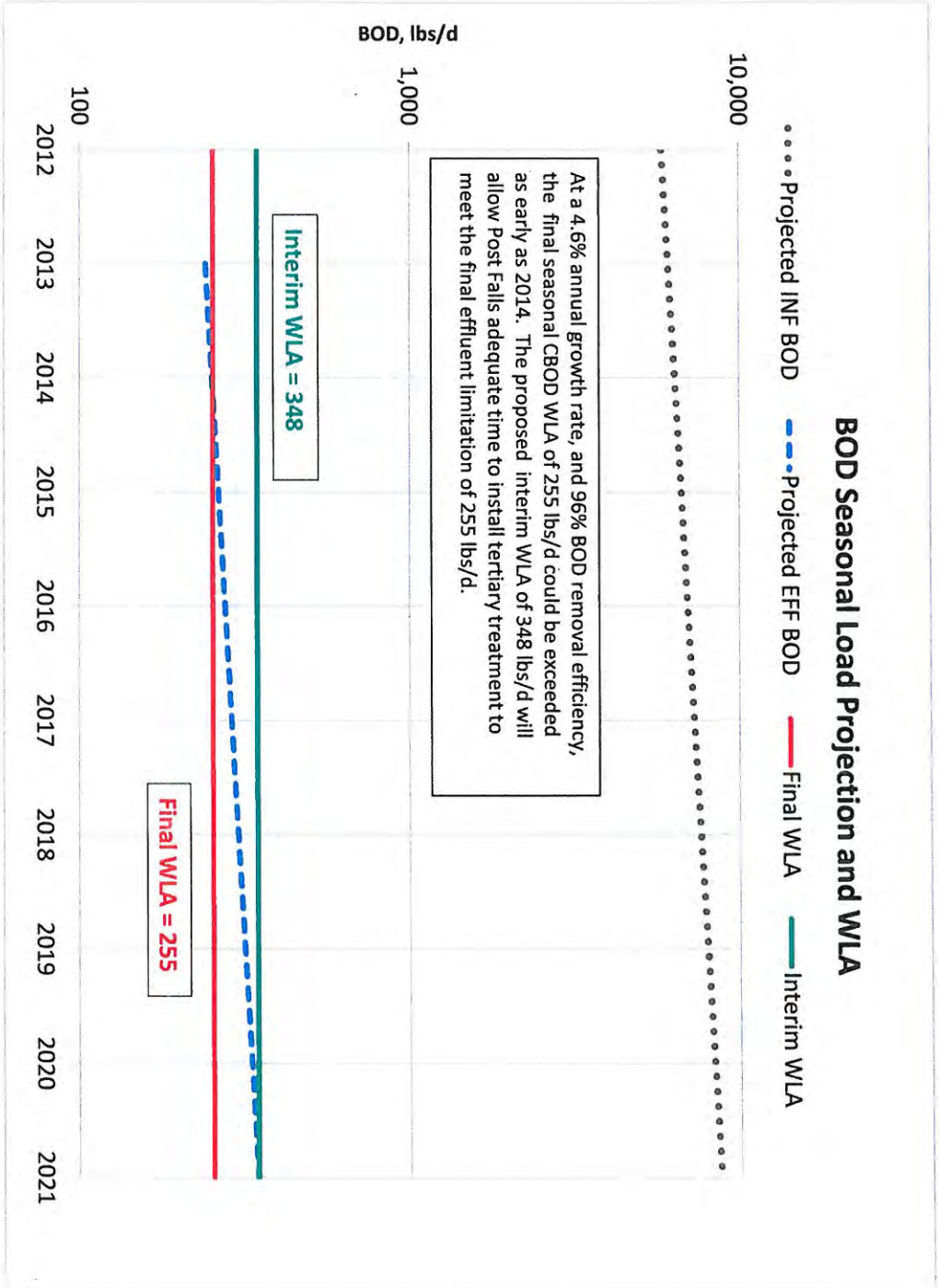
1/3/2020
1/2/2021


Average TMDL Season Removal Efficiency
TMDL Season = February 1 through October 31
Removal Efficiency %
99.0%
98.5%
98.0%
97.5%
97.0%
96.5%
96.0%
95.5%
98.5%
98.4%
98.4%
98.3%
98.2%
98.0%
98.0%
97.6%
97.2%
96.3%
96.2%
95.9%
97%+ efficiency would be needed to meet EFF BOD=255 ppd at projected INF BOD load of 8,707 ppd; this level of efficiency occurred only 68% of the time.
More reliable performance was achieved with 96%+ efficiency which occurred 90% of the time,
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Frequency of Indicated Removal Efficiency or Better


BOD Seasonal Load Projection and WLA
Projected INF BOD
Projected EFF BOD
Final WLA
Interim WLA
BOD, lbs/d
10,000
1,000
100
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
At a 4.6% annual growth rate, and 96% BOD removal efficiency, the final seasonal CBOD WLA of 255 lbs/d could be exceeded as early as 2014. The proposed interim WLA of 348 lbs/d will allow Post Falls adequate time to install tertiary treatment to meet the final effluent limitation of 255 lbs/d.
Interim WLA = 348
Final WLA = 255

CITY OF POST FALLS

Department of Public Services

April 12, 2013

Daniel Redline, Regional Administrator
Coeur d'Alene Office
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83815

Re: City of Post Falls NPDES Permit ID-002585-2: 401 Certification – CBOD Compliance Schedule Supplemental Information

Dear Mr. Redline:

This letter is to supplement the City of Post Falls' April 1, 2013 letter requesting an 8-year compliance schedule to meet the anticipated seasonal 5-day carbonaceous biochemical oxygen demand (CBOD) discharge limit in our upcoming NPDES permit renewal.

In addition to the detailed justification provided in our previous letter, it is important to realize that the improvements necessary to meet our anticipated final permit limits for CBOD and phosphorus will require significant and disruptive construction at our Water Reclamation Facility. We anticipate new preliminary treatment (headworks and equalization basins), new chemical coagulation facilities, possible tertiary clarification, tertiary filtration, disinfection improvements, and multiple recycle streams into the existing process units.

In particular, equalization basins and headworks construction will require complete rerouting of influent and preliminary treatment flows through the facility and increase the likelihood of biological upsets which can easily migrate through secondary clarification. The equalization basins are important because they will moderate the daily flow and load fluctuations that currently reduce the reliability of our biological phosphorus removal process (BPR). BPR is an essential component of permit compliance since it will significantly affect the pilot testing, selection, and sizing of our final tertiary process.

In addition, because our treatment system is biologically based, when the proposed tertiary treatment systems introduce chemicals for coagulation, filter cleaning and pH/alkalinity adjustments, they will undoubtedly create biological stresses that must be carefully managed. As with all new systems, start-up of the operations often negatively affects the existing biological system performance and the BPR often takes a number of weeks or even several months to return to previous performance levels.

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Thank you again for this opportunity to comment on EPA's proposed seasonal CBOD limit, and for considering our request for a compliance schedule and interim seasonal BOD limit in your revision of the 401 certification.

Sincerely,

Terry Werner, Director
Department of Public Services

c: Mike Neher, Environmental Manager
June Bergquist, IDEQ
Gary Allen, Givens Pursley
Paul Klatt, JUB ENGINEERS

Attachments: BOD charts

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STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton • Boise, Idaho 83706 • (208) 373-0502

C.L. "Butch" Otter, Governor
Curt Fransen, Director

May 21, 2013

The Honorable Eric Anderson
Idaho State Legislature
33 Match Bay Road
Priest Lake, ID 83856-5049

The Honorable George Eskridge
Idaho State Legislature
P.O. Box 112
Dover, ID 83825

Dear Representatives Eskridge and Anderson:

I am sorry I was unavailable for the meeting regarding the proposed lead, cadmium and zinc effluent limits contained in the draft Clean Water Act (CWA) permits for Coeur d'Alene, Post Falls and the Hayden Area Regional Sewer Board. I have had an opportunity to discuss with my staff the concerns and issues that you and the cities raised during the meeting, and would like to convey to you the manner in which DEQ intends to respond to those concerns and issues.

One of the concerns raised during the meeting was that DEQ's proposed certification of the Spokane River permits would prevent the cities from increasing the total amount (or mass) of metals discharged from their wastewater treatment facilities. According to the cities, this restriction would make it difficult to accommodate growth in their communities. Moreover, the cities assert this restriction would have no environmental benefit.

By way of background, the section of the Water Quality Standards (WQS) applicable to this issue (section 055.04) is intended to ensure that water quality is maintained in impaired waters that are designated as high priority for the development of a cleanup plan (a TMDL), such as the Spokane River, until the TMDL can be developed. The draft discharge permits require that the concentration of metals in the effluent meet the applicable criteria in the WQS adopted to protect aquatic life. The criteria for lead, cadmium and zinc are expressed as dissolved metal concentrations. Because 055.04 provides that the total "load" of causative pollutants must remain constant or decrease, DEQ's proposed certification also restricts the total amount, not just the concentration, of metals in the effluent discharged by the cities.

After consultation with my staff, and taking into consideration the additional information presented at the meeting, I believe section 055.04 must be applied in a manner that achieves its intended purpose of maintaining water quality to support designated and existing uses, in this case, specifically aquatic life uses. It also appears clear to me that an increase in the total amount or mass of metals discharged is not critical to ensuring protection of aquatic life in the Spokane River; instead, aquatic life is impacted by the concentration of metals in the river. In turn this means that water quality related to metals in this impaired stretch will be maintained, as required under the section 055.04 of the WQS, by ensuring that the concentration, rather than the mass, of metals is limited. DEQ intends to adjust the proposed

certifications to allow an increase in the metals discharged as the communities plan for growth as long as the effluent concentration meets the criteria applicable to these metals.

You also raised a concern about whether section 055.04 imposes restrictions that go beyond those required by the Clean Water Act. This section of the Idaho rules was adopted in 1997. The CWA requires that states include an antidegradation policy and implementation provisions in their WQS. As you may remember, in 2011, DEQ went through an extensive negotiated rulemaking effort and adopted the required antidegradation provisions in the WQS. Among other things, the provisions adopted in 2011 include measures to ensure that the water quality necessary to protect existing uses of all waters in the state, including impaired waters like the Spokane River, is maintained and protected. Now that the antidegradation provisions are in place, I believe it is appropriate to amend section 055.04 of the WQS. Therefore, DEQ intends to initiate rulemaking to remove the provisions in this section that require that the total load of pollutants remain constant or decrease in the watershed until a TMDL is developed.

I hope this letter helps to address the questions and concerns you raised during the recent meeting. If you have further questions or concerns regarding the Spokane River permits, or have questions or concerns about any other DEQ matter, please do not hesitate to contact me.

Sincerely,

Mark Dietrich for

Curt A. Fransen
Director

Post Falls WRF
Item: Equalization Storage
Engineer: RMC
Date: October 2011

Peak Daily Flow	6.10E+06	gal/day
Equalization %	25%	
Required Total Equalization Working Volume:	1,525,000	gal
Assume Rectungular Basin:		
Bottom Slab	2	ft
Working Depth	16	ft
Dead Depth (at bottom, when emptying)	2	ft
Free Board (headspace for air flow)	1	ft
Top Slab	1	ft
Total Overall Tank (height)	22	
Interior Dimensions:		
Length	160	ft
Width	80	ft
Calculated Volume (working)	204800	ft^3
Calculated Volume (working)	1,531,904	gal
Calculated Volume (working)	5798.8875	cubic Meters

Mixing Energy Requirements

From M&E pg 344	0.004 to 0.008	kW/M3	for med. Strength wastewater
Assume 0.006 kW/m3	0.006	kw/m3	
	34.793325	kW	
	24	hr/day	
	835.03979	kW-Hr/day	
	304789.52	kw-hr/yr	

Pumping Power Calculations:

Assume 15ft static and 15 ft friction head	30	ft
Assume 65% efficiency	0.65	
Flow (average daily flow -midpoint of lifecycle)	3.9	mgd
Flow (average daily flow -midpoint of lifecycle)	2706.6	gal/min
	6.0307487	cfs
HP Required	17368.556	ft-lb/hr
	31.579193	HP
	23.548604	kW
	24	hr/day
	565.1665	kW-Hr/day
	206285.77	kw-hr/yr

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: Post Falls WRF Facility Plan

DATE: October 1, 2011

PROJECT DESCRIPTION: Influent Equalization Alternative 1

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-033

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
1	Excavation and Site Work	7000	CY	$ 5	$ 35,000
2	Concrete Tank	1,525,000	GAL	$ 1.75	$ 2,668,750
3	Coatings	48960	SF	$ 8	$ 391,680
4	Interior Mechanical Piping	1	LS	$ 50,000	$ 50,000
5	Submerged Mixers	4	EA	$ 35,000	$ 140,000
6	Odor Control (Foul Air Scrubbing)	1	LS	$ 100,000	$ 100,000
7	**Pumping**				
8	Concrete - Common Wall Construction with EQ Tank	1	LS	$ 25,000	$ 25,000
9	Pumps	3	EA	$ 50,000	$ 150,000
10	Mechanical Piping	1	LS	$ 50,000	$ 50,000
11	Yard Piping and Forcemain Modifications	100	LF	$ 150	$ 15,000
12	Temporary Pumping During Construction	1	LS	$ 50,000	$ 50,000
12	**Upgraded Headworks**				
13	Additional Grit Channel and Equipment	1	LS	$ 175,000	$ 175,000
14	Replace Existing Rotamat Screen	1	LS	$ 200,000	$ 200,000

Construction Subtotal	**$ 3,625,400**
Mobilization, Bonding, Administration (12%)	$ 435,000
Site Electrical, Controls and Testing (25%)	$ 1,015,100
Construction Total	**$ 5,075,500**
Engineering and Administration (25%)	$ 1,268,900
Construction Reserve Contingency (20%)	$ 1,015,100
Total Capital	**$ 7,359,500**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
	Power Costs (mixing)	304790	kW-Hr	**$0.07**	**$ 21,335**
	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$35.00**	**$ 4,550**
	Pumping				
	Power Costs (Pumping)	206286	kW-Hr	**$0.07**	**$ 14,440**
	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$35.00**	**$ 4,550**
	Power over 20 years				**$ 715,505**
	Operator Time (over 20 years)				**$ 182,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 898,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Post Falls WRF Facility Plan

DATE: October 1, 2011

PROJECT DESCRIPTION: Influent Equalization Alternative 2

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-033

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
1	Excavation and Site Work	7000	CY	$ 5	$ 35,000
2	Concrete Tank	1,525,000	GAL	$ 1.75	$ 2,668,750
3	Coatings	48960	SF	$ 8	$ 391,680
4	Interior Mechanical Piping	1	LS	$ 50,000	$ 50,000
5	Submerged Mixers	4	EA	$ 35,000	$ 140,000
6	Odor Control (Foul Air Scrubbing)	1	LS	$ 100,000	$ 100,000
7	**Pumping**				
8	Concrete - Common Wall Construction with EQ Tank	1	LS	$ 25,000	$ 25,000
9	Pumps	3	EA	$ 50,000	$ 150,000
10	Mechanical Piping	1	LS	$ 50,000	$ 50,000
11	C-Trail Forcemain Modifications	360	LF	$ 125	$ 45,000
12	New Forcemain	360	LF	$ 100	$ 36,000
12	**New Headworks**				
13	Building 40 x 65 (on top of EQ Tank)	2,400	SF	$ 200	$ 480,000
14	Screening and Solids Washing/Compacting Equipment	2	EA	$ 200,000	$ 400,000
15	Grit Chambers and Classification Eqpt	2	EA	$ 175,000	$ 350,000
16	Rathdrum Flow Measurement	1	LS	$ 10,000	$ 10,000
17	Odor Control (Foul Air Scrubbing)	1	LS	$ 40,000	$ 40,000
18	Alkalinity Addition (Tank and Mixing)	1	LS	$ 15,000	$ 15,000
19	Pumps and Piping	1	LS	$ 25,000	$ 25,000

Construction Subtotal	**$ 5,011,400**
Mobilization, Bonding, Administration (12%)	$ 601,400
Site Electrical, Controls and Testing (25%)	$ 1,403,200
Construction Total	**$ 7,016,000**
Engineering and Administration (25%)	$ 1,754,000
Construction Reserve Contingency (20%)	$ 1,403,200
Total Capital	**$ 10,173,200**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
	Power Costs (mixing)	304790	kW-Hr	**$0.07**	**$ 21,335**
	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$35.00**	**$ 4,550**
	Pumping				
	Power Costs (mixing)	206286	kW-Hr	**$0.07**	**$ 14,440**
	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$35.00**	**$ 4,550**
	Headworks				
	No difference between alternatives (same O&M)				
	Power over 20 years				**$ 715,505**
	Operator Time (over 20 years)				**$ 182,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 898,000**

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: Post Falls WRF Facility Plan

DATE: October 1, 2011

PROJECT DESCRIPTION: Influent Equalization Alternative 3

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-033

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
1	Excavation and Site Work	7000	CY	$ 5	$ 35,000
2	Concrete Tank	1,525,000	GAL	$ 1.75	$ 2,668,750
3	Coatings	48960	SF	$ 8	$ 391,680
4	Interior Mechanical Piping	1	LS	$ 50,000	$ 50,000
5	Submerged Mixers	4	EA	$ 35,000	$ 140,000
6	Odor Control (Foul Air Scrubbing)	1	LS	$ 100,000	$ 100,000
7	**Pumping**				
8	Concrete - Common Wall Construction with EQ Tank	1	LS	$ 25,000	$ 25,000
9	Pumps	3	EA	$ 50,000	$ 150,000
10	Mechanical Piping	1	LS	$ 50,000	$ 50,000
11	C-Trail Forcemain Modifications	360	LF	$ 125	$ 45,000
12	New Forcemain	360	LF	$ 100	$ 36,000
13	**Upgraded Headworks**				
14	Additional Grit Channel and Equipment	1	LS	$ 175,000	$ 175,000
15	Replace Existing Rotamat Screen	1	LS	$ 200,000	$ 200,000

Construction Subtotal	**$ 3,691,400**
Mobilization, Bonding, Administration (12%)	$ 443,000
Site Electrical, Controls and Testing (25%)	$ 1,033,600
Construction Total	**$ 5,168,000**
Engineering and Administration (25%)	$ 1,292,000
Construction Reserve Contingency (20%)	$ 1,033,600
Total Capital	**$ 7,493,600**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
	Power Costs (mixing increased energy *1.25)	380987	kW-Hr	**$0.07**	**$ 26,669**
	Operator Time (Annual Man-Hours) (4 hrs/week)	208	HR	**$35.00**	**$ 7,280**
	Pumping				
	Power Costs (Pumping)	206286	kW-Hr	**$0.07**	**$ 14,440**
	=	130	HR	**$35.00**	**$ 4,550**
	Power over 20 years				**$ 822,182**
	Operator Time (over 20 years)				**$ 236,600**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,059,000**

Post Falls WRF
Item: Primary Sedimentation
Engineer: RMC
Date: October 2011

TYPICAL DESIGN PARAMETERS

Overflow Rate:

Average Flow	1000	gpd/ft2	Typical, M&E pg 398
Peak Hour Flow	2500	gpd/ft3	Typical, M&E pg 398
Weir Loading	20000	gal/ft-day	Typical, M&E pg 398

UPSTREAM OF EQUALIZATION

Depth	14.0	ft
Diameter	50.0	ft
Bottom Slope:	1.0	in/ft
Flight Speed:	0.030	rev/min
Number of Units	3	
Wier Length (N-1) units	314	ft
Area of Clarifier (N-1) units	3927	ft2

20-year Conditions:

Average Flow	5.20	mgd	3609 gpm	5200000 gpd
Peak Hour Flow	12.00	mgd	8328 gpm	12000000 gpd

Calculations:

Overflow Rate:

Average Flow	1324	gpd/ft2	Typical, M&E pg 398
Peak Hour Flow	3056	gpd/ft3	Typical, M&E pg 398
Weir Loading	16552	gal/ft-day	Typical, M&E pg 398

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: Post Falls WRF Facility Plan

DATE: October 1, 2011

PROJECT DESCRIPTION: Primary Sedimentation

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-033

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	**Clarifiers**				
2	Clarifier (50 ft) excavation, backfill, concrete	3	EA	$ 195,000	$ 585,000
	Clarifier Mechanism	3	EA	$ 110,000	$ 330,000
3	Structures to cover clarifiers (odor containmen)	6000	SF	$ 100	$ 600,000
4	Odor Control	3	EA	$ 100,000	$ 300,000
5	**Pump Building**				
6	Excavation and Site Work	500	CY	$ 5	$ 2,500
7	Solids Pump Station (20 x30 Building Basement)	600	SF	$ 300	$ 180,000
8	Pumps	4	EA	$ 30,000	$ 120,000
9	Mechanical Piping and Installation	4	EA	$ 30,000	$ 120,000
	Anaerobic Digestion (COSTS NOT INCLUDED HERE, MUST BE ACCOUNTED FOR ELSEWHERE)				

Construction Subtotal	**$2,237,500**
Mobilization, Bonding, Administration (12%)	$ 268,500
Site Electrical, Controls and Testing (25%)	$ 626,500
Construction Total	**$ 3,132,500**
Engineering and Administration (25%)	$ 783,100
Construction Reserve Contingency (20%)	$ 626,500
Total Capital	**$ 4,542,100**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Pumping				
	Power Costs	131400	kW-Hr	**$0.07**	**$ 9,198**
	Operator Time (Annual Man-Hours) (1 hrs/week/unit)	156	HR	**$35.00**	**$ 5,460**
	Power over 20 years				**$ 183,960**
	Operator Time (over 20 years)				**$ 109,200**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 293,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Post Falls WRF Facility Plan

DATE: October 1, 2011

PROJECT DESCRIPTION: Salsness Filter

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-033

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Salsness				
1	Excavation and Site Work	1000	CY	$ 5	$ 5,000
2	Building (40 x 50)	2,000	SF	$ 300	$ 600,000
3	Mechanical Equipment (4 trains)	1	LS	$ 1,066,667	$ 1,066,667
4	Installation and Mark-Up	1	LS	25%	$ 266,667
5	Odor Control (Foul Air Scrubbing)	1	LS	$ 100,000	$ 100,000

Construction Subtotal	**$ 2,038,300**
Mobilization, Bonding, Administration (12%)	$ 244,600
Site Electrical, Controls and Testing (25%)	$ 570,700
Construction Total	**$ 2,853,600**
Engineering and Administration (25%)	$ 713,400
Construction Reserve Contingency (20%)	$ 570,700
Total Capital	**$ 4,137,700**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Pumping				
	Power Costs (Assumed in other unit process upgrades)	52560	kW-Hr	**$0.07**	**$ 3,679**
	Operator Time (Annual Man-Hours)	352	HR	**$35.00**	**$ 12,320**
	Power over 20 years				**$ 73,584**
	Operator Time (over 20 years)				**$ 246,400**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 320,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Secondary Treatment Evaluation for O&M Costs

		DIFF AIR Fine Bubble with blowers 60 lb O2/day/hp	OX DITCH Rotor 91 lb O2/day/hp	MBR Fine Bubble with blowers 60 lb O2/day/hp
lb O2 required per day (2021)		*16006*	*16006*	*16006*
Secondary Aeration HP		267 hp	176 hp	267
Secondary RAS HP		60	60	60
Clarifiers		20	20	20
Scour Air Blowers				10
Internal Recirc				30
Screening Motors				10
Permeate Pumping				75
TOTAL HP		347	256	472
TOTAL KW		259	191	352
KW-HR/YR		2266106	1672232	3082976
		1.48E+04	1.48E+04	1.48E+04
	gal	1.53E+02	1.13E+02	2.09E+02
	gal/m3	264.17	267.17	270.17
	kwH/m3	0.5807	0.4237	0.7725

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Secondary Treatment - Oxidation Ditch Expansion to 5.2 MGD

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Expansion and Population of Train 6 Equipment				
1	Excavation and Site Work	1	LS	$ 10,000	$ 10,000
2	Handrail	400	LF	$ 65	$ 26,000
3	Interior Mechanical Piping	1	LS	$ 50,000	$ 50,000
4	Aerators (150 hp) (including installation)	2	EA	$ 165,000	$ 330,000
5	Anaerobic and Anoxic Mixers (including installation)	4	EA	$ 50,000	$ 200,000
6	*Aerators (existing 8, 60 hp aerators have 10 year life remaining)*	4	EA	$ 135,000	$ 540,000
	Assume 4 of 8 replaced on trains 1-4 in next 20 years				
7	Clarifier No. 8 and associated RAS pumps	1	EA	$ 325,000	$ 325,000
8	Add Mixers to Ox Ditches 1-4	4	EA	$ 50,000	$ 200,000
9	Gates and Transfer Structes for phased operation (NO3 removal)	4	EA	$10,000.00	$40,000.00

Construction Subtotal	**$1,721,000**
Mobilization, Bonding, Administration (15%)	$ 258,200
Site Electrical, Controls and Testing (30%)	$ 593,800
Construction Total	**$ 2,573,000**
Engineering and Administration (25%)	$ 643,300
Construction Reserve Contingency (20%)	$ 514,600
Total	**$ 3,730,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Costs (Annual)	1672232	kw-Hr	**$0.08**	**$ 133,779**
2					
3	Operator Time (Annual Man-Hours) - Aeration Basins 8 hrs/wk	416	HR	**$30.00**	**$ 12,480**
4	Operator Time (Annual Man-Hours) - Clarifiers 8 hrs/wk	416	HR	**$31.00**	**$ 12,896**
	Power Costs (over 20 years)				**$ 2,675,571**
	Operator Time (over 20 years)				**$ 249,600**
	Operator Time (over 20 years)				**$ 257,920**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 3,183,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 6,913,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Secondary Treatment - Diffused Air Modifications to 5.2 MGD

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Expansion and Population of Train 6 Equipment				
1	Ditch 1-4 Structural Concrete (raise walls 6 ft)	320	CY	$ 800	$ 256,000
2	Ditch 5-6 Structural Concrete (raise walls 6 ft)	266	CY	$ 800	$ 212,800
3	Internal Weir Structureand Partition Wall (Ditch 1-4)	212	CY	$ 800	$ 169,600
4	Internal Weir Structure and Partition Wall (Ditch 5-6)	135	CY	$ 800	$ 108,000
5	Handrail Ditch 6	400	LF	$ 65	$ 26,000
6	Mechanical Air Piping (Train 1-4)	450	LF	$ 200	$ 90,000
7	Mechanical Air Piping (Train 5-6)	300	LF	$ 200	$ 60,000
8	Diffusers (Ditch 1-4)	4	EA	$ 80,000	$ 320,000
9	Diffusers (Ditch 5-6)	2	EA	$ 100,000	$ 200,000
10	Blower Building Trains 1-4 (20 x 40) atop end of ditch platform	800	SF	$ 175	$ 140,000
11	Blower Building Trains 5-6 (20 x 40) atop end of ditch platform	800	SF	$ 175	$ 140,000
12	Blowers (Ditches 1-4) 5 each at 125 hp (including installation)	5	EA	$ 75,000	$ 375,000
13	Blowers (Ditches 5-6) 5 each at 125 hp (including installation)	5	EA	$ 75,000	$ 375,000
14	Anaerobic and Anoxic Mixers (including installation)	4	EA	$ 50,000	$ 200,000
14	Clarifier No. 8 and associated RAS pumps	1	EA	$ 325,000	$ 325,000

Construction Subtotal	**$ 2,997,400**
Mobilization, Bonding, Administration (15%)	$ 449,600
Site Electrical, Controls and Testing (30%)	$ 1,034,100
Construction Total	**$ 4,481,100**
Engineering and Administration (25%)	$ 1,120,300
Construction Reserve Contingency (20%)	$ 896,200
Total	**$ 6,500,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Costs (Annual)	2266106	kw-Hr	**$0.08**	**$ 181,289**
2					
3	Operator Time (Annual Man-Hours) - Aeration Basins 8 hrs/wk	416	HR	**$30.00**	**$ 12,480**
4	Operator Time (Annual Man-Hours) - Clarifiers 8 hrs/wk	416	HR	**$30.00**	**$ 12,480**
	Power Costs (over 20 years)				**$ 3,625,770**
	Operator Time (over 20 years)				**$ 249,600**
	Operator Time (over 20 years)				**$ 249,600**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 4,125,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 10,625,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Secondary Treatment - MBR to 5.2 MGD

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Ditch 5-6 Structural Concrete (raise walls 6 ft)	266	CY	$ 800	$ 212,800
2	Internal Weir Structure and Partition Wall (Ditch 5-6)	135	CY	$ 800	$ 108,000
3	Handrail Ditch 6	400	LF	$ 65	$ 26,000
4	Mechanical Air Piping (Train 5-6 conversion)	300	LF	$ 200	$ 60,000
5	Diffusers (Ditch 5-6)	2	EA	$ 100,000	$ 200,000
6	Blower Building Trains 5-6 (20 x 40) atop end of ditch platform	800	SF	$ 175	$ 140,000
7	Blowers (Ditches 5-6) 10 each at 125 hp (including installation)	10	EA	$ 75,000	$ 750,000
8	Anaerobic and Anoxic Mixers (including installation)	4	EA	$ 50,000	$ 200,000
9	Membrane Equipment	5.2	MGD	$ 1,400,000	$ 7,280,000
	(Controls, Membrane Cassettes, Permeate Pumps and Scour Air Blowers)				
10	Installation			25%	$ 1,820,000
11	Re-Screening Building (MBR Eqpt Protection) (30 x 50)	1500	SF	$ 200	$ 300,000
12	*Screening Equipment (3 drum screens)*	4	EA	$ 200,000	$ 800,000

Construction Subtotal	**$ 11,896,800**
Mobilization, Bonding, Administration (15%)	$ 1,784,500
Site Electrical, Controls and Testing (30%)	$ 4,104,400
Construction Total	**$ 17,785,700**
Engineering and Administration (25%)	$ 4,446,400
Construction Reserve Contingency (20%)	$ 3,557,100
Total	**$ 25,800,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Costs (Annual)	3082976	kw-Hr	**$0.08**	**$ 246,638**
2					
3	Operator Time (Annual Man-Hours) - Aeration Basins 8 hrs/wk	416	HR	**$30.00**	**$ 12,480**
4	Operator Time (Annual Man-Hours) - Membranes 16 hrs/wk	832	HR	**$30.00**	**$ 24,960**
5	Operator Time (Annual Man-Hours) - MF Support Systems 8 hrs/wk	416	HR	**$30.00**	**$ 12,480**
6	Chemical Costs (cleaning MF Fiber) Annual	1	LS	**$30,000**	**$ 30,000**
	Power Costs (over 20 years)				**$ 4,932,762**
	Operator Time (over 20 years)				**$ 249,600**
	Operator Time (over 20 years)				**$ 499,200**
	Operator Time (over 20 years)				**$ 249,600**
	Chemical Costs (over 20 years)				**$ 600,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 6,531,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 32,331,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

City of Post Falls, Idaho

2012 Water Reclamation Facility Plan

TECHNICAL MEMORANDUM TM 8 - DRAFT

Tertiary Treatment to Meet Anticipated Permit Limits For Phosphorus "Next Level Treatment"

Mark H. Esvelt, P.E., BCEE

February, 2012
Revised: May, 2012
July, 2012

ESVELT ENVIRONMENTAL ENGINEERING

REGISTERED PROFESSIONAL ENGINEER 11401 STATE OF IDAHO MARK H ESVELT

7-9-12

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Background:

The Environmental Protection Agency Region 10 has issued a revised Fact Sheet and Preliminary Draft NPDES Permit for the City of Post Falls Wastewater Treatment Plant (Permit No. ID0025852). The Preliminary Draft Permit and Revised Fact Sheet outline the steps the City will take to meet requirements for discharge to the Spokane River, including meeting the Waste Load Allocation (WLA) for effluent phosphorus, consistent with the *Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load: Water Quality Improvement Report,* Completed by the Washington State Department of Ecology (2010), and approved by EPA with waste loads for total phosphorus assigned to upstream dischargers across the State Line in Idaho.

The permit includes limitations for conventional pollutants as well as toxics, and the facilities to address these constituents and consistently meet permit limitations are discussed in other technical memoranda associated with this facility planning effort.

This technical memorandum focuses on the tertiary treatment facility alternatives for removing phosphorus to the concentrations necessary to meet the WLA.

The Preliminary Draft Permit requires development of a Phosphorus Management Plan. The permit language regarding the phosphorus management plan are as follows:

> *The permittee must provide written notice to EPA and IDEQ that the plan has been developed within 1 year after the effective date of the final permit and implemented within 18 months of the effective date of the final permit.*

The Preliminary Draft Permit lists the required elements of the Phosphorus Management Plan. The Plan will identify phosphorus reduction goals, which must be consistent with the final effluent limitations in the permit, for the facility, and the improvements required to meet the goals.

Memo Purpose

This memo summarizes the process for developing recommendations for the "Next Level of Treatment" (NLT) for the removal of phosphorus to meet the waste load allocations in the City of Post Falls' new NPDES permit. An evaluation of feasible alternatives is presented, followed by comparison of alternatives, conclusions regarding most economically feasible technology and recommendations.

Design Criteria

The draft NPDES permit for the City of Post Falls sets a waste load allocation (WLA) of 3.19 lb total phosphorus per day for effluent discharged to the Spokane River on a seasonal average basis. The WLA of 3.19 lb/day is based on meeting an average effluent concentration of 50 μg/L at the design flow of 7.65 mgd.

Current flows and projected increases in flows are presented in technical memorandum TM 3. The initial tertiary phosphorus removal project is anticipated to be implemented with a design flow of 4.0 mgd. At 4.0 mgd, the effluent total phosphorus concentration required to meet the 3.19 lb/day WLA would be 95 μg/L. As flows increase due to growth, meeting the mass limit of the WLA will require lower concentrations. The average effluent concentration requirements are presented in Table 1 for the 4-mgd and 5-mgd capacity phases, along with the concentration required for the "ultimate" design capacity of 18.0 mgd.

Table 1 – Performance criteria (total phosphorus average), each phase to meet WLA.

Design phases	Design flow (seasonal ave)	WLA	Concentration µg/L
Phase 1	4 mgd	3.19 lb/d	95 µg/L
Phase 2	5 mgd	3.19 lb/d	75 µg/L
Ultimate	18 mgd	3.19 lb/d	21 µg/L

Next Level Treatment (NLT) process units are physical and chemical. Design is governed by:

- Average and peak hydraulic loading
- Average and peak solids loading, a function of chemical addition, which is related to phosphorus concentration at the process inlet.

The planned equalization for Post Falls limits the peak loading to the tertiary phosphorus removal facilities to the maximum day projections. This proposed equalization would be expected to result in significant cost savings for the NLT implementation. Projected flows for the NLT units are summarized in Table 2.

Table 2 – Average and Maximum Flows

Design phases	Design flow (seasonal ave)	Peak flow (Max day)
Phase 1	4 mgd	6.1 mgd
Phase 2	5 mgd	7.7 mgd
Ultimate	18 mgd	27.5 mgd

Peaking factor 1.53 per TM3 Table 3-2.

Tertiary Phosphorus Removal

The state-of-the-industry methods for reducing phosphorus to 0.1 mg/L (100 µg/L) and below are based on chemical precipitation of phosphorus and removal of the precipitated solids. All known facilities that are considered "exemplary" in achieving the lowest concentrations of effluent phosphorus use one or more stages of effluent polishing by chemical coagulation and removal of the precipitated solids. For the lowest levels of total phosphorus effluent, metal salt coagulants are added at significantly higher than the stoichiometric theoretical dose. The precipitated solids generated by alum, the most commonly used coagulant, include aluminum phosphate and aluminum hydroxide. The solids are removed at the final stage using a filter to achieve high capture efficiency for the smallest precipitates. Upstream stages of coagulation and solids removal (prior to final filtration) can use clarifiers, since the downstream filter would remove the solids carry-over. In a two-stage tertiary system the first stage (usually clarifier) can take a high solids loading, reducing the coagulant dose (and solids loading) for the final filter.

The Post Falls WWTP currently utilizes enhanced biological phosphorus removal (EBPR) activated sludge. This existing first stage phosphorus reduction is a critical component for limiting the tertiary coagulant dose to amounts that result in a manageable solids loading to subsequent units, as well as in reducing the expense associated with high coagulant doses.

The maximum dose rate of alum that can consistently be applied to tertiary filters is approximately 100 mg/L (as $Al_2(SO_4)_3 \cdot 14H_2O$). This was found through investigation of the existing "exemplary" phosphorus removal facilities in Colorado, and confirmed in local installations and in pilot studies in the Spokane basin investigating treatment technologies to achieve very low effluent phosphorus concentrations. Dose rates in excess of about 100 mg/L tend to result in excessive solids load on the filters, resulting in shortened filter runs or filter blinding (clogging).

The following general guidelines for tertiary phosphorus removal are based on known chemical reaction processes, supported by extensive evaluation of the operation of existing facilities and large-scale pilot units.

- At a feed phosphorus concentration of 0.5-0.8 mg/L (achievable with biological P-removal), further reduction to 0.1 to 0.2 mg/L (100 to 200 μg/L) TP would require alum dose rate of about 10:1 on a Mole Ratio basis, or about 75 to 150 mg/L alum (as $Al_2(SO_4)_3 \cdot 14H_2O$), to the effluent from the activated sludge system.
- To achieve TP of 0.05 mg/L (50 μg/L), starting at 0.5 to 0.8 mg/L from the secondary effluent, a mole ratio (MR) coagulant dose rate of 50 to 150 would be required, which would amount to 200 to 800 mg/L for single stage treatment. This is a higher alum dosage than could be handled by filters, so an intermediate chemical precipitation / sedimentation step is typically needed to consistently achieve this lower concentration.
    - The intermediate stage would reduce TP from approximately 0.8 mg/L to about 0.1 to 0.2 mg/L, at a Mole Ratio (Al:P) dose of about 10, or 75 to 150 mg/L (as Alum).
    - The filtration step could then reduce the TP from 0.1 to 0.05 mg/L (50 μg/L) with a Mole Ratio of about 50. Since the incoming phosphorus is now at a lower concentration, this ratio translates to a dose of about 100 mg/L (as $Al_2(SO_4)_3 \cdot 14H_2O$), which is within the range that most tertiary filter systems have been shown to be capable of accommodating.

Reject Water

All of the settling and filter units considered require reject to carry away the accumulated coagulant precipitate. Reject water flow ranges from 5% to 10% of production for all of the units, and is probably not a distinguishing factor in the comparison. The reject water, with the solids it carries would necessarily be transported back to the plant for treatment to separate out the solids. Returning the reject to the headworks with the plant influent (full secondary treatment) is a viable option for this material. Some of the existing facilities in Colorado (see the section below) have found it advantageous to recycle the reject streams back to the secondary clarifier inlet, where it can be combined with the mixed liquor flowing to the clarifiers. Where this may slightly overload the secondary clarifiers (in terms of solids loading rate), the escaped floc is removed in the downstream tertiary clarifier or filter, and extra contact time and mixing improves coagulant efficiency.

The chemical sludge wasted (either directly from the tertiary process or if wasted with the secondary sludge) would join the biosolids stream for beneficial use or disposal.

Alkalinity and pH Control

- For all chemical polishing alternatives for phosphorus removal the dose of alum (or other

coagulants, including ferric) required will deplete the available alkalinity in the wastewater. It will be necessary to add alkalinity to offset the depletion due to the chemical (coagulant, alum) addition. Six moles of alkalinity will be required to offset each mole of alum. On a weight ratio basis this would result in about 40% of the alum feed rate (in mg/L as $Al_2(SO_4)_3 \cdot 14H_2O$) (in mg/L) for NaOH (caustic) or $Ca(OH)_2$ (lime). Magnesium hydroxide ($Mg(OH)_2$) (in mg/L) would need to be fed at about 25% the rate for alum (in mg/L as $Al_2(SO_4)_3 \cdot 14H_2O$).

- In addition to alkalinity feed for the coagulant reaction, it may be necessary to feed additional alkalinity to the effluent to maintain the effluent pH at the permit requirements. This may be necessary if the coagulant reaction for phosphorus removal is optimized at near to or lower than pH 6.0 (Permit lower limit). Some of the pilot runs at the Spokane RPWRF P-Pilot plants ran most efficiently at near pH 6.0. It would require continuous monitoring to assure that the effluent did not slip below that following the phosphorus removal reactions.

AlgEvolve

AlgEvolve is a biological tertiary process proposed as a means to polish wastewater treatment plant effluent to the low phosphorus concentrations of interest in Post Falls (and at other treatment plants discharging to the Spokane River). The AlgEvolve process provides an environment where algae grows in the wastewater, uptaking the trace amount of phosphorus. The algae is then separated from the waste stream by using membrane filters. A reject stream of algae-laden water is produced by the process. AlgEvolve has been pilot tested in Post Falls, but there are no known full-scale installations specifically designed for phosphorus polishing of secondary effluent in a municipal facility where solids handling is done on-site. The AlgEvolve process is considered in this memorandum as a potentially cost-competitive alternative to compare against chemical treatment. The potential for being cost-competitive is based primarily on the pilot testing performed at Post Falls.

Evaluation Outline

The summary of the evaluation presented in the next sections of this technical memorandum follows this outline:

- Effectiveness for TP meeting limitations. In the next section, alternatives are screened to determine the capability to meet the concentrations required to stay within the waste load allocation at the initial implementation, as well as at future phases of build-out. Given the range of effluent concentrations required over the course of the build-out schedule, as indicated in Table 1, the first-phase technology may need to be compatible with add-on technology in future phases, to meet lower concentration limits in the future. The effectiveness at removing phosphorus by a variety of technologies was determined based on information gathered from the following sources:
    1. EEE conclusions from evaluation of exemplary phosphorus removal facilities in Colorado, 2005.
    2. City of Moscow low-P performance full scale (2010, 2011 seasonal operation)
    3. Liberty Lake SWD P-Pilot tertiary membrane filtration (January, 2010 report by Esvelt Environmental Engineering).

4. City of Spokane P-Pilot project performance and technology comparison (2009 – 2011 provisional data).
5. Preliminary AlgEvolve pilot results, Post Falls, reports 2011, 2012.

- Relevant data summaries from the above facilities is presented below, along with discussion of observations of the data that are of importance in the technology selection for Post Falls.
- Using the determination of effectiveness as a screening tool, the viable technologies for Post Falls are presented.
- In subsequent sections of this memo, additional discussion of the specific technologies is presented.
- After the presentation of technologies, Preliminary alternatives are then developed at the conceptual level in order to prepare comparative-level capital project costs and footprint requirements for the initial 4-mgd implementation and the subsequent expansion to 5-mgd (since the different effluent TP concentration criteria at 5-mgd impact how each alternative can be expanded).
- A comparison matrix with preliminary sizing, cost, and building footprint is presented to summarize.
- The comparison of alternatives is expanded by developing the estimated difference in operation and maintenance (O&M) costs between the alternatives that appear to be most cost-competitive at the capital project costs, for the 4-mgd initial phase and the 5-mgd expansion.
- A section is devoted to how the alternatives compare for effectiveness in removing other parameters of future concern, particularly heavy metals, PCBs, and dioxin.
- A comparison of present worth estimated cost, incorporating the projected operation, maintenance, and replacement costs is presented.
- Conclusions and recommendations are then presented.

Effectiveness of tertiary phosphorus removal at other facilities

This section summarizes findings from recent investigations into the effectiveness of different tertiary treatment technologies at exemplary phosphorus removal facilities as well as piloting in this region specific to the Spokane River TMDL.

1. In late November / early December 2005, select wastewater treatment facilities in Colorado, meeting the lowest effluent total phosphorus limitations in the U.S. were visited to assess the then-current state of technology of effluent tertiary phosphorus removal. A summary of the facilities' performance is presented below in Table 3.

   Observations from the trip included the following, considered to be important in the selection of technology for Post Falls.

   - All of the P-removal plants visited have normally operated at about 50% of design flow according to operator statements and data provided for review.

- The coagulant dose rate (see Table 3) was reported by the operators, and in some cases was included in data received from the plant after return from the trip. Method for calculation of the dose was not verified between plants.
- All plants used a polymer flocculent-aid in addition to the metal-salt coagulant.
- The Breckenridge Sanitation District plants at Iowa Hill and Farmers Korner achieved the best TP effluent concentration, and had the highest coagulant dose rate (150 to 200 mg/L as Alum). The Iowa Hill Plant is a "scalping" plant, which sends its residual (including chemical sludge from the tertiary treatment and filtration) back into the sewer interceptor to be treated at the Farmers Korner Plant. The Farmers Korner Plant operates at nominally 1/3-1/2 of design capacity.
- All of the exemplary facilities achieved their results with two stages after the secondary treatment process – a chemical coagulation and settling step followed by a filtration step.
    - Two of the facilities achieved the two-steps by recycling the poorly-settling chemical (alum) sludge through the secondary clarifiers and allowing it to overflow the weirs (to some degree) and to pass through filtration again.
    - Chemical coagulation and settling process observed included both "conventional high-rate" settling (tube- or plate-settlers) and "solids contact" or slurry-recycle" clarification (DensaDeg in one case). A water treatment facility using ballasted sedimentation (Actiflo) was also visited. Since it was a water treatment plant application instead of wastewater phosphorus polishing, it is not included in Table summary of performance.
    - All the filtration processes observed utilized granular media filtration, either continuous backwash upflow filters (CBUF) or downflow multi-media filters.
- Reported performance summarized in Table 3 does not identify testing methods used for monitoring total phosphorus. This is a consideration when using these results to predict future performance, since testing methods have been shown to produce different results for split samples.

Table 3. Summary of Phosphorus-Removal Performance for Colorado Wastewater Treatment Plants

Treatment Facility	*Period*	*Influent*			*Biological Effluent*			*Final Effluent*	
		50%	95%	99%	50%	95%	99%	50%	95%
Aurora WRP	2002	5.06	6.89	7.83	0.18	0.71	1.25		
	2003	5.74	6.38	6.95	0.18	0.6	0.99		
	2004	5.79	6.43	7.01	0.13	0.29	0.4		
	2005	5.82	6.29	6.71	0.23	1.08	2.03		
Breckenridge Sewer District – Iowa Hill const. flow, densedeg @ 4.3 gpm/sf and dynasand (CBUF) @									
- Iowa Hill WRP	2003	3.54	6.41	8.36	1.54	3.53	4.99	0.007	0.026
	2004	3.99	5.53	6.33	1.20	3.26	4.93	0.005	0.017
	2005	3.09	5.01	6.11	1.27	2.29	2.89	0.008	0.019
- Farmers Korner WRP	2003	3.38	8.76	12.98	0.57	2.02	3.41	0.006	0.020
	2004	3.67	6.74	8.98	0.63	2.18	3.64	0.004	0.013
	2005	3.56	6.04	7.01	0.73	1.63	2.05	0.007	0.029
Frisco WRP	11/03-10/04	5.72	7.81	8.89				0.049	0.093
	11/04-10/05	6.24	8.99	10.46				0.069	0.124
Snake River WRP	2003	6.44	11.22	14.12	0.61	2.29	3.96	0.015	0.035
	2004	6.72	9.75	11.37	1.32	3.53	5.31	0.018	0.038
	2005	6.21	9.12	10.7	0.82	3.35	6.00	0.014	0.034
Pinery WWTP	2002	8.78	10.25	10.92	0.337	0.709	0.965	0.029	0.060
	2003	8.89	10.55	11.32	0.238	0.337	0.389	0.027	0.050
	2004	9.14	10.23	10.72	0.218	0.401	0.516	0.029	0.054

2. The Moscow, Idaho Wastewater Treatment Plant is permitted for seasonal effluent phosphorus concentrations of 0.136 mg/L for average monthly limitation and 0.270 for maximum average weekly concentration limitation.

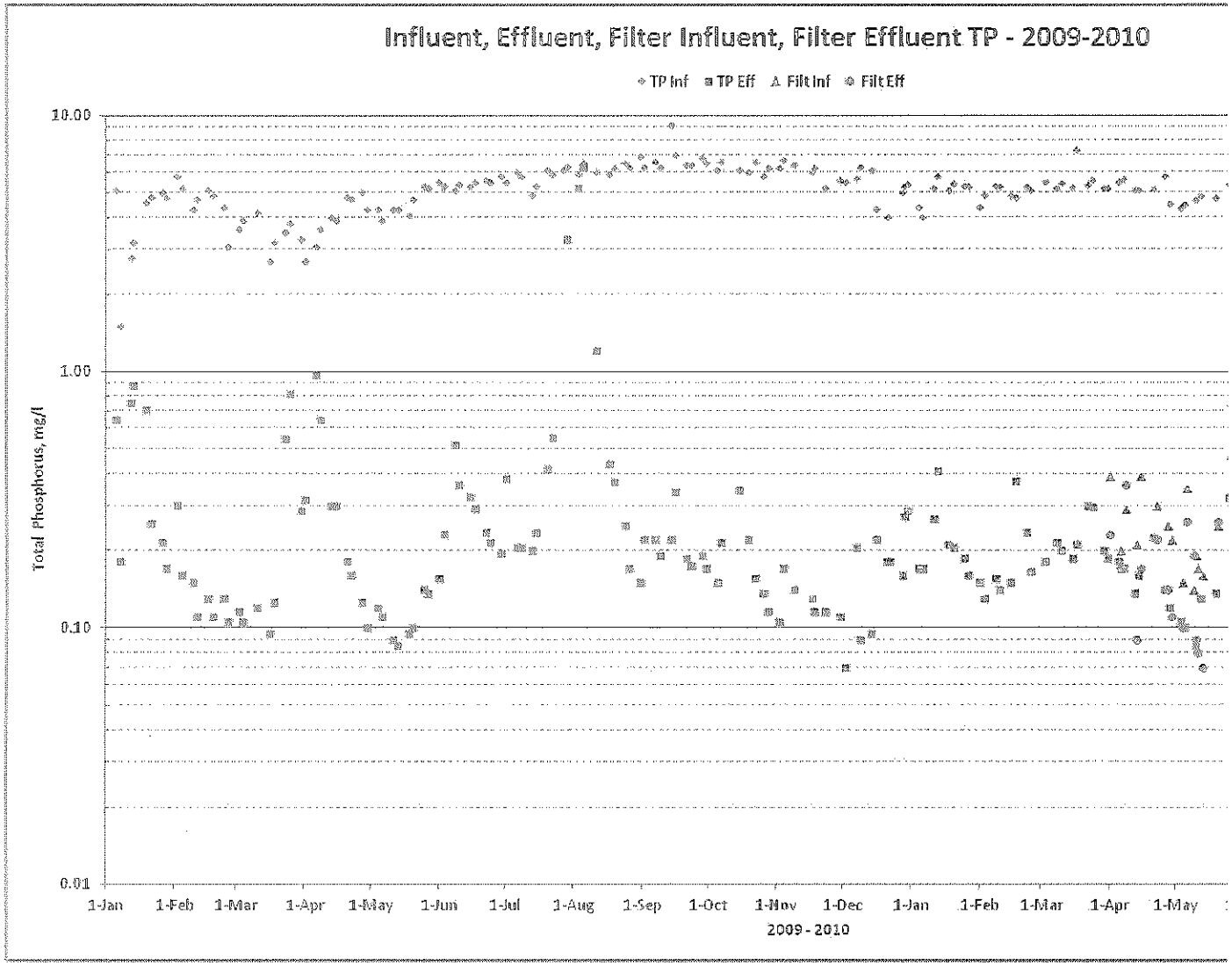
The enhanced biological phosphorus removal (EBPR) facility was constructed in 2001. Facility operations have been optimized, such that by 2009-2010, phosphorus concentration in the EBPR effluent had been fairly consistently below 0.30 mg/L, but with occasional excursions above 0.40 mg/L.

The effluent filtration system was added in a project begun in 2008. The project constructed continuous backwash upflow filters (CBUF). The project also included a plate-settler unit to concentrate the residuals stream. The processes came on line in 2009. There are 20 filter modules (standard CBUF 50 sf each) in 5 cells of four modules each. The cells are configured to allow dual pass operation, but have been operated in single pass mode regularly since start-up.

With the effluent filtrations system, the Moscow facility has been able to consistently meet permit limitations for the flow of approximately 3 mgd. Figure 1 shows the 2009-2010 phosphorus data. After the first two seasons of operation, the following observations were made:

- The City's EBPR is an important component in meeting the effluent limitations:
  - The low phosphorus concentration in the tertiary filter feed allows the coagulant dose to be low enough to avoid overloading the filters with solids and allow a reject rate of no more than 10% of feed flow.
  - There is still significant chemical use. Alum solution is fed at approximately 50-60 mg/L with the filter feed phosphorus concentration of around 0.3-0.5 mg/L. If the feed concentration were 1.0 mg/L, it is predicted the alum dose would need to be approximately 100 mg/L.
- The filter facility requires an estimated 32-35 hours per week for operation, maintenance, and testing.

Figure 1 – City of Moscow Low-P Performance, (EBPR followed by single-pass CBUF)



3. In 2008, The City of Airway Heights and the Liberty Lake Sewer and Water District collaborated on a pilot study of tertiary membrane filters to determine the capability for phosphorus removal from a biological nutrient removal plant. The study lasted four months, and utilized a Pall microfiltration pilot unit. The pilot unit had a rated capacity of 30 gpm.

   During the study, the system was operated at a target flux rate of 40 to 50 gfd, with feed water alum doses of 70 to 170 mg/L, and a trans-membrane pressure range of 4 to 43 psig. The percent recovery, the percentage filtrate quantity produced of the total feed water quantity, ranged between 93.6% and 96.2% for the 3 testing cycles.

   The pilot system achieved an effluent (filtrate) Total Phosphorus of <70 μg/L at the 50%ile. The flux rate through the test met the target of a continuous 32 GFD corrected for 20°C, and the recovery exceeded 93%. The Clean-in-place interval was greater than 30 days, with a maintenance clean interval of more than 24 hours. A portion of the testing results for the 2008 Liberty Lake pilot are presented on Figure 2, and a probability distribution of the effluent TP is presented in Figure 3.

   The data shows that single-stage treatment consisting of coagulation and membrane filtration, following EBPR activated sludge, can achieve average results of less than 95μg/L, and possibly lower.

   Note that the poorest results were during the first four to six weeks of the test, when the BNR system lost phosphorous removal efficiency. After this period, the filter feed phosphorus concentration was around 0.4 mg/L. The alum dose, as shown on Figure 2, was normally in the 80 – 110 mg/L range during the pilot test.

   Another observation from the pilot study at Liberty Lake, and reflected Figure 3, is that the effluent TP results can be significantly different depending on the testing method used. In this case, the testing method difference was as much as 9-fold, though this difference is somewhat skewed by the effect noted above (worst performance early in the study), since the testing methods do not cover the same sampling dates.

Figure 2 – Filtrate Total Phosphorus Concentration and Feed Alum Dose, LLSWD Pilot, 2008.

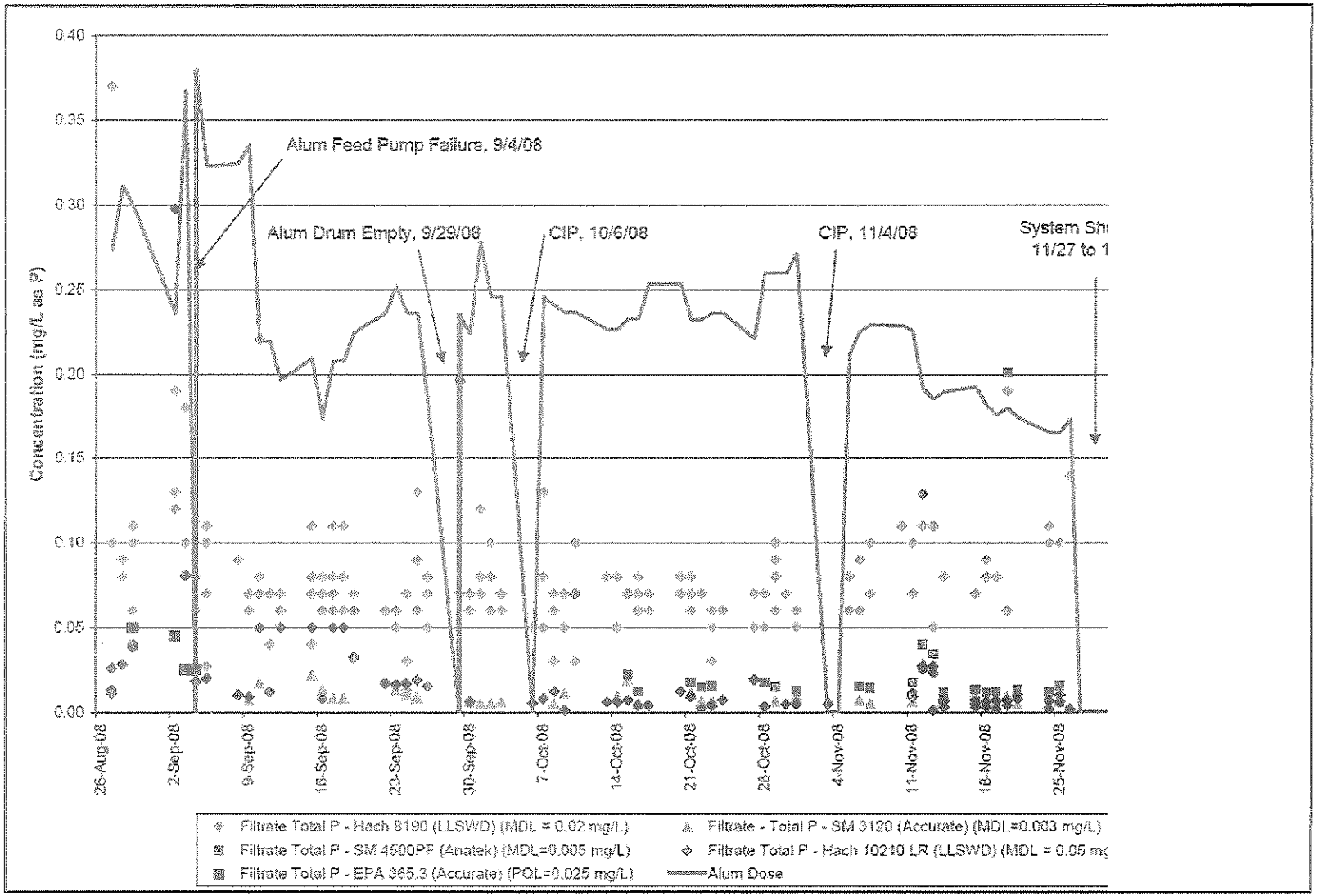
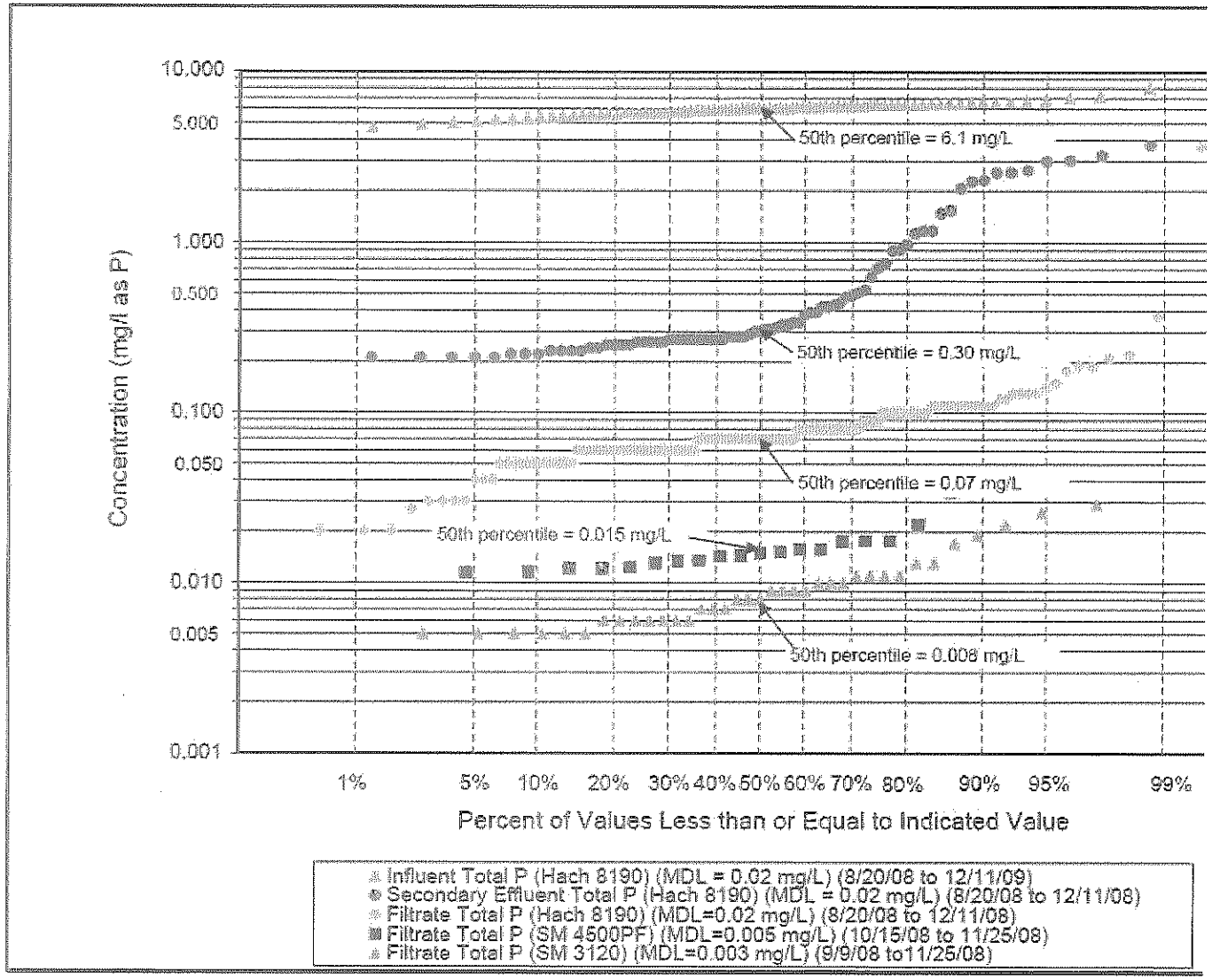


Figure 3 – LLWSD tertiary membrane filtration pilot data, probability distribution



4. The City of Spokane installed, in 2009, full-scale treatment units (0.15 – 0.5 mgd each) to pilot test and compare technologies for phosphorus removal following the biological treatment facilities at the Riverside Park Water Reclamation Facility (RPWRF). The RPWRF uses nitrifying activated sludge to treat approximately 44 mgd on average. During the critical phosphorus removal season, alum is added in the secondary process to precipitate phosphorus for removal with the secondary sludge, resulting in consistently achieving total effluent phosphorus concentrations of 0.5 mg/L to 0.7 mg/L.

   Six different technologies were tested in the pilot study: 3 chemical coagulation and settling units, and three filtration technologies:

   a. Chemical coagulation and settling

      i. "High-Rate" sedimentation with rapid mixing, two-stage flocculation, and a clarifier with tube-settlers.

      ii. Kruger Actiflo ballasted sedimentation – utilizing ballast consisting of micro-sand to achieve high-rate sedimentation, with the micro-sand recovered in a cyclone, which also knocks off the floc to be sent to the reject stream.

      iii. Cambridge Water Technologies "CoMag" ballasted sedimentation, which uses magnetite for ballast, with the floc separated from the magnetite using intense agitation, and the magnetite recovered using a magnetized drum for reuse.

   b. Final filtration

      i. Granular Media - Continuous backwash, upflow filter (CBUF), which was installed to allow either single-pass or dual-pass operation.

      ii. Granular Media - Conventional downflow dual-media filter, with high-rate coagulation and two-stage flocculation ahead of the downflow filter.

      iii. Membrane filtration – consisting of GE-Zenon submerged membrane system.

   The pilot testing was performed in anticipation of forthcoming limitations for effluent phosphorus to meet waste load allocations for the facility's discharge to the Spokane River. Final waste load allocations were issued after the pilot testing was underway, and have been written into the Spokane NPDES permit as a seasonal average mass load limitation based on 42 μg/L TP.

   Table 4 summarizes the performance results (provisional until officially released) of the pilot study at Spokane.

Table 4 – Provisional Combined Results of RPWRF Pilot Testing

Constituent	Winter Average	Summer Average
Pilot Plant Influent TP (Winter=activated sludge, summer=activated sludge with alum addition)	2.3 mg/L	0.52 mg/L
Pilot Plant Sedimentation Step TP (combined 3 technologies)	0.26 mg/L	0.06 mg/L
Pilot Plant Filtration Step TP (combined granular media technologies)	0.08 mg/L	0.025 mg/L
PP membrane filt TP*	0.05 mg/L	0.017 mg/L

The combined performance data for the sedimentation units (three technologies) is presented in Figure 4 below. The data for the three settling technologies are combined in Figure 4 because the data analysis has not shown substantial performance differences between the three technologies piloted at the Spokane RPWRF.

The "high-rate" sedimentation with tube-settlers was operated at a surface overflow rate of 1.17 gallons per minute per square foot. This is higher than a typical rate for a conventional clarifier without the tube settlers. Without tube-settlers, a typical overflow rate would be in the range 0.30 to 0.60 gpm/sf. The two ballasted settling units were operated at overflow rates of 4 gpm/SF (ave comag) and approximately 14-15 gpm/sf for the actiflo by Kruger. These are overflow rates for the settling surface area only, and do not account for the surface area of the flocculation / maturation fully-mixed zones employed by these technologies. Total surface area, and thus footprint, are important considerations in the selection of preferred technology for Post Falls.

Effluent from the three sedimentation units at the Spokane RPWRF pilot study was directed to the three filtration units. The pilot study area was plumbed to allow the effluent from any of the sedimentation units to be directed to any of the filtration units.

The final filter performance for the pilot study (2010 critical season), are shown in the probability distributions plotted in Figure 5. On the plot, "B1E & B2E" represent the CBUF effluent, "F1E&F2E" is the label for the dual-media downflow results, and "Z1E&Z2E" is the label for the ultrafiltration membranes. The data presented in Figure 5 includes only data where the filters received effluent from one of the sedimentation units (trial runs using effluent direct from the secondary process were excluded from Figure 5 data).

In addition to the two-stage (sedimentation plus filtration) testing during the pilot study at RPWRF, limited runs were performed where the filtration units received effluent directly from the secondary process to determine the capability of the final filtration units without a sedimentation step ahead of them. Also, the CBUF units were run for a limited time in series

operation to determine the capability of the CBUF in two stage operation where both stages are CBUFs.

Figures 6, 7, and 8 show TP effluent data for select periods of the RPWRF pilot study for the three filtration technologies, where the data shown within the ovals was from the pilot runs where the filters received secondary effluent directly (no upstream settling step).

Figure 9 shows CBUF effluent TP data, with a bracketed area to indicate the period when the CBUFs were operated in dual-pass mode, with the first stage receiving effluent directly from the secondary process.

Figure 4 – Spokane RPWRF Low-P Pilot testing provisional results - Settling units combined.

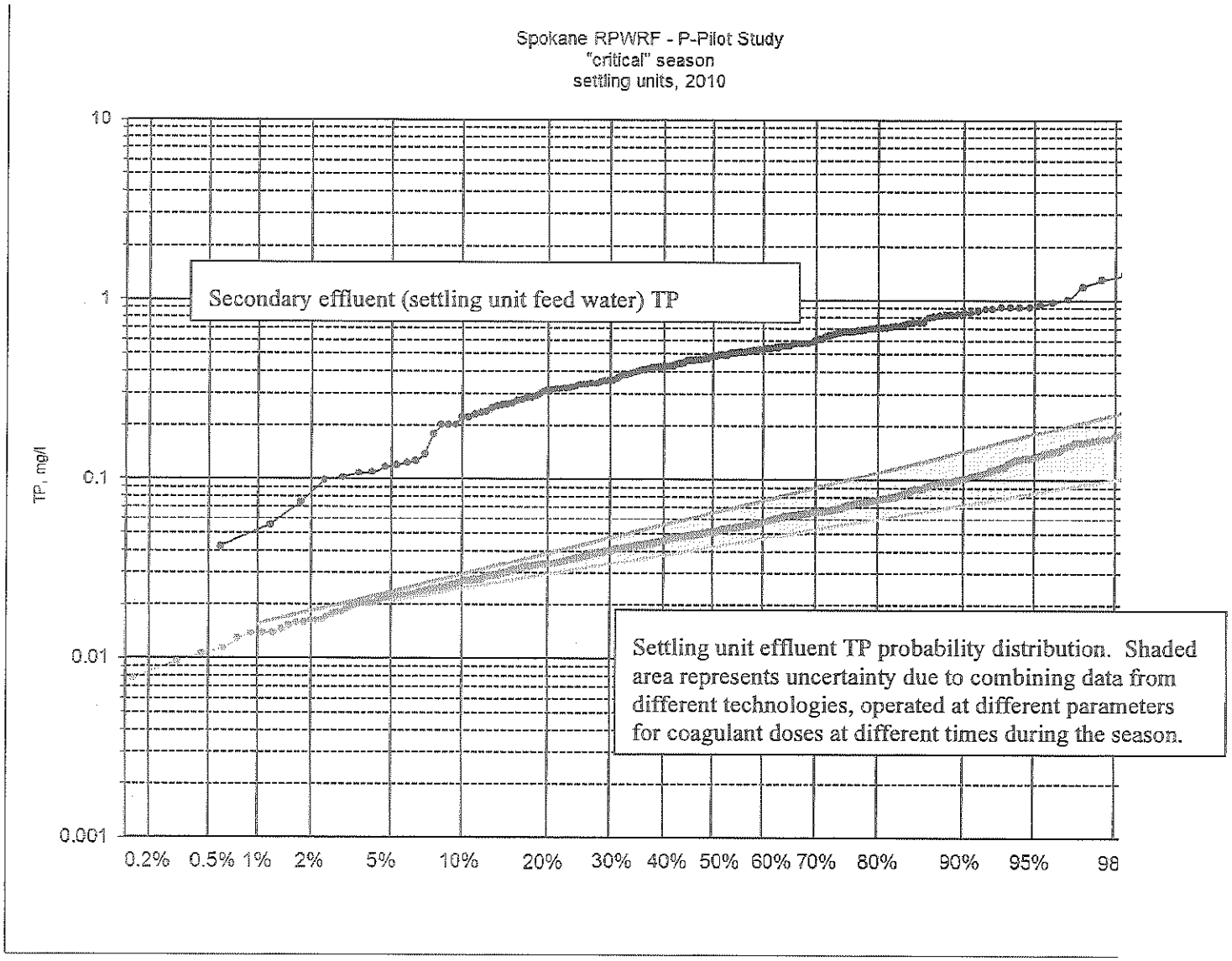


Figure 5 – Spokane RPWRF Low-P Pilot testing provisional results – Filter units.

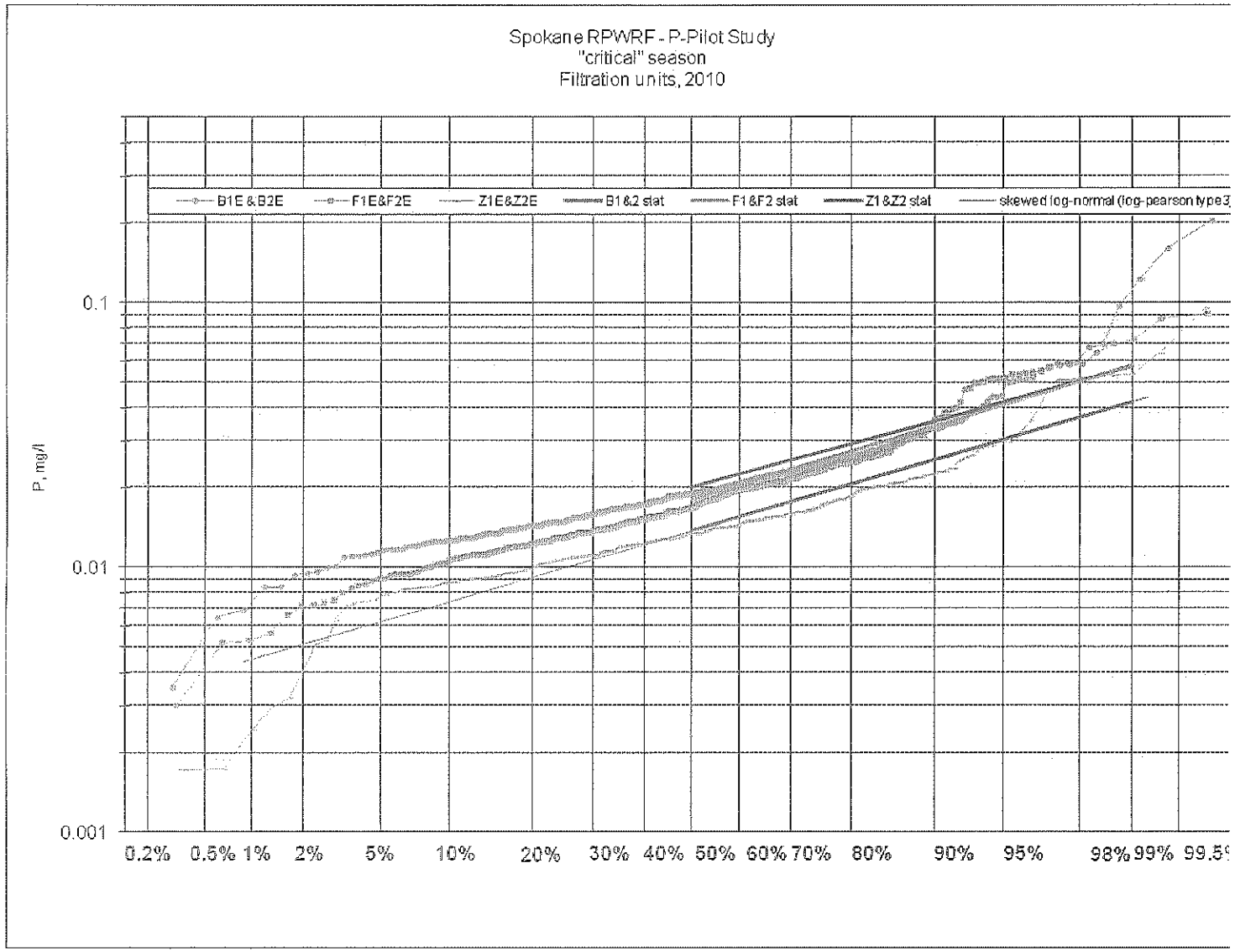


Figure 6 – Spokane RPWRF Pilot - Dual media performance (including no upstream settling step).

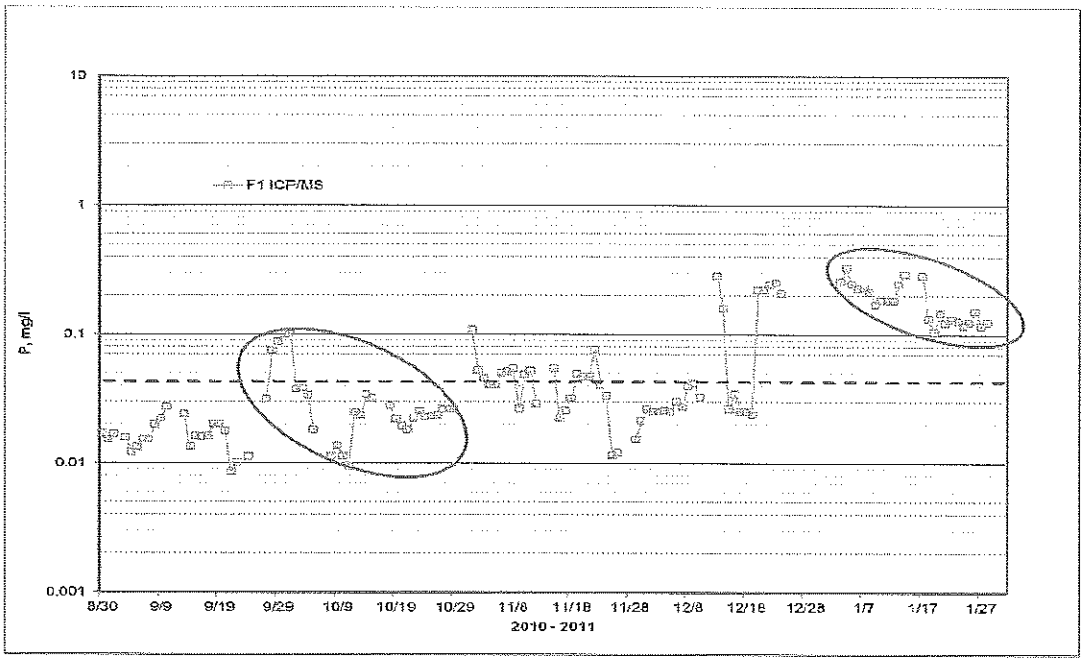


Figure 7 – Spokane RPWRF Pilot – CBUF performance, (including no upstream settling step).

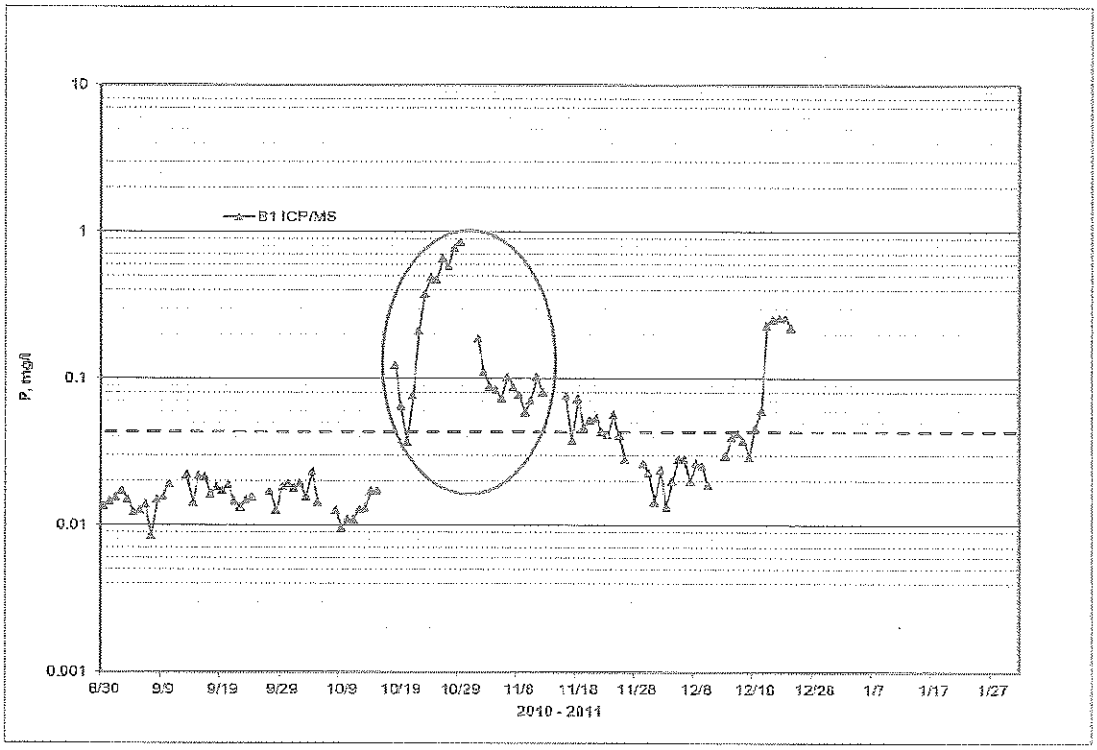


Figure 8 – Spokane RPWRF Pilot – Ultrafiltration performance, (including no upstream settling step).

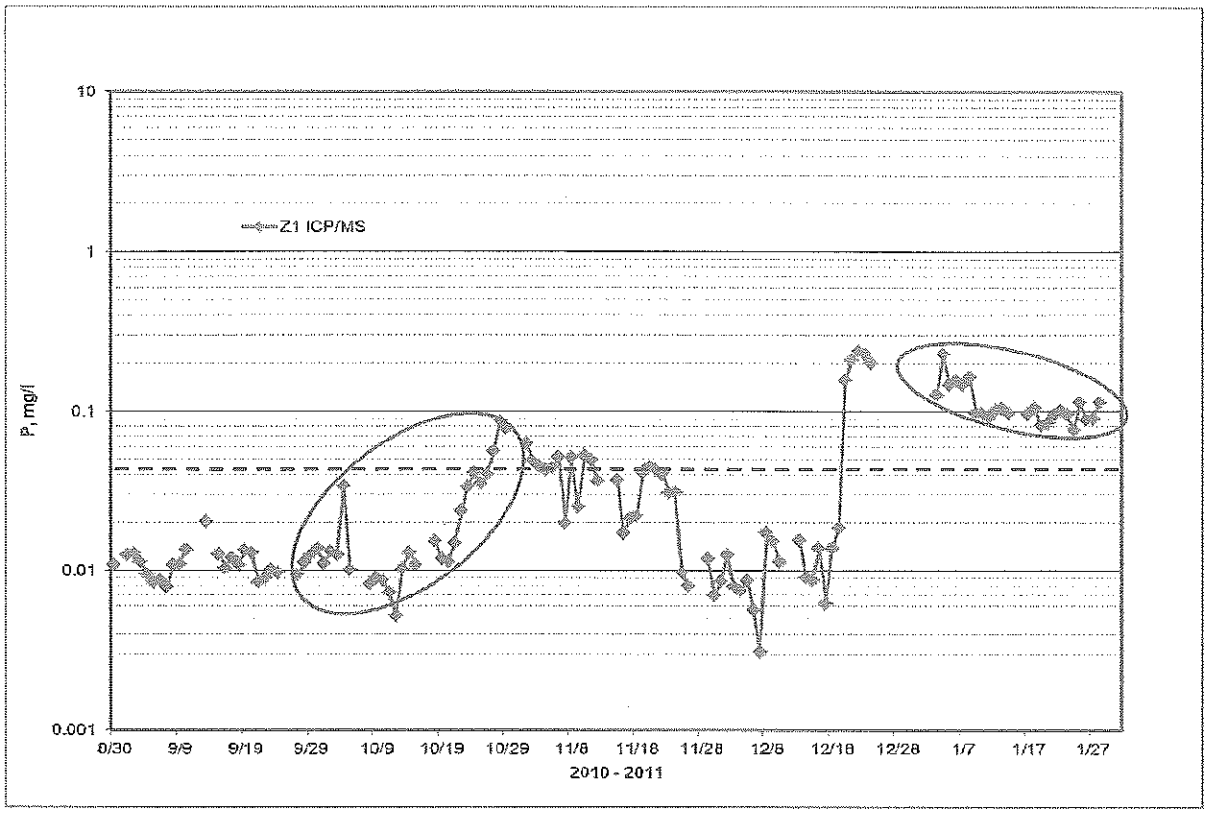
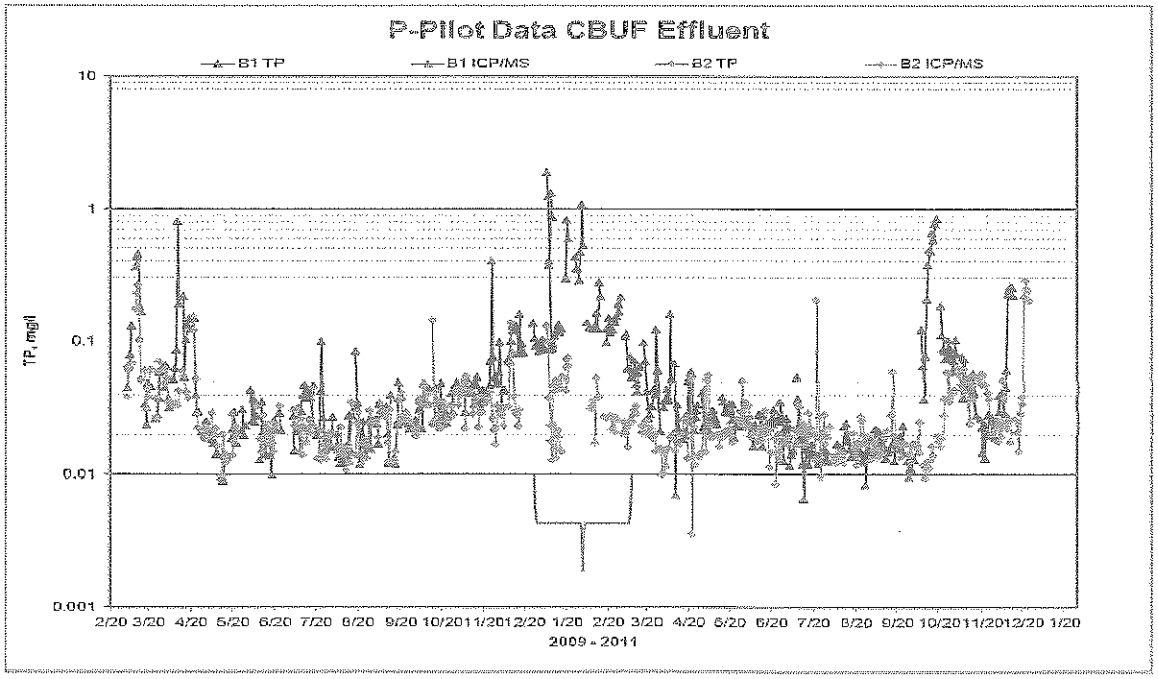


Figure 9 – Spokane RPWRF Pilot – CBUF performance – dual-pass operation shown bracketed



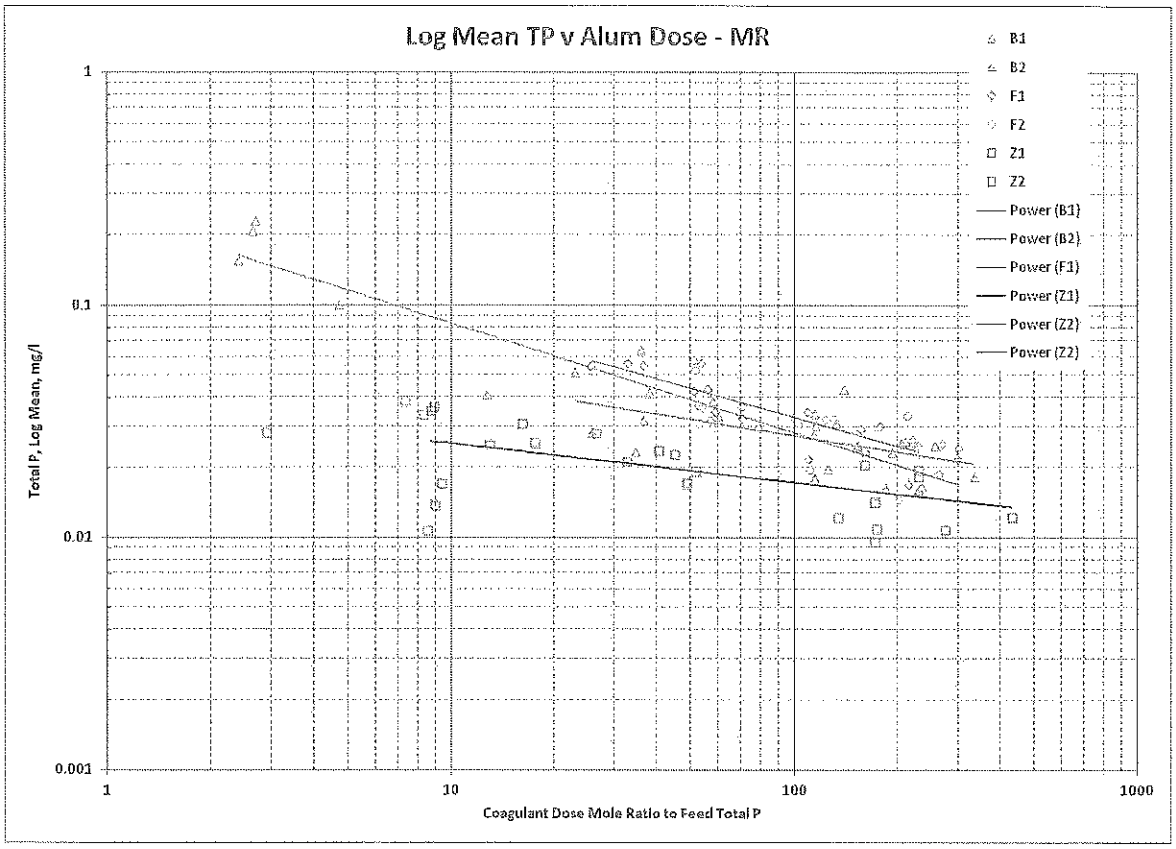
Observations of the Spokane RPWRF pilot study data presented in the Figures above that are of particular interest in the selection of preferred technology for the Post Falls WWTP include:

- The season average concentration for the filtration effluents can be expected to be 20% to 50% higher than the 50th percentile values for the seasonal effluent data.
- The overall two-stage (settling followed by filtration, with coagulant addition at each stage) performance data confirms that two-stage technology is capable of meeting the WLA at the initial 4-mgd implementation, and through the phased expansions, likely out to about 8-10 mgd at least (effluent concentration to meet the WLA at 8-mgd average flow is 0.048 mg/L or 48 μg/L).
- Limited data suggests that dual media downflow and ultrafiltration alone (no upstream settling) could meet the WLA through the first phase of expansion (4.0 mgd, meeting 95 μg/L), and possibly into subsequent phases:
  - The dual media downflow unit was able to achieve less than 100 μg/L consistently when the settling step was bypassed (during the critical season when chemical phosphorus-removal was occurring in the secondary process).
  - The ultrafiltration unit was able to achieve less than 100 μg/L consistently when the settling step was bypassed (during the critical season when chemical phosphorus-removal was occurring in the secondary process).
  - The CBUF unit was not able to meet the phase 1 (4-mgd) target effluent total phosphorus concentration of 95 μg/L when there was no upstream settling step. But is must be recognized that these trials occurred after the critical season, so there was no alum addition in the upstream secondary process.
- When operated in series (dual-pass mode), the CBUF unit was capable of achieving effluent TP in the range needed to meet the WLA at least through the first phase of expansion (target concentration 95μg/L), and likely the concentration target (75 μg/L) through the 5-mgd capacity.

Other relevant RPWRF observations include the following:

- There were substantial operational challenges with the pilot units due primarily to the high doses of coagulant applied, along with the correspondingly high alkalinity supplementation. It is believed that these challenges can be mitigated during design of the full-scale installation.
- Initial coagulation mixing energy was found to be an important parameter in not just coagulant utilization efficiency, but also in final TP performance.
- For each filtration technology, effluent total phosphorus concentration is a function of the mole ratio metal salt addition (Al:P). However, the data appears to support the observation that the ultra filtration units were able to achieve a lower effluent TP concentration for the same coagulant dose in comparison to the two granular media technologies. This observation is illustrated in Figure 10 below.

Figure 10 – RPWRF Pilot study. Effluent TP vs mole ratio (Al:P) coagulant addition.



5. The City of Post Falls hosted its own pilot study during the Fall of 2011. The technology piloted was "AlgEvolve", which is a system where an environment is provided to encourage phosphorus uptake by algae. The phosphorus-laden algae then must be separated from the effluent by micro- or ultra- filtration. Other methods of algae removal have not proved to be viable, confirming a long history of difficulty removing algae in natural treatment systems.

   The pilot study results were presented in a report furnished by AlgEvolve, dated January 3, 2012. The effluent membrane filters utilized in the latest pilot runs were cross flow membranes, which AlgEvolve also proposed for an upsized pilot study (20,000 gallons per day proposed). The cross-flow membranes were operated up to 15 gpm feed flow. The recommendation in the pilot report proposes 0.77 gpm as the scale-up feed flow, which is estimated to be the most economical sizing, as it allow single-pass operation. Refer to the pilot reports by AlgEvolve and Koch Membrane Systems for further details regarding the pilot study and the conclusions.

   The City has requested additional clarification regarding the pilot reports to help estimate the potential for long-term economic competitiveness with the more established chemical polishing. Significant unknowns remain regarding the viability of the AlgEvolve process in a full-scale installation, including:

   - Cost competitiveness for the initial capital project. Budget-level proposals have been requested, but there are still elements of the process that AlgEvolve

acknowledges need to be worked out, therefore making it difficult to prepare such proposals for a full-scale system that would present no more risk to the City than more established technologies. AlgEvolve has proposed to install, at the City's cost, a 20,000 gallon per day system to operate for 12 months to determine operational parameters and data necessary to design a full-scale system (3-mgd and larger).

- Operational cost competitiveness. This concern is addressed in operating cost comparison presented below in another section of this technical memorandum.
- Waste algae handling concerns. Algae is known to be incompatible or poorly compatible with municipal sludge handling, including belt filter press dewatering, as used in Post Falls. Special provisions for dealing with waste algae, and the costs associated with any special provisions are still unknown, adding a significant cost risk at this time to implementing this technology.

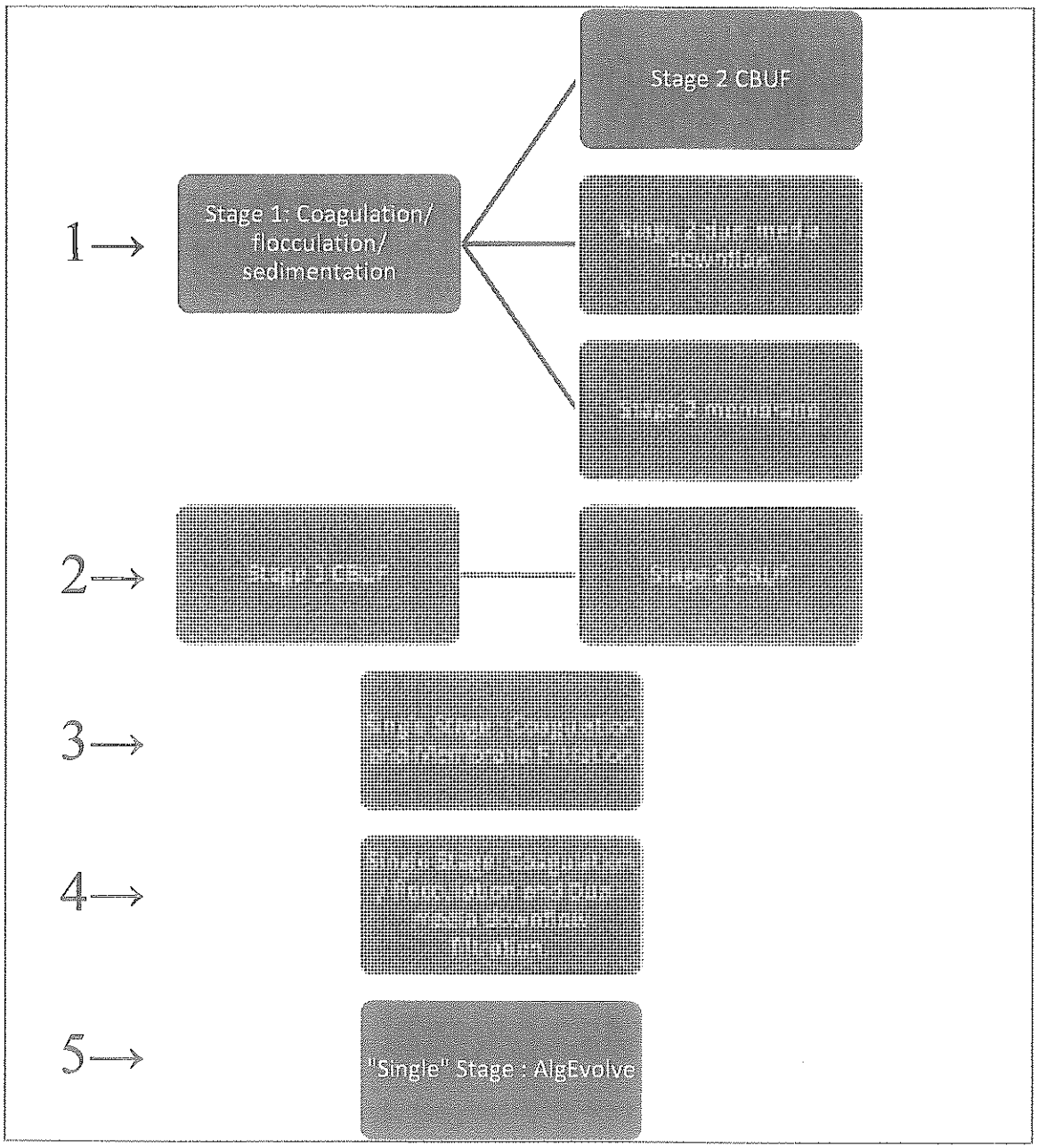
Conclusions from the above evaluations of performance for the various technologies at the above locations and applications are:

1. The WLA structure of the permit, as outlined in Table 1 results in the finding that some technologies or combinations of technologies would be appropriate for the initial phase of implementing Next Level of Treatment but may not be adequate for meeting subsequent phases, when the average effluent TP concentration will need to be lower.
2. For the initial phase, to meet the WLA of 3.19 lb/day seasonal average, the seasonal average effluent concentration must be 95 μg/L or lower.
    a. The data summaries presented above indicate that this initial phase seasonal effluent phosphorus concentration can be met on a consistent basis by two-stage treatment alternatives (two stages of chemical treatment following the activated sludge with enhanced biological phosphorus removal), as summarized in alternatives "1" and "2" Figure 11.
    b. The phase 1 effluent TP concentration level appears to also be achievable with select single stage treatment alternatives, also shown on Figure 11, alternatives 3, 4, 5.
    c. Data from full-scale operation at Moscow and from the pilot study in Spokane do not support utilization of the CBUF in a single-pass mode to meet the phase 1 TP concentration target.
3. Future expansion will require more stringent effluent TP concentrations. At the 5-mgd average annual flow facility capacity, as indicated in Table 1, the effluent TP concentration will need to be 75μg/L. The two-stage treatment alternatives shown in Figure 11 will still be capable of meeting the effluent TP requirement. However, the single-stage treatment alternatives that could be expected to be effective are limited now to the following:
    - Membrane
    - AlgEvolve

    Therefore, if the dual-media downflow filter technology were implemented as a single-stage NLT treatment for the initial 4-mgd phase, future phases are expected to require the addition of a new first stage chemical coagulation / flocculation / sedimentation step upstream of the filter units.

4. At ultimate flows in the 18-mgd range, the only NLT process train that could be expected to perform at the seasonal average 21 µg/L effluent TP level would be a two-stage treatment consisting of coagulation / flocculation / sedimentation followed by membrane treatment. And consistent performance at this level is not certain. It appears that the AlgEvolve system may have the potential to approach this level of treatment, but at this time there is insufficient data and experience in full-scale facilities to draw that conclusion.

Figure 11 – "NLT" alternatives effective to the phase 1 TP limitations (95 µg/L)



The feasible alternatives by phase are summarized in Table 5.

Table 5 – Summary Matrix of Preliminary alternatives: Effectiveness at initial and future capacities.

	Phase 1 .095 mg/L	Phase 2 .075 mg/L	Ultimate .021 mg/L
Single-stage alts	• Membrane • Downflow dual-media • Algevolve*	• Membrane • Algevolve*	• ?
2-stage alts	• Sed-Membrane • Sed-CBUF • Sed-downflow dual media • CBUF-CBUF	• Sed-Membrane • Sed-CBUF • Sed-downflow dual media • CBUF-CBUF	• Sed-membrane

* AlgEvolve is listed as a single stage process, though the "system" consists of multiple stages

? Potential for AlgEvolve to meet this level, but currently lacking full-scale installation data to demonstrate conclusively.

Presentation of the technologies

This section presents a summary of the technologies identified above that are being considered for Post Falls NLT.

Precipitation and sedimentation technologies

There are several configurations that are capable of serving as the coagulation / flocculation / settling first stage in a two-stage NLT treatment model. In terms of P-removal capability these are presented together, based mainly on the Spokane RPWRF pilot finding that performance is comparable regardless of settling configuration, as illustrated above in Figure 4.

Standard-rate

Standard-rate clarifiers include conventional, horizontal flow (rectangular tanks) or circular, peripheral overflow tanks (similar to the secondary clarifiers currently used in Post Falls). In a chemical P-removal application, separate from the biological sludge, conventional clarifiers can be operated at an overflow rate of nominally 0.3 – 0.6 gpm/sf.

Advantages of this type of arrangement include its proven operational track-record and its accessibility for maintenance tasks. The principal disadvantage is the high footprint requirements. The 4-mgd initial phase would require a total surface area of nominally 6,000-7,000 square feet. Sludge mechanisms limit the length and width of the basins, so with multiple basins, as well as access space, sludge pumping facilities, and chemical feed facilities, total footprint would be expected to be in the range of 18,000 sf for rectangular clarifiers

"High-rate" settlers

This configuration utilizes pre-manufactured tanks with inclined-plate or tube-settlers to allow a surface loading rate in the range of 0.8 to 1.3 gpm/sf. The Spokane WPRF pilot study included two 0.5-MGD units constructed of marine-grade aluminum. Each unit included two-stage flocculation and a high-energy initial mixing zone to optimize coagulant efficiency. The RPWRF pilot unit tanks (which included the mixing and flocculating zones) each had an overall footprint of 12'w x 36'l. This is approaching the largest size that can reasonably be expected for a pre-manufactured unit to be ship-able. With feed pumps, sludge pumps, chemical feed areas, and sampling equipment, the overall footprint came to 2,120 sf (53'x40' interior building dimensions) to treat 1.0 mgd. Extrapolating to 4-mgd for the first phase at Post Falls and allowing for improved access, chemical storage, and electrical service needs for a permanent installation (as opposed to the temporary installation of the pilot unit in Spokane) results in an estimated building footprint for pre-manufacturer high-rate settler units of 10,800 sf.

Standard pre-manufactured units are typically constructed for water treatment plants. Customization would be recommended for adapting to phosphorus removal – the principal issue is sludge removal – the chemical sludges generated in piloted units settle very poorly, overwhelming the tube settlers as well as the sludge removal (underflow) piping capacity. Submerged mechanisms and/or a cleaning mechanism at the tube components may be designed that could reduce operational demands.

Ballasted Sedimentation

The following two ballasted sedimentation technologies were included in the Spokane RPWRF pilot study. Both performed well in terms of phosphorus removal, and were comparable to the high-rate tube-settlers operated in parallel.

- Kruger Actiflo ballasted sedimentation – utilizing ballast consisting of micro-sand to achieve high-rate sedimentation, with the micro-sand recovered with a cyclone for reuse.
- Cambridge Water Technologies "CoMag" ballasted sedimentation, which uses magnetite for ballast, with the floc separated from the magnetite using intense agitation, with the magnetite recovered using a magnetized drum for reuse.

The presence of ballast allows for a substantially lower surface overflow rate, as mentioned above in the presentation of results for the RPWRF pilot study. However, the ballast recovery was never 100%, and the escaped ballast cause difficulties (mainly wear and abrasion) for the downstream effluent and sludge handling units.

Another concern with the ballasted sedimentation units is the high polymer dose required (relative to the polymer use in the high-rate tube-settler units). One of the problems with high polymer is the complication of polymer carryover, if membrane units are downstream as a second stage, because too much polymer can blind membrane filters).

Reactor clarifier (slurry recirculation or sludge blanket solids contact clarifier)

This type of settling unit arrangement utilizes a sludge or slurry recirculation and/or contact reactor with the incoming water to allow the overflow rate to be dictated by the bulk settling rate rather than the settling velocity of the discreet particles. These units are typically proprietary (like the ballasted sedimentation processes).

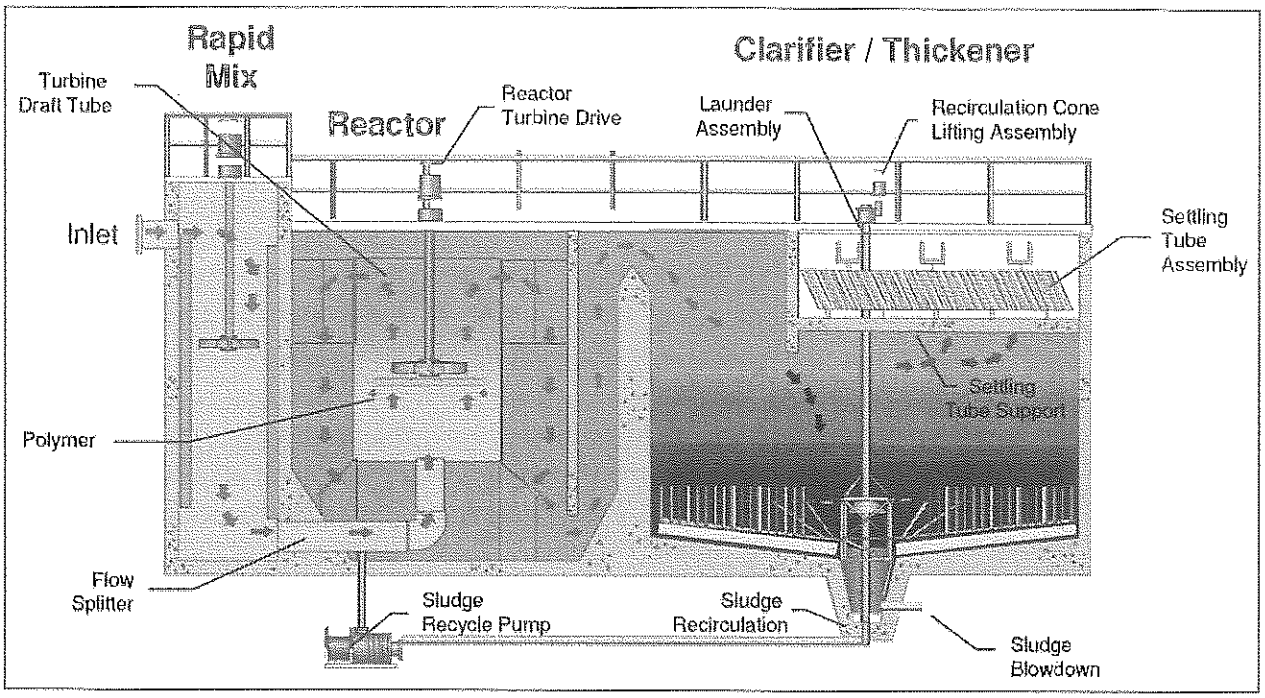
A variation of this type of clarification is utilized at the Rock Creek facility in Oregon. The configuration utilized at the Rock Creek Facility has been applied to many water treatment facilities across the country. These units are subject to upset due to hydraulic surges because a deep sludge blanket is maintained within the primary flow pattern of the effluent.

Another sludge/slurry recycle clarifier system that has been applied to wastewater effluent treatment for phosphorus polishing is the Densadeg, offered by Infilco Degremont, Inc. (IDI). A Densdeg unit was observed in operation at the Iowa Hill wastewater treatment plant in Colorado for phosphorus removal. Operators at Iowa Hill were pleased with the performance of the unit, though it was loaded at less than half its "rated" capacity. The overflow rate for this system falls between the ballasted sedimentation units and the conventional and high-rate settling processes, at 3-5 gpm/sf. The Densedeg will typically utilize polymer near to the same range as is used by the ballasted sedimentation units, so there would be a concern about possible carry-over if membranes are utilized downstream. One notable difference with the ballasted sedimentation unit, however, is that there is no high-energy ballast recovery step, which would be one opportunity for release of polymer that may be more prone to carryover.

A proposal was received for implementation of a Densadeg for Post Falls. Based in part on this proposal, it appears that Densadeg for the initial phase of NLT for Post Falls, at 4 mgd would utilize 2 parallel units to provide 100% redundancy (except there would no effective "de-rating" with one unit out of service), and a building footprint would be approximately 6,400 sf.

Figure 12 shows a Densadeg process schematic.

Figure 12 – Densadeg Process, Figure Source Infilco Degremont, Inc.



Dissolved Air flotation

There is no data available on utilization of DAF in a phosphorus removal application, though it has been piloted with mixed results in Massachusetts. Given the lack of data at this time, it is not recommended as a primary alternative for further evaluation during this facility planning effort.

Filter Technologies

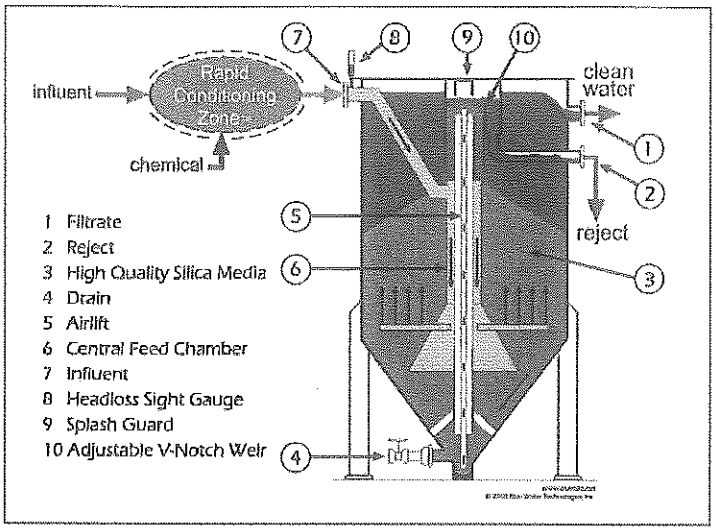
Upflow Continuous Backwash Sand Filters

Standard configuration for these filters is for individual filters with 50 square feet of filter area each. Sand depth is 1 to 2 meters at the side of the filter. Filters with 2 meter depth perform better for water reuse application, and for phosphorus removal applications. This makes the filter overall height up to 20 ft.

36 of the standard 50 sq. ft. filters would be required to treat average daily flow of 4 MGD of effluent for phosphorus reduction (sized to handle the peak flow, which will be equalized to the maximum day flow). At 5.0 mgd average flow, 44 filters would be required. The filtration rate would be about 2 gpm/sf for average flows, accommodating maximum day flows at a rate of 2.5 gpm/sf.

The above preliminary sizing is based on single-pass operation. If used in dual-pass mode with no upstream treatment after the biological process (i.e. no coagulation/flocculation/settling step), the number of units would be doubled. The filtration rate is assumed the same for both stages since the solids loading would be expected to be approximately the same for both stages.

Figure 13 – Continuous Backwash, Upflow Filter (CBUF). Figure Source Bluewater / ContraFlow



The filter units could be installed in concrete basins (e.g., Moscow WWTP Dyna-Sand filters), with more than one filter unit per filter module. It is suggested that modules of 2 to 4 filters be considered in preliminary layouts to determine an optimum configuration.

Coagulant dose rates up to about 100 mg/L as alum have been successful at Spokane pilot plants and at Moscow WWTP, so long as operators are diligent to prevent clogging due to the solids (e.g., monitor performance and provide special cleaning when needed.). Predicted dose for Post falls is in the 75-125 mg/L range per pass.

The reject stream from each filter is about 10 gpm, continuous, and is derived from the filtered water. The total water use for backwash is about 10%.

Dual-Media Gravity Filters

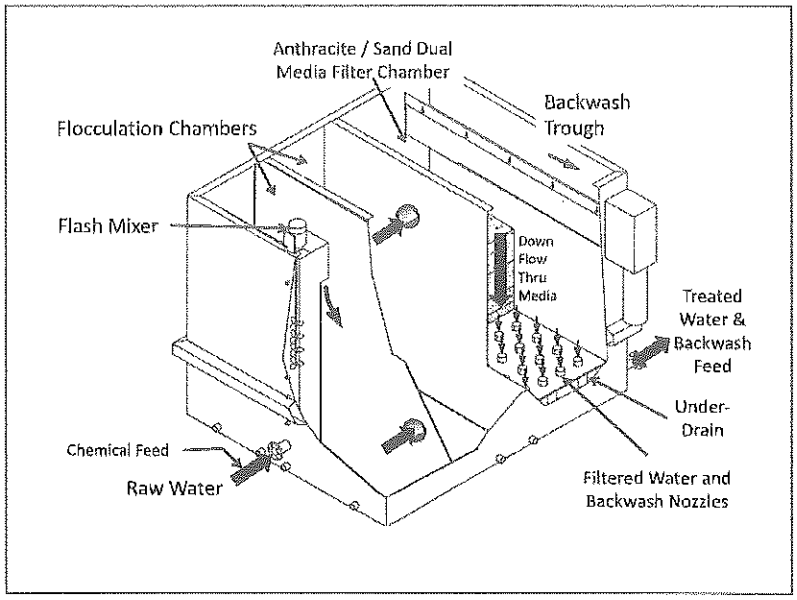
Pre-manufactured dual media "conventional water filters" could be installed with complete systems for operation, including backwash. Individual units with about 1.0 MGD (average) capacity would allow 6 units to treat the effluent to low phosphorus requirements. These units would be about 12 ft wide by 8 ft high by about 44 ft long, including flocculation units. Filter rate would be about 2.1 gpm/sf for maximum day flow.

These units could be pre-manufactured (package) systems, as the units at Spokane were, or constructed in concrete structures. The units have been demonstrated to successfully function with up to 100 mg/L of coagulant, as alum, added to the units at Spokane. A small dose of polymer sometimes improves performance.

Backwash water for these units must come from treated water storage. The storage would most likely consist of on-site tank with pumps used to backwash (this was the arrangement at the Spokane Pilot plants). The backwash water flow rate is high for these systems, although the duration is short which makes the total backwash water use approximately the same as for the other systems (5% to 10% of production). The backwash is automatically controlled, and is initiated by headloss, turbidity, or time. The backwash would be programmed to not permit backwash of more than a minimum number of the units simultaneously to reduce total backwash flow rate (reducing storage volume requirements and pipe-size requirements). Equalizing the backwash (flow back to the treatment plant) would likely be necessary if the dual media filter

technology is used, but the equalization of the backwash waste could be combined with the planned WWTP influent equalization, resulting in minimal added cost.

Figure 14 – Dual Media Downflow Filter – Anthracite and Sand. Figure source Corix Water Systems.



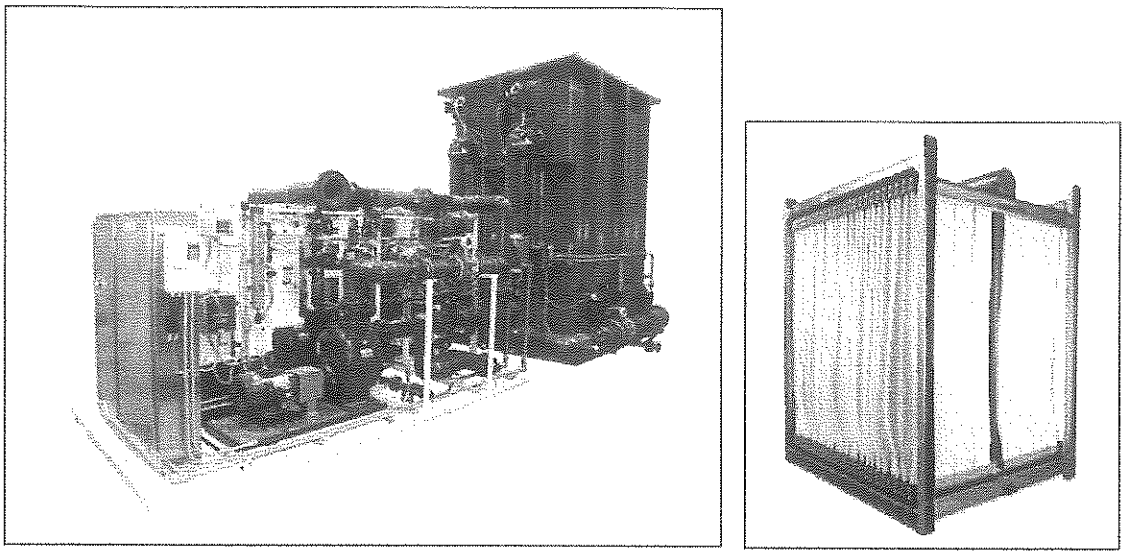
Membrane Filters

Open-tank atmospheric pressure membrane systems are assumed at this time to be preferable for this application where large alum doses may be needed to reduce phosphorus. However, the pilot unit for Liberty Lake Sewer and Water District successfully used enclosed pressure membranes, so they will not be eliminated from consideration (during the design phase if membranes are selected as the preferred technology). Modular systems consisting of individually sized units are one option, up to a production capacity of nominally 830,000 gpd each (The Zenon L128, de-rated based on pilot experience and application experience). It would take 8 such units to meet the first phase of NLT implementation (to meet maximum day when average flow is 4-mgd). One of the units would be only partially-populated membrane cassettes. At 5-mg average flow, it would take 10 such units, with one once again only partially populated.

GE/Zenon also proposed a submerged membrane system that is not made up of modular stand-alone units – requiring concrete tanks. This approach allows ancillary components, such as cleaning systems and controls to serve the entire process instead of have these components for each skid-mounted, stand-alone unit. The non-modular, concrete tank system utilizes the same membrane fibers as the modular, package units. This non-modular option appears to be significantly more cost-effective than the skid-mounted, multiple modular units option, because there is less duplication of ancillary equipment.

The modular units store water on the skid for back-pulsing the membranes and backwashing the tanks. The operation of each individual unit is controlled by a PLC controller that directs all of the functions to operate the system.

Figure 15 – Modular membrane package system and membrane cassette. Picture source GE/Zenon.



AlgEvolve

This process utilizes algae to uptake the trace amounts of phosphorus in the effluent. The algae is then removed from the effluent stream by a membrane separation process. This is a biological process, so coagulant dose is kept to a minimum. The process has not had any full-scale installations applied expressly for phosphorus polishing for discharge to a surface water. From the piloting done at Post Falls as well as at Inland Empire Paper Company, along with a review of the technology, it would appear that the main drawbacks to this technology are:

- Lack of experience
- Production of waste algae, which may present greater handling difficulties than alum sludge, and therefore unknown solids handling cost impacts, and;
- High expected initial implementation costs due to reactor footprint, which is housed in a "greenhouse" type building, as well as the membrane separation step.
- Possibly high energy costs.

For additional detail regarding the AlgEvolve system and the proposed larger-scale demonstration unit (20,000 gpd commercial demonstration project proposed for Post Falls), refer to the Pilot Project Report from AlgEvolve.

Final Alternatives Comparison

Selection criteria

The alternatives presented above are selected based on the following criteria:

1. Preliminary Screening Criterion:
   - Effectiveness – Ability to consistently meet the WLA criteria at the initial phase of implementation and in future phases. The preliminary screening, outlined in the above sections of this memorandum, and summarized in Figure 11 and Table 5, used

effectiveness as the primary means of screening, so the final alternatives listed in Table 5 are considered to be effective at meeting the WLA as the flows indicated.

2. Final Comparison Criteria:

   - Cost – Relative initial capital cost;
   - Footprint – The footprint implications are only considered in this memo in their direct effect to implementation costs. The implication for overall plant layout must be considered also, but is reserved for other technical memoranda;
   - Operations – Chemical use, headloss (energy), and operations (operating time, operator skills required, maintenance requirements);
   - Consideration of other parameters of concern – There are limitations for other constituents in the effluent, specifically, metals copper, lead, and zinc. Additionally, there are constituents that are being monitored and may potentially have regulated limits in the future. These include metals cadmium and silver, as well as total PCBs and 2,3,7,8 TCDD. The potential for the effluent polishing alternatives to remove these other parameters of concern was evaluated to determine if the effectiveness is better with any particular technology, and if the difference is significant enough to influence the technology selection.

The final comparison using these final comparison criteria is presented below.

Project Cost and Building Footprint Comparison

Table 6 below presents a comparison matrix of the one-stage and two-stage alternatives. The costs shown are the preliminary Engineer's opinion of probable costs. These costs were prepared for comparison of these alternatives, and represent the probable range of costs for implementing the alternative as a stand-alone project (it includes a contingency and engineering based on percentages of only the tertiary NLT project). The building footprint for each alternative is also presented for comparison purposes. The building footprint impact to costs are included in the cost numbers. The two-stage alternatives that include a coagulation / sedimentation first stage show a range for cost and footprint. This range is representative of two viable means of achieving the first-stage coagulation/sedimentation step – using "high-rate sedimentation" similar to the tube-settlers piloted at Spokane and observed in operation at the exemplary P-removal facilities in Colorado, and the Densadeg alternative slurry-recirculation separator.

AlgEvolve is included in the Table, though as noted above, and in the footnote to the Table, there are significant unknowns regarding the viability and cost-structure of a full-scale system. Therefore, the AlgEvolve capital project cost estimates are subject to revision based on new information which may be made available. It is not expected that satisfactory answers to critical questions about solids handling can be addressed within the City's decision time frame, so the City would be in a position of unacceptable risk in pursuing this technology as the only alternative for phosphorus polishing. As the estimated probable costs show, AlgEvolve has little potential for savings in the capital construction project.

The highlighted cells in Table 6 show the apparent lowest-cost alternatives for implementation of NLT for Post Falls. These correspond to the alternatives most likely to be economically feasible, and are the focus of the next section, a comparison of operating and maintenance costs.

The comparison of probable costs for the final feasible alternatives, as summarized in Table 6 results in the following conclusions:

- The lowest-cost alternative at the initial-phase implementation is the single stage (no upstream coagulation/settling) dual media downflow package filters. However, when the facility is expanded and a lower effluent TP concentration is required to meet the WLA, a new process would need to be constructed upstream of the filters, so that at that phase of expansion, the dual-media downflow filters are no longer the most cost-effective.
- The single-stage membrane filter alternative has the second lowest capital project cost at the first stage, but indications are that the same process will continue to be a satisfactory technology for meeting the lower TP concentration of the next phase of expansion, so while phase 2 will require an expansion of the tertiary membrane filters, a new intermediate process is not anticipated to be needed.
- The two-stage CBUF-CBUF is not cost-competitive at the initial implementation phase. It has the advantage at the next expansion phase that a new upstream component is not needed, so the only requirement is an expansion of the already-operating facility. This advantage makes the CBUF-CBUF alternative cost competitive at the phase 2 expansion with the two-stage alternatives involving the dual-media downflow filters.

Table 6 – Summary Sizing, cost, and footprint comparison.

	Phase 1 .095 mg/L	Phase 2 .075 mg/L	Ultimate .021 mg/L
Single-stage alternatives			
Membrane – package modular units	• 8 units • $24.7 M • 23,800 SF bldg	• 11 units • $33.0 M • 32,200 SF bldg	?
Membrane – concrete tank	• 960 +/- ZW500 mods • $15.4 M • 9,000 SF bldg	• 1300 +/- ZW500 mods • $19.2 M • 12,000 SF bldg	?
Downflow dual-media	• 8 units • $14.1 M • 16,000 SF bldg	?	X
AlgEvolve*	• $28.5 M+/- • 34,500 +/-SF bldg	• $36.8 M+/- • 52,000 +/- SF bldg	X
Two-stage alternatives			
Sed-CBUF	• 12 sed/36 filt Or 2 Densadeg and 36 filt. • $20.3M - $25.2M • 13,000 - 17,500 SF bldg	• 16 sed/44 filt Or 3 Densadeg/44 filt. • $24.9M - $31.5M • 16,500 - 22,000 SF bldg	X
CBUF-CBUF	• 72 filt • $18.3M • 11,000 SF bldg	• 88 filt • $22.0M • 13,000 SF bldg	X
Sed-downflow dual media	• 12 sed/6 filt Or 2 Densadeg / 6 filt. • $18.3M - $23.4M • 22,400 - 26,800 SF bldg • Alt. ph.1 would be downflow filters only (no sed. until ph. 2), see above single-stage, 8 units.	• 16 sed/8 filt Or 3 Densadeg / 8 filt. • $23.5M - $30.1M • 28,200 - 33,600 SF bldg	X
Sed-membrane (package modular)	• 12 sed/8 filt Or 2 Densadeg / 8 filt. • $31.7M - $36.9M • 30,000 +/- SF bldg • Alt. ph.1 would be membrane filters only (no sed. until ph. 2), see above single-stage, 8 units.	• 16 sed/10 filt Or 3 Densadeg / 10 filt. • $41.1M - $47.7M • 38,000 - 43,000 SF bldg	? (likely)
Sed – membrane (concrete tanks)	• 12 sed/800 ZW500 mods Or 2 Densadeg / 800 ZW500 mods • $21.6M - $26.7M • 15,000 - 19,400 SF bldg • Alt. ph.1 would be membrane filters only (no sed. until ph. 2), see above single-stage, concrete tank.	• 16 sed/1060 ZW500 mods Or 3 Densadeg / 1060 ZW500 mods • $27.1M - $33.7M • 20,000 - 25,400 SF bldg	? (likely)

Notes for Table:
* = AlgEvolve costs are speculative based on draft pilot report, verbal communication regarding possible full-scale build scenarios, and estimated costs for components expected to be utilized in the full-scale operation.
? = Data indicates may be potentially viable, but not conclusive, long-term operation at higher limitation concentration could establish capability to meeting lower concentration limits.
X = Data indicates the alternatives is not proven capable of meeting the limitations sufficiently to be considered at this stage.

Operating Cost Differences

This section presents a comparison of the operating costs of the two final alternatives with the lowest probable initial phase (4-mgd) costs, down-flow dual media and membrane filter. The operating cost comparison at the phase 2 expansion flows (5-mgd) is also presented. The discussion also includes the continuous backwash upflow filters in series alternative (CBUF-CBUF), since this two-stage technology appears to be cost-competitive at the phase 2 flow (approximately 15% higher total project costs). In general, the CBUF-CBUF alternative would be expected to have similar O&M costs as the down-flow dual media filter alternative. This is because the coagulant addition for these granular media alternatives are assumed to be effectively equal based on the study findings summarized above, and coagulant related costs (chemical, alkalinity, and sludge production) are the largest O&M cost categories. Higher pumping costs of CBUF-CBUF will approximately offset lower building-related energy costs (heat and light) at the first phase design flow (4-mgd), but the other costs are effectively the same for the two granular media filtration alternatives.

As stated above, the removal of phosphorus is a function of the mole ratio of metal salt added to the effluent phosphorus. The Spokane RPWRF pilot study has the best data for comparison of coagulant use, since the methods for sampling and testing was all controlled and equivalent for each technology piloted, and the technologies were piloted in parallel, utilizing the same treatment plant effluent. In general, there is a minimum required mole ratio Al:P to achieve a target TP in the effluent. The data however, did show potential for the membrane filtration to be able to perform better at lower doses of coagulant. This effect was shown in Figure 10, where the trend line shows lower TP for the same mole ratio Al:P compared to the other technologies.

Based on figure 10, as well as on individual pilot runs at the Spokane RPWRF pilot plants in Fall, 2010, it would appear that there is the potential for membrane filtration to achieve equivalent TP performance to the granular media filters for 20% - 40% lower coagulant dose. During the initial implementation phase (4-mgd) at Post Falls, this could amount to chemical use difference as follows in Table 7.

Table 7 – Coagulant use comparison for lowest-cost alternatives for phase 1.

Phase 1 alternative	Phase 1 (4-mgd) alum use, est. annual	Phase 1 (4-mgd) annual alum cost[1]
Membrane	655,000 lbs	$82,000
Granular Media Filtration	890,000 lbs	$111,000

Notes for Table:
1. 2011-2012 bulk alum prices.

At the second phase expansion (5-mgd), the difference in coagulant use will be greater, as effluent total phosphorus must be lower to satisfy the waste load allocation (Table 1 in this TM). The associated increase in coagulant dose will be greater with granular media than with membrane treatment. Expansion at the future phase 2 flow and effluent TP concentration is expected to require a new coagulation / settling process if using dual-media downflow filtration is used for the first phase, but with membranes, no new upstream or intermediate process is needed. At the 5-mgd average flow level, the difference in alum use is estimated at 580,000 lb/yr, at a cost difference of approximately $73,000 per year.

The alum use difference also impacts the amount of alkalinity addition needed. The above

difference in alum consumption would result in a difference of approximately 95,000 pounds per year of sodium hydroxide at the 4-mgd average flow, and 240,000 lbs per year at the 5-mgd average flow. The cost difference associated with this chemical use difference would be about $40,000 at 4-mgd and approximately $95,000 at 5-mgd.

The chemical cost differences would be partially offset by the cleaning chemical use required for the membrane treatment system, which would not be required with any granular media filters. Preliminary cleaning chemical costs at the 4-mgd average flow are $18,000 per year, and at the 5-mgd flow are $22,000 per year.

It is also probable that dual-media downflow filters would use a small dose of polymer (.1 - .3 mg/L was found to be effective at the RPWRF, amounting to nominally $5,000 per year for 4-mgd in Post Falls).

The chemical feed difference also impacts the sludge production. The alum dose difference would be expected result in a difference of approximately 80-90 pounds per day (dry solids) of sludge (at 4 mgd), and about 210-230 pounds per day difference at 5-mgd. At typical cost per dry-ton processing and disposal costs, this could be a difference (between membrane filtration and granular media filtration of about $8,000 – $12,000 per year at 4-mgd, and $20,000-$25,000 at 5-mgd.

Media replacement costs are significant. Assuming a 10-year life for the membranes, on an annual budget basis, membrane module replacement per year would average approximately $95,000 to $115,000 (when treating an average 4-mgd on a seasonal basis). Granular media filters also require media supplementation. The annual budget for media replacement would not be expected to more than approximately $5,000 - $10,000 at the 4-mgd average flow.

Energy use would be similar for membrane and dual media down-flow systems. The primary energy costs would be for pumping and for heating and lighting the final treatment building. Pumping costs would be expected to be in the $8,000 to $12,000 range per year for a 4-mgd flow, with the lower estimate corresponding to the dual-media filter because of the lower overall average pumping head. The slightly higher energy costs predicted for the membrane system pumping would be more than offset by the higher energy costs required for the larger building footprint of the dual-media downflow filtration.

Manpower costs are not expected to be significantly different between granular media filtration and membrane filtration.

Overall, the approximate difference in annual O&M costs between the membrane filtration and dual media down flow filtration would be expected to be approximately $30,000 to $40,000 per year in favor of the dual-media downflow filters for the first phase. By the 5-mgd phase, the O&M budgetary costs, on an annual basis would favor the membrane filters by approximately $60,000 - $80,000. A summary comparison of the operation, maintenance, and replacement projections is presented in Table 8 below. The costs presented in Table 8 are suitable for comparison of these two tertiary effluent phosphorus polishing alternatives, and are based on the following assumptions and limitations:

- Power costs assume 4 mgd in phase 1 as indicated and 5 mgd in phase 2 as indicated, with pumping being a significant expense that is directly related to flow volume.
- Costs for power assume $0.08 per kW-hr. Considered a little bit conservative but reasonable given the potential variability of energy costs over then 20+ years.
- Chemical costs were based on 2011-2012 prices for chemicals, but total chemical use is based on dosing at the flow levels indicated in the Table (4-mgd and 5-mgd). Overall

O&M cost projections utilized for budgeting in the main body of this WRF facility plan may take a different approach to projected growth in flow, but this approach is useful in this context of P-removal alternatives comparison.

- Only costs associated with the tertiary P-removal (Next Level of Treatment) are incorporated into the comparison in Table 8. No O&M costs for other facilities or processes in the wastewater treatment plant are included in Table 8. This includes the category "Sludge Handling / Disposal", which accounts only for the sludge produced in the effluent phosphorus treatment, and does not include biological sludge. Refer to the main body of the report for overall O&M cost projections.
- As noted above, the CBUF-CBUF alternative would have estimated operation and maintenance costs comparable to the downflow dual-media alternative at the 4-mgd flow (within about $3,000 per year at this level of estimating). At the 5-mgd flow, the estimated operating costs of the CBUF-CBUF alternative could be up to $15,000 less per year than the dual-media downflow alternative, because of building-related energy expenses. CBUF-CBUF would still have substantially higher O&M costs than the membrane filter alternative at the 5-mgd flow.

Table 8 – O&M Cost Comparison, Membrane Treatment and Downflow Filters

	Phase 1 (4-mgd flow) comparison		Phase 2 (5-mgd flow) comparison	
O&M Category	Membrane	Dual Media Down-flow	Membrane	Dual Media Down-flow
Power (process)	$12,000	$10,000	$15,000	$12,000
Power – lights and heat	$14,000	$24,000	$18,000	$46,000
Equipment Maintenance / Parts	$57,000	$44,000	$71,000	$55,000
Media replacement –Budget	$99,000	$7,000	$124,000	$9,000
Labor	$33,000	$33,000	$39,000	$39,000
Coagulant	$82,000	$111,000	$131,000	$204,000
Alkalinity	$108,000	$147,000	$174,000	$271,000
Cleaning Chemicals	$18,000	-	$22,000	-
Polymer	-	$5,000	-	$6,000
Sludge Handling / Disposal	$27,000	$37,000	$44,000	$68,000
Sub-Total O&M annual	$450,000	$418,000	$638,000	$710,000

The AlgEvolve system, which would appear to be more costly for the capital construction (see Table 6), would have a very different mix of O&M costs compared to the dual-media filters and the membrane filters. With AlgEvolve, there would be potential for reduced chemical costs. At the 4-mgd level, the alum costs in Table 7 and 8 could be eliminated or very severely reduced.

On the other hand, the power costs would be substantially higher for AlgEvolve. Based on the AlgEvolve proposal for the 20,000 gpd demonstration plant, a 4-mgd plant could draw approximately 2,000 kW, resulting in a power bill in the $1,000,000 per year range (assuming

operating 280 days per year for phosphorus polishing). It is not clear if the power use estimate from AlgEvolve includes pumping for the reactor, mixing, and permeate, or if this is strictly for the lights. Even if all pumping use is included in this power cost, it is substantially more than the total O&M costs expected for the granular media or membrane filters. Even if the full-scale system were 50% more efficient than the 20,000 gpd demonstration unit, its power costs would be higher than all O&M costs for the other alternatives.

Media replacement would still be needed with the AlgEvolve, expected to be in the same order of magnitude as the media replacement costs projected for the membrane filtration alternative.

Another O&M consideration with AlgEvolve is the potentially high dewatering and sludge disposal costs, because of the production of algae, which is known to be difficult to separate and may cause operational challenges if mixed with biological and chemical sludges.

It appears that the AlgEvolve system would have a higher O&M cost than the dual media or membrane filter alternatives, in addition to the higher expected capital costs. Because of these cost differences, until more information is provided, and new design parameters are available based on full-scale operations, further consideration of AlgEvolve is not recommended.

Consideration of other effluent parameters potentially of concern in the future.

The preliminary screening of technically feasible alternatives and the comparison of final alternatives above was based on effectiveness at meeting the limitations for total phosphorus. In addition to total phosphorus, the City of Post Falls is facing increasingly stringent effluent limitations for a range of other constituents. Specifically, the following constituents are incorporated into the new NPDES permit with limitations or with a monitoring schedule with reporting requirements that my results in future specific numerical limits.

- Total Polychlorinated Biphenyls (PCB's). According to the NPDES Permit Fact Sheet, there is reasonably sufficient evidence to suggest that the Post Falls discharge may potentially be contributing to some portions of the Spokane River downstream of Long Lake Dam not meeting water quality standards. The Fact Sheet also states insufficient data precludes establishing numerical limitations at this time, but a monitoring program and implementation of best management practices (BMPs) are required under the NPDES Permit. If any of the phosphorus-polishing technologies can more efficiently remove PCBs, then this is a long-term consideration that should be factored into the technology selection for phosphorus removal.
- 2,3,7,8 Tetrachlorodibenzo-p-dioxin (2,3,7,8 TCDD) is also suspected to be above the water quality standards in the Spokane River and downstream in Lake Spokane and below Long Lake Dam. Monitoring required in the new NPDES permit is intended to establish the likely contribution from the Post Falls effluent to any excursions above the water quality standards. If there is any measurable difference in removal efficiency between the phosphorus-removal technologies, then it should be taken into consideration in the selection of technology.
- The Post Falls NPDES permit includes numerical limits for dissolved metals Copper, Lead, and Zinc. Additionally, Cadmium, and Silver are monitored in the effluent consistent with the NPDES permit requirements. Effluent monitoring records indicate there have been no violations of the permit limits during the period of record reviewed, January, 2001 – July, 2011. Nevertheless, given the risk of future changes to effluent regulations and the opportunity to minimize the potential for these constituents to result

in water quality violations, it is still reasonable to compare capability of the effluent phosphorus polishing technologies at removing dissolved metals.

PCBs and 2,3,7,8 TCDD

The NPDES permit requires new monitoring for PCBs and 2,3,7,8 TCDD. No limitations are imposed at this time. Ultimately, when limitations are imposed, they are likely to be based on downstream water quality standards for Idaho, Washington, and the Spokane Tribe of Indians, and possibly taking into consideration the City of Post Falls wastewater treatment plant performance. The existing facility is most likely removing approximately 90% of incoming PCBs.

There is limited PCB data available from regional wastewater treatment plants, and even less available data on 2,3,7,8 TCDD. During the City of Spokane Pilot testing, PCBs were sampled on two occasions in order to determine if any of the phosphorus removal technologies studied can be expected to outperform the others for PCB removal.

The two sampling events both occurred when the pilot units were being operated in 2-stage treatment modes, with the activated sludge effluent first receiving a chemical coagulation step followed by a filtration step. The removal in the first stage after the secondary process (coagulation and sedimentation processes) was fairly consistent, with the combined removal for the "sedimentation" processes averaging 80%, with a range of 73.4% to 98.8%. Additional removal beyond the sedimentation stage was inconsistent, particularly for the membrane processes, where negative removal was commonly observed for this limited amount of data. Note that during the July, 2010 sampling, there was no alum addition in the sedimentation units ahead of the membrane units. The sampling and testing for PCBs for the RPWRF pilot study are summarized in Table 9.

Table 9 - Spokane RPWRF PCB Performance Summary

Process	Range Effluent Total PCBs	PCB removal	
Secondary Treatment	1,260 – 1,490 pg/L	91.3% (through activated sludge)	
	415 - 835 pg/L	92.8% (through activated sludge)	
Additional treatment		Additional Removal (after secondary)	Overall Removal (Activated sludge plus advanced pilot units)
CBUF following tertiary sed	150 – 182 pg/L	86% - 90%	99.0%
	25.4 – 102 pg/L	75% - 97%	99.3%
Conventional downflow dual-media filter following tertiary sed	163 – 248 pg/L	80% - 89%	98.6%
	63.2 – 57.5 pg/L	86% - 95%	99.3%
Membrane filtration following tertiary sed	428 – 425 pg/L	66% - 71%	97.2%
	101 pg/L	75% - 88%	98.8%

The rate of removal for PCBs through the secondary system demonstrated in the Spokane testing (nominally 92% removal) is consistent with observed performance of other activated sludge treatment plants in this region. For example, studies at the Pullman, Washington wastewater treatment facility have found removal rates of 94%-95%.

Drawing conclusions from the data taken during the Spokane Pilot studies is not straightforward with respect to comparing different technologies. PCBs adhere to solids, and the removal process in wastewater treatment plants is sorption to solids and removal with waste sludge. The adherence to solids implies that the filtration technology with the best solids removal will also be the best at PCB removal. However, piloting at the Spokane SAWTP did not indicate that this was the case, as shown in Table 9.

One factor to consider in reviewing the data from Spokane, is the extremely low concentration of PCBs following the sedimentation step (which is after the secondary treatment), in the range where PCB testing accuracy is very poor. The pilot study did not therefore conclude that any of the three technologies under consideration would necessarily result in better PCB removal. No specific data was found to contradict this conclusion from other facilities that could compare technologies.

The SAWTP phosphorus pilot study did not measure 2,3,7,8 TCDD, but the dioxin compound is an organic molecule that, like PCBs, adheres to solids. Note membrane pores are not small enough to exclude PCB or dioxin molecules, so even for membranes, sorption to solids is the removal mechanism for these compounds.

There is not sufficient evidence to conclude that any particular technology would help to consistently achieve better performance. The ultimate PCB and/or dioxin strategy may rely on achieving the maximum removal possible through the phosphorus-removing technology, along with, perhaps, an additional unit process specifically implemented for removal of organic compounds such as PCBs. The current state of technology of PCB removal would be activated carbon, while advanced oxidation processes (AOPs) continue to be developed and gradually implemented in some special-circumstance installations. AOPs utilize the hydroxyl radical to oxidize the most difficult to destroy organics. The hydroxyl radical is generated at the point of use since it is very short-lived. Methods of generating hydroxyl radicals for AOP include peroxide/ozonation or peroxide/UV.

Metals

Copper, lead, zinc, and cadmium were included in the regular monitoring program during the Spokane RPWRF pilot study, resulting in 40-60 valid samples from each of the six technologies piloted. Silver was not monitored during the RPWRF pilot study, so results are not available for this metal. The results are summarized below in Table 10 for the technologies evaluated for the Post Falls facility. Note that the data is combined for all pilot runs, which reflects a range of coagulant doses, as well as an intermediate coagulation and sedimentation step between the secondary effluent and the final filtration.

Table 10 – Metals Removal Performance for three filtration technologies at the Spokane RPWRF Pilot Testing

Metal	Secondary Effluent	Dual Media Downflow	CBUF	Tertiary Membrane Filtration
Copper (mg/L ave)	.00940	.00558	.00507	.00594
Lead (mg/L ave)	.00063	.00047	.00059	.00046
Zinc (mg/L ave)	.04488	.04060	.04174	.04087
Cadmium (mg/L ave)	.00012	.00013	.00010	.00013

The data from the Spokane pilots shows that some removal of copper (nominally 40% removal), lead (20%), and zinc (8%) was occurring through the pilot units, but in general, the difference between the technologies is not significant enough to conclude that any particular technology performs better than another for removal of these metals. For cadmium, the data shows effectively no removal through any of the pilot units. In conclusion, with respect to metals removal performance, there is no evidence to change the recommendations of the alternatives evaluation.

Summary of Alternatives Comparison

Table 11 presents a summary of the financial comparison of final alternatives. Due to the unknowns and the limited potential for being cost competitive at least through the life-cycle of the 4-mgd phase of expansion, the AlgEvolve system is not included in this comparison.

The present worth comparison shown in Table 11 is based on assuming facility startup in 2016, projecting O&M expenses in each year of the 20-year planning horizon of this study, and finding the present worth of each annual expense. The present worth calculation assumed a 20-year life and an interest rate of 5%. This approach requires making adjustments to the assumed coagulant and alkalinity costs as flows increase in accordance with projections (and required effluent total phosphorus concentration declines). The expansion to 5-mgd is assumed to be on-line by 2024 to keep up with the projected growth.

As noted previously, the costs assume implementation of equalization to limit maximum flows as presented in Table 2.

Table 11 – Summary Cost Comparison – Present Worth

	Final Alternatives		
	Tertiary Membrane Filtration	Dual-media Downflow	CBUF-CBUF (2-pass)
Implementation Cost	$15.4 Million	$14.1 Million	$18.3 Million
O&M cost (Present Worth, i=5%)	$4.3 Million	$4.2 Million	$4.1 Million
Expansion to 5-mgd requirements	Expand by adding more modules	New coag/ floc / settling units ahead of filters	Expand by adding more cells
PW of incremental expansion	$3.8 Million	$9.4 Million	$3.7 Million
TOTAL PRESENT WORTH	$23.5 Million	$27.7 Million	$26.1 Million

Conclusions

The cost comparison at the initial, 4-mgd project favors the dual-media downflow filter alternative. At the 5-mgd level, the tertiary membrane filter has more favorable economics, due to the ability to expand without adding a process, and the expected lower chemical costs. This expansion capability also results in a lower present worth for the membrane alternative for 20-year operation incorporating future expenses into the comparison.

The tertiary membrane alternative has the distinct advantage of permitting direct expansion to occur by adding to the previously constructed facilities, without the need to implement yet another technology. This would be true at the 5-mgd average flow, and likely out to the 8-mgd range at least. Thus, operational experience will be directly applicable to the design and operation of future expansions.

These future expansion considerations, along with the cost comparison for future facilities offset the higher cost of the tertiary membrane system for the initial implementation project.

With respect to constituents likely to be regulated in future permit cycles with numerical limits, including PCBs and metals, there is no substantial evidence that the performance capability for any of the final alternatives is superior to any of the other alternatives, and any differences in performance that may be found based on future study are unlikely to come close to offsetting the cost differences.

Recommendation

The conclusions presented above favor tertiary membrane filtration for effluent phosphorus polishing.

It is recommended the City of Post Falls incorporate the following into the preparation of the Phosphorus Management Plan that will be prepared in compliance with City's NPDES Permit:

1. Include budgeting for tertiary phosphorus removal in the City's Facility Planning, as summarized in Table 11.
2. Include piloting of tertiary membrane filter in the City's Phosphorus Management Plan. Budgeting should be based on soliciting proposals from suitable manufacturers for piloting. Piloting should ideally be performed during the low-phosphorus removal season, including the early part of the season (February), when cooler wastewater temperatures may make effective removal most challenging. The piloting should also overlap, if possible, periods during which EBPR transitions through more and less stable phases (this typically occurs during summer for most EBPR plants).

   The purpose of the piloting would be:

   a. Confirm capability to meet target TP concentrations at the initial implementation phase, as well as at future phases of expansion, when effluent TP concentrations will need to blower to meet the WLA.

   b. Provide verification of operational parameters that can influence design sizing, including chemical feed capacity for coagulant and alkalinity, and to improve the sludge production estimates for use in sizing solids handling improvements.

Existing Chlorine Contact Evaluation, and Required Add'l Volume

PH Flow (assumes attenuation down to Peak Day with Flow Equalization) 7.7 mgd = 5343.8 gpm

Contact Time Calculations		Proportional Flow			
Chamber No. 1	18800 gallons	22%	1162.098785 gpm	16.2 minutes	
Chamber No. 2	18800 gallons	22%	1162.098785 gpm	16.2 minutes	
Chamber No. 3	48850 gallons	57%	3019.602429 gpm	16.2 minutes	
				16.2 minutes	(JUST OVER 15 MINUTES)

NOT POSSIBLE, HYDRAULICS WON"T ALLOW CONTACT CHAMBERS TO BE RUN IN PARALLEL . CAN ONLY RUN 1+2 or #3 by itself.

ASSUMING ALL FLOW THROUGH 1 and 2

PH Flow (assumes attenuation down to Peak Day with Flow Equalization) 3.6 mgd = 2498.4 gpm

Contact Time Calculations		Proportional Flow			
Chamber No. 1	18800 gallons	50%	1249.2 gpm	15.0 minutes	
Chamber No. 2	18800 gallons	50%	1249.2 gpm	15.0 minutes	
Chamber No. 3	0 gallons	0%	0 gpm	minutes	
				15.0 minutes	(JUST UNDER 15 MINUTES)

ASSUMING ALL FLOW THROUGH UV CHANNEL

PH Flow (assumes attenuation down to Peak Day with Flow Equalization) 4.7 mgd = 3261.8 gpm

Contact Time Calculations		Proportional Flow			
Chamber No. 1	0 gallons	0%	0 gpm	minutes	
Chamber No. 2	0 gallons	0%	0 gpm	minutes	
Chamber No. 3	48850 gallons	100%	3261.8 gpm	15.0 minutes	
				15.0 minutes	(JUST UNDER 15 MINUTES)

FUTURE PLANNED VOLUME

PH Flow (assumes attenuation down to Peak Day with Flow Equalization) 8 mgd = 5552 gpm

Contact Time Calculations		Proportional Flow			
Chamber No. 1	18800 gallons	21%	1191.525114 gpm	15.8 minutes	
Chamber No. 2	18800 gallons	21%	1191.525114 gpm	15.8 minutes	
Chamber No. 3	gallons	0%	0 gpm	minutes	
Chamber No. 4	50000 gallons	57%	3168.949772 gpm	15.8 minutes	New
				15.8 minutes	(JUST OVER 15 MINUTES)

Project: Post Falls Dechlorination Backup Systems
Item: Dechlorination Process Calcs
Engineer: RMC
Date: Nov 2011
CHEMICAL = Sodium Hypochlorite

FOS =	1	
TRC=	6	mg/L
DESIGN POINT	6	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	0
Dose, mg/L	6	6	6	6
Dose Ratio	1	1	1	1
required NaOCl, lb/day	**90.1**	**260.2**	**400.3**	**0.0**
standard solution, %	10.5%	10.5%	10.5%	10.5%
sg	1.2	1.2	1.2	1.2
std solution, lb/gal	10.01	10.01	10.01	10.01
lb active chemical / gal	1.05	1.05	1.05	1.05

Required solution at a dilution of

std solution (gal)	**water (gal)**				
1	0				
lb / mixed gal		1.05	1.05	1.05	1.05
mixed gal / day		85.7	247.6	381.0	0.0
mixed gal / wk		**600**	**1733**	**2667**	**0**
mixed gal / month		**2400**	**6933**	**10667**	**0**
mixed gal / hr		3.57	10.32	15.87	0.00

NORMAL OPERATION

chem feed pump -	10	gph chemical feed pump
Number of Pumps	2	
Likely Stroke During Operation	80%	
Actual Pump Rating	16	gph output
max operating speed -	0%	based on peak hour at 1:0 dillution and
normal operating speed -	64%	based on avg day at 1:0 dillution and
min operating speed -	99%	based on peak day at 1:0 dillution and
abs min oper. speed -	22%	based on min day at 1:0 dillution and

Project: Post Falls Dechlorination Backup Systems
Item: Dechlorination Process Calcs
Engineer: RMC
Date: Nov 2011
CHEMICAL = Chlorine Gas

FOS =	1	
Dose:	6	mg/L
DESIGN POINT	6	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	
TRC, mg/L	6	6	6	
	1	1	1	
required (Cl_2), lb/day	**90.1**	**260.2**	**400.3**	
lb/week	631	1821	2802	
lb/month	2522	7286	11209	

Bottles (@150 lb/bottle)	bottles/day	0.60	1.73	2.67
	bottles/week	4.20	12.14	18.68
	bottles/month	16.81	48.57	74.73

Max Capacity with 4 bottles on-line 240 lb/day

FOS =	2	
TRC=	6	mg/L
DESIGN POINT	12	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	
TRC, mg/L	12	12	12	
0	1	1	1	
required (Cl2), lb/day	**180.1**	**520.4**	**800.6**	
lb/week	1261	3643	5604	
lb/month	5044	14572	22418	

Bottles (@150 lb/bottle)	bottles/day	1.20	3.47	5.34
	bottles/week	8.41	24.29	37.36
	bottles/month	33.63	97.14	149.45

Project: Post Falls Dechlorination Backup Systems
Item: Dechlorination Process Calcs
Engineer: RMC
Date: Nov 2011
CHEMICAL = SODIUM BISULFITE

FOS =	1	
TRC=	1.2	mg/L
DESIGN POINT	1.2	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	12
TRC, mg/L	1.2	1.2	1.2	1.2
NaHSO4 : TRC	1.6	1.6	1.6	1.6
required NaHSO4 (de-Cl_2), lb/day	**28.8**	**83.3**	**128.1**	**192.2**
standard solution, %	38%	38%	38%	38%
sg	1.35	1.35	1.35	1.35
std solution, lb/gal	11.26	11.26	11.26	11.26
lb active chemical / gal	4.28	4.28	4.28	4.28

Required solution at a dilution of

std solution (gal)	**water (gal)**				
1	**0**				
lb de-Cl2 / mixed gal		4.28	4.28	4.28	4.28
mixed gal / day		6.7	19.5	29.9	44.9
mixed gal / wk		**47**	**136**	**210**	**314**
mixed gal / month		**189**	**545**	**838**	**1258**
mixed gal / hr		0.28	0.81	1.25	1.87

NORMAL OPERATION

chem feed pump -	2.5	gph chemical feed pump
Likely Stroke During Operation	50%	
Actual Pump Rating	1	gph output
max operating speed -	150%	based on peak hour at 1:0 dillution and
normal operating speed -	65%	based on avg day at 1:0 dillution and
min operating speed -	100%	based on peak day at 1:0 dillution and
abs min oper. speed -	22%	based on min day at 1:0 dillution and

FOS =	2	
TRC=	1.2	mg/L
DESIGN POINT	2.4	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	12
TRC, mg/L	2.4	2.4	2.4	2.4
NaHSO4 : TRC	1.6	1.6	1.6	1.6
required NaHSO4 (de-Cl_2), lb/day	**57.6**	**166.5**	**256.2**	**384.3**
standard solution, %	38%	38%	38%	38%
sg	1.35	1.35	1.35	1.35
std solution, lb/gal	11.26	11.26	11.26	11.26
lb de-Cl2 / gal	4.28	4.28	4.28	4.28

Required solution at a dilution of

std solution (gal)	**water (gal)**				
1	**0**				
lb de-Cl2 / mixed gal		4.28	4.28	4.28	4.28
mixed gal / day		13.5	38.9	59.9	89.8
mixed gal / wk		**94**	**272**	**419**	**629**
mixed gal / month		**377**	**1090**	**1677**	**2515**
mixed gal / hr		0.56	1.62	2.50	3.74

EXTREME OPERATION

chem feed pump -	2.5	gph chemical feed pump
Likely Stroke During Operation	100%	
Actual Pump Rating	3	gph output
max operating speed -	150%	based on peak hour at 1:0 dillution and
normal operating speed -	65%	based on avg day at 1:0 dillution and
min operating speed -	100%	based on peak day at 1:0 dillution and
abs min oper. speed -	22%	based on min day at 1:0 dillution and

Project: Post Falls Dechlorination Backup Systems
Item: Dechlorination Process Calcs
Engineer: RMC
Date: Nov 2011
CHEMICAL = Sulfur Dioxide Gas

FOS =	1	
TRC=	1.2	mg/L
DESIGN POINT	1.2	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	12
TRC, mg/L	1.2	1.2	1.2	1.2
Sulfur Dioxide : TRC	0.903	0.903	0.903	0.903
required (de-Cl_2), lb/day	**16.3**	**47.0**	**72.3**	**108.4**
lb/week	114	329	506	759
lb/month	455	1316	2024	3037

Bottles (@150 lb/bottle)	bottles/day	0.11	0.31	0.48	0.72
	bottles/week	0.76	2.19	3.37	5.06
	bottles/month	3.04	8.77	13.50	20.24

Max Capacity with 2 bottles on-line 80 lb/day

FOS =	2	
TRC=	1.2	mg/L
DESIGN POINT	2.4	mg/L

	min	average	peak day	peak hour
WWTP flow condition, mgd	1.8	5.2	8	12
TRC, mg/L	2.4	2.4	2.4	2.4
Sulfur Dioxide : TRC	0.903	0.903	0.903	0.903
required (de-Cl2), lb/day	**32.5**	**94.0**	**144.6**	**216.9**
lb/week	228	658	1012	1518
lb/month	911	2632	4049	6073

Bottles (@150 lb/bottle)	bottles/day	0.22	0.63	0.96	1.45
	bottles/week	1.52	4.39	6.75	10.12
	bottles/month	6.07	17.54	26.99	40.49

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Dechlorination Upgrades (SODIUM BISULFITE)

CLIENT:
Post Falls WRF

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 5,000	$ 5,000
2	Building (12 x 20)	240	SF	$ 300	$ 72,000
3	Interior Mechanical Piping	1	LS	$ 15,000	$ 15,000
4	Chemical Feed Equipment (Pumps)	3	EA	$ 5,000	$ 15,000
5	Chemical Handling and Storage Equipment (Tanks)	2	EA	$ 10,000	$ 20,000
6	Buried Piping	1	LS	$ 10,000	$ 10,000
7	Injection Equipment	1	LS	$ 2,500	$ 2,500
8	Analyzer and Controller	1	LS	$ 15,000	$ 15,000

Construction Subtotal	**$ 154,500**
Mobilization, Bonding, Administration (15%)	$ 23,200
Site Electrical, Controls and Testing (40%)	$ 71,100
Construction Total	**$ 248,800**
Engineering and Administration (25%)	$ 62,200
Construction Reserve Contingency (20%)	$ 49,800
Total	**$ 360,800**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Chemical Costs (Annual)	6539	GAL	**$3.60**	**$ 23,541**
2	Equipmant Replacement (Pumps and Tanks at 10 years)	1	LS	**$ 35,000**	**$ 35,000**
3	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$30.00**	**$ 3,900**
	Chemical Costs (over 20 years)				**$ 470,824**
	Equipment Costs (over 20 years)				**$ 35,000**
	Operator Time (over 20 years)				**$ 78,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 583,824**
		PRESENT WORTH CAPTITAL AND O&M			**$ 944,624**

J-U-B ENGINEERS, INC.
7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Dechlorination Upgrades (Sulfur Dioxide)

CLIENT:
Post Falls WRF

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 5,000	$ 5,000
2	Building (12 x 16)	192	SF	$ 300	$ 57,600
3	Interior Mechanical Piping	1	LS	$ 10,000	$ 10,000
4	Chemical Feed Equipment (Injectors, Scales)	2	EA	$ 15,000	$ 30,000
5	Fire Sprinkler System and Safety Eqpt.	1	LS	$ 15,000	$ 15,000
6	Buried Piping	1	LS	$ 10,000	$ 10,000
7	Injection Equipment	1	LS	$ 2,500	$ 2,500
8	Analyzer and Controller	1	LS	$ 15,000	$ 15,000
	- Gas scrubbing assumed to not be required nor included in costs.				

Construction Subtotal	**$**	**145,100**
Mobilization, Bonding, Administration (15%)	$	21,800
Site Electrical, Controls and Testing (40%)	$	66,800
Construction Total	**$**	**233,700**
Engineering and Administration (25%)	$	58,400
Construction Reserve Contingency (20%)	$	46,700
Total	**$**	**338,800**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Chemical Costs (Annual)	15790	LBS	**$0.94**	**$ 14,842**
2	Equipment Replacement (Pumps and Tanks at 10 years)	1	LS	**$ 30,000**	**$ 30,000**
3	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$30.00**	**$ 3,900**
	Chemical Costs (over 20 years)				**$ 296,849**
	Equipment Costs (over 20 years)				**$ 30,000**
	Operator Time (over 20 years)				**$ 78,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 404,849**
		PRESENT WORTH CAPTITAL AND O&M			**$ 743,649**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Chlorine Gas Upgrades

CLIENT:
Post Falls WRF

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work		LS		
2	Existing Building		SF	$ -	$ -
3	Interior Mechanical Piping	1	LS	$ 5,000	$ 5,000
4	Chemical Feed Equipment (Injectors, Scales)	2	EA	$ 15,000	$ 30,000
5	Buried Piping (use existing)	0	LS		
6	Injection Equipment	1	LS	$ 2,500	$ 2,500
7	Analyzer and Controller	1	LS	$ 15,000	$ 15,000
	- Gas scrubbing assumed to not be required nor included in costs.				

Construction Subtotal	**$**	**52,500**
Mobilization, Bonding, Administration (15%)	$	7,900
Site Electrical, Controls and Testing (40%)	$	24,200
Construction Total	**$**	**84,600**
Engineering and Administration (25%)	$	21,200
Construction Reserve Contingency (20%)	$	16,900
Total	**$**	**122,700**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Chemical Costs (Annual)	87430	LBS	**$0.94**	**$ 82,184**
2	Equipment Replacement (Pumps and Tanks at 10 years)	1	LS	**$ 30,000**	**$ 30,000**
3	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$30.00**	**$ 3,900**
	Chemical Costs (over 20 years)				**$ 1,643,682**
	Equipment Costs (over 20 years)				**$ 30,000**
	Operator Time (over 20 years)				**$ 78,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,751,682**
		PRESENT WORTH CAPTITAL AND O&M			**$ 1,874,382**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Calcium Hypochlorite Tablet Feeder Costs

CLIENT:
Post Falls WRF

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work		LS		
2	Existing Building		SF	$ -	$ -
3	Interior Mechanical Piping	1	LS	$ 5,000	$ 5,000
4	Chemical Feed Equipment (Tablet Feed Eqpt)	1	EA	$ 25,500	$ 25,500
5	Buried Piping (use existing typical, minor mods)	1	LS	$ 5,000	$ 5,000
6	Injection Equipment	1	LS	$ 1,000	$ 1,000
7	Analyzer and Controller (Included)				$ -

Construction Subtotal	**$**	**36,500**
Mobilization, Bonding, Administration (15%)	$	5,500
Site Electrical, Controls and Testing (40%)	$	16,800
Construction Total	**$**	**58,800**
Engineering and Administration (25%)	$	14,700
Construction Reserve Contingency (20%)	$	11,800
Total	**$**	**85,300**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Chemical Costs (Annual)	142464	LBS	**$0.94**	**$ 133,916**
2	Equipment Replacement (Pumps and Tanks at 10 years)	1	LS	**$ 25,500**	**$ 25,500**
3	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$30.00**	**$ 3,900**
	Chemical Costs (over 20 years)				**$ 2,678,321**
	Equipment Costs (over 20 years)				**$ 25,500**
	Operator Time (over 20 years)				**$ 78,000**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 2,781,821**
		PRESENT WORTH CAPTITAL AND O&M			**$ 2,867,121**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Layout 1 - UV Plus Chlor/Dechlor Backup (River Discharge)

CLIENT:
Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 5,000	$ 5,000
2	Gates	2	EA	$ 3,500	$ 7,000
3	Concrete Chlorine Contact Chamber	50000	GAL	$ 2.8	$ 137,500
	(50,000 gallons, expandable)				
4	Building Enclosure (20 x 16)	320	SF	$ 200	$ 64,000
5	*Chlorine Tablet Feed Eqpt (Calc'd on other sheet)*	*1*	*LS*	*$ 36,500*	*$ 36,500*

Construction Subtotal	**$ 250,000**
Mobilization, Bonding, Administration (15%)	$ 37,500
Site Electrical, Controls and Testing (30%)	$ 86,300
Construction Total	**$ 373,800**
Engineering and Administration (25%)	$ 93,500
Construction Reserve Contingency (20%)	$ 74,800
Total	**$ 542,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Costs (annual) for UV System	129823	kW-Hr	**$0.07**	**$ 9,088**
2					
3					
	Power (over 20 years)				**$ 181,752**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 182,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 724,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Layout 2 - Modify Existing UV System with Full Redundency (River Discharge)

CLIENT:
Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 2,500	$ 2,500
2	New Skin on Existing Building (20 x 16)	320	SF	$ 150	$ 48,000
4	New 48" Piping Bypass to/from UV System (200 LF)	200	LF	$ 250	$ 50,000
5	Inlet Flow Splitter Box	1	LS	$ 10,000	$ 10,000
6	Gates	2	EA	$ 2,500	$ 5,000
7	Concrete	10	CY	$ 1,200	$ 12,000
13	New Control Panel	1	LS	$ 75,000	$ 75,000
14	Installation and Markup	1	LS	20%	$ 15,000
15	Backup Chlorine Tablet System (no contact tank)	1	LS	$ 36,500	$ 36,500

Construction Subtotal	**$**	**254,000**
Mobilization, Bonding, Administration (15%)	$	38,100
Site Electrical, Controls and Testing (30%)	$	87,600
Construction Total	**$**	**379,700**
Engineering and Administration (25%)	$	94,900
Construction Reserve Contingency (20%)	$	75,900
Total	**$**	**550,500**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Layout 3 - New UV System Relocated (River Discharge)

CLIENT:
Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 5,000	$ 5,000
2	New Building Expansion (20 x 30)	600	SF	$ 275	$ 165,000
3	Bridge Crane/Hoist	1	LS	$ 25,000	$ 25,000
4	New 48" Piping to/from UV System (150 LF)	150	LF	$ 250	$ 37,500
5	Inlet Flow Splitter Box	1	LS	$ 10,000	$ 10,000
6	Gates	6	EA	$ 2,500	$ 15,000
7	Concrete	26	CY	$ 1,200	$ 31,200
8	Outlet Flow Splitter Box	1	LS	$ 10,000	$ 10,000
9	Gates	8	EA	$ 2,500	$ 20,000
10	Concrete	26	CY	$ 1,200	$ 31,200
11	UV Concrete Channels	68	CY	$ 900	$ 61,200
12	Reuse and Relocate UV Panels and 8 UV Module Eqpt.	1	LS	$ 35,000	$ 35,000
13	New Module (1) and (2) New Control Panel	1	LS	$ 191,000	$ 191,000
14	Installation and Markup	1	LS	20%	$ 38,200
15	Backup Chlorine Tablet System (no contact tank)	1	LS	$ 36,500	$ 36,500

Construction Subtotal	**$**	**711,800**
Mobilization, Bonding, Administration (15%)	$	106,800
Site Electrical, Controls and Testing (30%)	$	245,600
Construction Total	**$**	**1,064,200**
Engineering and Administration (25%)	$	266,100
Construction Reserve Contingency (20%)	$	212,800
Total	**$**	**1,543,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Layout 4 - New Pressure UV System Relocated (River Discharge)

CLIENT:
Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 2,500	$ 2,500
2	New Building Expansion (20 x 30)	600	SF	$ 200	$ 120,000
3	*New 48" Piping to/from UV System*				
4	*(included elsewhere with Tertiary Filtration)*				
5	Mechanical Piping Header (48")	1	LS	$ 10,000	$ 10,000
6	Isolation valves (16")	12	EA	$ 2,200	$ 26,400
7	Mechanical Piping Per Vessel	6	EA	$ 2,500	$ 15,000
8	New UV Reactors with Independent Control Panel	6	EA	$ 123,500	$ 741,000
9	Installation and Markup	1	LS	20%	$ 148,200
15	Backup Chlorine Tablet System (no contact tank)	1	LS	$ 36,500	$ 36,500

Construction Subtotal	**$**	**1,099,600**
Mobilization, Bonding, Administration (15%)	$	164,900
Site Electrical, Controls and Testing (30%)	$	379,400
Construction Total	**$**	**1,643,900**
Engineering and Administration (25%)	$	411,000
Construction Reserve Contingency (20%)	$	328,800
Total	**$**	**2,384,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
New Class A Reuse UV System in New Relocated Structure

CLIENT:
Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Site Work	1	LS	$ 5,000	$ 5,000
2	New Building Expansion (20 x 30)	600	SF	$ 275	$ 165,000
3	Bridge Crane/Hoist	1	LS	$ 15,000	$ 15,000
4	New 48" Piping to/from UV System (150 LF)	150	LF	$ 250	$ 37,500
5	Inlet Flow Splitter Box	1	LS	$ 10,000	$ 10,000
6	Gates	6	EA	$ 2,500	$ 15,000
7	Concrete	26	CY	$ 1,200	$ 31,200
8	Outlet Flow Splitter Box	1	LS	$ 10,000	$ 10,000
9	Gates	8	EA	$ 2,500	$ 20,000
10	Concrete	26	CY	$ 1,200	$ 31,200
11	UV Concrete Channels	68	CY	$ 900	$ 61,200
12	Reuse and Relocate UV Panels and 8 UV Module Eqpt.	1	LS	$ 25,000	$ 25,000
13	New Module (6) and (2) New Control Panel	1	LS	$ 325,000	$ 325,000
14	Installation and Markup	1	LS	25%	$ 81,250

Construction Subtotal	**$ 832,400**
Mobilization, Bonding, Administration (15%)	$ 124,900
Site Electrical, Controls and Testing (40%)	$ 382,900
Construction Total	**$ 1,340,200**
Engineering and Administration (25%)	$ 335,100
Construction Reserve Contingency (20%)	$ 268,000
Total	**$ 1,943,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Costs (annual)	751608	kW-Hr	**$0.07**	**$ 52,613**
2					
3					
	Power (over 20 years)				**$ 1,052,251**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,052,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 2,995,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Phase I Outfall

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Permitting Public Involvement				
2	Joint Application for Permits (COE)	1	LS	$ 15,000	$ 15,000
3	Public Involvement	1	LS	$ 7,500	$ 7,500
4	Streambed sediment sampling for toxics	1	LS	$ 15,000	$ 15,000
5	Land and Easement Acquisition				$ -
6	Permanent Easement	1	LS	$ 48,800	$ 48,800
7	Temporary Construction Easement	1	LS	$ 36,500	$ 36,500
8	River Shoring and Dewatering	1	LS	$ 250,000	$ 250,000
9	WQ Monitoring and Mitigation	1	LS	$ 50,000	$ 50,000
10	Trenching (excavation, bedding, backfill)				$ -
11	River	113	LF	$ 500	$ 56,500
12	Steep Slope	96	LF	$ 300	$ 28,800
13	Standard	734	LF	$ 80	$ 58,720
14	Outfall Line Piping (30" C-905)	734	LF	$ 150	$ 110,100
15	Outfall Line Piping (30" C-51 DI)	209	LF	$ 165	$ 34,485
16	Valves and Steep Slope Pipe Thrust Restraint				$ -
17	Valves and Fittings	4	EA	$ 7,500	$ 30,000
18	Steep Slope Pipe Thrust Restraint	5	EA	$ 2,000	$ 10,000
19	River Diffuser				$ -
20	River Diffuser (Elbows and Tees)	1	LS	$ 42,000	$ 42,000
21	Installation (concrete encasement)	1	LS	$ 50,000	$ 50,000
22	Surface Restoration	943	LF	$ 25	$ 23,575
23	Outfall Line Effluent Monitoring Station	1	LS	$ 25,000	$ 25,000

Construction Subtotal	**$ 892,000**
Mobilization, Bonding, Administration (15%)	$ 133,800
Site Electrical, Controls and Testing (10%)	$ 89,200
Construction Total	**$ 1,115,000**
Engineering and Administration (25%)	$ 278,800
Construction Reserve Contingency (20%)	$ 223,000
Total	**$ 1,620,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Phase II Outfall

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Trenching (excavation, bedding, backfill)	1	LS	$ 51,200	$ 51,200
2	In Casing	262	LF	$ 125	
3	Standard	230	LF	$ 80	
4	Outfall Line Piping (30" C-905)	492	LF	$ 150	$ 73,800
5	Valves and Fittings	5	EA	$ 7,500	$ 37,500
6	Surface Restoration	230	LF	$ 25	$ 5,750

Construction Subtotal	**$**	**168,300**
Mobilization, Bonding, Administration (15%)	$	25,200
Site Electrical, Controls and Testing (30%)		-
Construction Total	**$**	**193,500**
Engineering and Administration (25%)	$	48,400
Construction Reserve Contingency (20%)	$	38,700
Total	**$**	**280,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Alternative 1 - Critical Infrastructure to Add Power Generation

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Hydropower Turbine Structure				
2	Mass Excavation and Backfill	1	LS	$ 30,000	$ 30,000
3	Structure Concrete	1	LS	$ 80,000	$ 80,000
4	Retaining Walls	1	LS	$ 40,000	$ 40,000
5	Mechanical from Mainline to Hydropower Turbine Structure				
6	Outfall Line Piping (30" C-51 DI)	80	LF	$ 165	$ 13,200
7	Trenching	80	LF	$ 100	$ 8,000
8	Surface Repair	80	LF	$ 25	$ 2,000
9	Valves and Fittings	4	EA	$ 5,000	$ 20,000
10	Electrical Feeder,& Conduit to WRF (wire included in Alt 2 later)	1	LS	$ 7,000	$ 7,000
11					
12					

Construction Subtotal	**$**	**200,200**
Mobilization, Bonding, Administration (15%)	$	30,000
Site Electrical, Controls and Testing (5%)	$	11,500
Construction Total	**$**	**241,700**
Engineering and Administration (25%)	$	60,400
Construction Reserve Contingency (20%)	$	48,300
Total	**$**	**350,000**

J-U-B ENGINEERS, INC.
7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:
Post Falls WRF Facility Plan

DATE:
November 1, 2011

PROJECT DESCRIPTION:
Alternative 2 - Power Generation Facilities

CLIENT:
City of Post Falls

CLIENT PROJ. NO. 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Complete Mechanical inside Hydropower Turbine Structure				
2	8" Piping and Fittings	1	LS	$ 50,000	$ 50,000
3	Isolation Valves and bypass valves	4	EA	$ 3,500	$ 14,000
4	Flow Control Valve (emergency bypass)	1	EA	$ 25,000	$ 25,000
5	Pelton Wheel Turbine (5 mgd capacity)	1	LS	$ 40,000	$ 40,000
6	Generator (included with turbine)				$ -
7	Electrical Feeder,& Conduit to WRF (wire included in Alt 2 later)	1	LS	$ 18,000	$ 18,000

Construction Subtotal	**$ 147,000**
Mobilization, Bonding, Administration (15%)	$ 22,100
Site Electrical, Controls and Testing (40%)	$ 67,600
Construction Total	**$ 236,700**
Engineering and Administration (25%)	$ 59,200
Construction Reserve Contingency (20%)	$ 47,300
Total	**$ 340,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Power Costs (Assumed 5 mgd (14kw) = Revenue				**($7,358)**
	Operator Time (Annual Man-Hours)	94	HR	**$35.00**	**$3,290**
	Power Revenue over 20 years				**($147,160)**
	Operator Time (over 20 years)				**$65,800**
	O&M Costs (20 Year Lifecycle) Subtotal				**($81,360)**

J-U-B ENGINEERS, INC.
7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **Post Falls WRF Facility Plan**

DATE: November 1, 2011

PROJECT DESCRIPTION: **Class A Reuse System on 618 (PF) + 314 Acres (Purchased From Rathdrum)**

CLIENT: **City of Post Falls**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Transmission Piping	24,000	LF	$175.00	$ 4,200,000
2	Pumping Station (to irrigation from WRF (3 @ 180 HP)	3	EA	$ 75,000	$ 225,000
3	Installation and Piping	3	EA	$ 50,000	$ 150,000
4	Building 15' x 15' per pump	675	SF	$ 300	$ 202,500
5	Irrigation System (Pivot)	832	ACRE	$ 1,200	$ 998,400
6	Irrigation System (Pivot)	100	ACRE	$ 1,200	$ 120,000
7	Monitoring Wells	8	EA	$ 50,000	$ 400,000
8	Monitoring Wells	4	EA	$ 50,000	$ 200,000
9	Soil Moisture Monitoring	16	EA	$ 10,000	$ 160,000
10	Soil Moisture Monitoring	6	EA	$ 10,000	$ 60,000
11	***Disinfection (Costs for Class A disinfection included in Disinfection Evaluation)***				
				Construction Subtotal	**$ 6,715,900**
				Mobilization, Bonding, Administration (12%)	$ 805,900
				Site Electrical, Controls and Testing (20%)	$ 1,504,400
				Construction Total	**$ 9,026,200**
				Engineering and Administration (25%)	$ 2,256,600
				Construction Reserve Contingency (20%)	$ 1,805,200
1	Land Acquisition	314	ACRE	$15,000	$ 4,710,000
				Total Capital	**$ 17,800,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	345039	kW-Hr	**$0.07**	**$ 24,153**
2					
3	Operator Time (Annual Man-Hours) (16 hrs/week)	832	HR	**$30.00**	**$ 24,960**
	Power Costs (over 20 years)				**$ 483,055**
	Equipment Costs (over 20 years)				**$ -**
	Operator Time (over 20 years)				**$ 499,200**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 982,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 18,782,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **Post Falls WRF Facility Plan**

DATE: November 1, 2011

PROJECT DESCRIPTION: **Class A Reuse System on 618 (PF), + 314 Purchased from Rathdrum + New 582 acres for total of 5.2 mgd capacity**

CLIENT: **City of Post Falls**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Transmission Piping	24,000	LF	$175.00	$ 4,200,000
2	Pumping Station (to irrigation from WRF (3 @ 180 HP)	3	EA	$ 75,000	$ 225,000
3	Installation and Piping	3	EA	$ 50,000	$ 150,000
4	Building 15' x 15' per pump	675	SF	$ 300	$ 202,500
5	Irrigation System (Pivot)	932	ACRE	$ 1,200	$ 1,118,400
6	Irrigation System (Pivot)	582	ACRE	$ 1,200	$ 698,400
7	Irrigation System (Pivot)	0	ACRE	$ 1,200	$ -
8	Irrigation System (Pivot)	0	ACRE	$ 1,200	$ -
9	Monitoring Wells	8	EA	$ 50,000	$ 400,000
10	Monitoring Wells	4	EA	$ 50,000	$ 200,000
11	Soil Moisture Monitoring	16	EA	$ 10,000	$ 160,000
12	Soil Moisture Monitoring	6	EA	$ 10,000	$ 60,000
13	***Disinfection (Costs for Class A disinfection included in Disinfection Evaluation)***				
				Construction Subtotal	**$ 7,414,300**
				Mobilization, Bonding, Administration (12%)	$ 889,700
				Site Electrical, Controls and Testing (20%)	$ 1,660,800
				Construction Total	**$ 9,964,800**
				Engineering and Administration (25%)	$ 2,491,200
				Construction Reserve Contingency (20%)	$ 1,993,000
1	Land Acquisition	896	ACRE	$15,000	$ 13,440,000
				Total Capital	**$ 27,890,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	748278	kW-Hr	**$0.07**	**$ 52,379**
2					
3	Operator Time (Annual Man-Hours) (16 hrs/week)	832	HR	**$30.00**	**$ 24,960**
	Power Costs (over 20 years)				**$ 1,047,589**
	Equipment Costs (over 20 years)				**$ -**
	Operator Time (over 20 years)				**$ 499,200**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,547,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 29,437,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **Post Falls WRF Facility Plan**

DATE: November 1, 2011

PROJECT DESCRIPTION: **Class A Reuse System on 618 (PF)+ 314 Purchased From Rathdrum (3.2 MGD) + New 2298 acres for total of 5.2 mgd capacity**

CLIENT: ***Assumes no River Discharge Retained***
City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1					
2	Transmission Piping	24,000	LF	$175	$ 4,200,000
3	Pumping Station (to irrigation from WRF (3 @ 180 HP)	3	EA	$ 75,000	$ 225,000
4	Installation and Piping	3	EA	$ 50,000	$ 150,000
5	Building 15' x 15' per pump	675	SF	$ 300	$ 202,500
6	Irrigation System (Pivot)	932	ACRE	$ 1,200	$ 1,118,400
7	Irrigation System (Pivot)	2,298	ACRE	$ 1,200	$ 2,757,600
8	Irrigation System (Pivot)	0	ACRE	$ 1,200	$ -
9	Irrigation System (Pivot)	0	ACRE	$ 1,200	$ -
10	Monitoring Wells	8	EA	$ 50,000	$ 400,000
11	Monitoring Wells	4	EA	$ 50,000	$ 200,000
12	Soil Moisture Monitoring	16	EA	$ 10,000	$ 160,000
13	Soil Moisture Monitoring	6	EA	$ 10,000	$ 60,000
14	Storage (7 days, 3.2 mgd)	22.4	MG	$ 30,000	$ 672,000
15	Storage (7 days, 2mgd)	14	MG	$ 30,000	$ 420,000
16	210 days non growing season storage	1092	MG	$ 25,000	$ 27,300,000
17	***Disinfection (Costs for Class A disinfection included in Disinfection Evaluation)***				
				Construction Subtotal	**$ 37,865,500**
				Mobilization, Bonding, Administration (12%)	$ 4,543,900
				Site Electrical, Controls and Testing (15%)	$ 6,361,400
				Construction Total	**$ 48,770,800**
				Engineering and Administration (25%)	$ 12,192,700
				Construction Reserve Contingency (20%)	$ 9,754,200
1	Land Acquisition	2,612	ACRE	$15,000	$ 39,180,000
				Total Capital	**$ 109,900,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	1631997	kW-Hr	**$0.07**	**$ 114,240**
2					
3	Operator Time (Annual Man-Hours) (16 hrs/week)	832	HR	**$30.00**	**$ 24,960**
	Power Costs (over 20 years)				**$ 2,284,796**
	Equipment Costs (over 20 years)				**$ -**
	Operator Time (over 20 years)				**$ 499,200**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 2,784,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 112,684,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **Post Falls WRF Facility Plan**

DATE: November 1, 2011

PROJECT DESCRIPTION: **WRF and Public Works Property Demonstration Projects**

CLIENT: **City of Post Falls**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Irrigation Pumping Station (1 @ 15 HP)	1	EA	$15,000	$ 15,000
2	Installation and Mechanical Piping	1	LS	$15,000	$ 15,000
3	Transmission Piping	500	LF	$40.00	$ 20,000
4	Irrigation System (Buried Subsurface Rotary Heads)	12	ACRE	$ 3,000	$ 36,000
5	***Disinfection (improvements not required for Class C or D)***				

Construction Subtotal	**$ 86,000**
Mobilization, Bonding, Administration (12%)	$ 10,300
Site Electrical, Controls and Testing (20%)	$ 19,300
Construction Total	**$ 115,600**
Engineering and Administration (25%)	$ 28,900
Construction Reserve Contingency (20%)	$ 23,100
Total Capital	**$ 167,600**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Services Contract For The

Transportation and Composting of Biosolids

And Other Related Services

1. Parties. The Parties to this Service Contract (Contract) are the City of Post Falls, Idaho (Post Falls or Generator), a joint powers entity formed under Idaho Code 67-2328 (Generator), and Barr-Tech LLC, a Washington Limited Liability Company (Barr-Tech). Barr-Tech operates a Composting Beneficial Use Facility, as defined in WAC 173-308-080.

2. Biosolids Production and Use. The Parties acknowledge and agree that (a) the Generator produces wastewater sludge in the form of biosolids (biosolids) as a by-product of its wastewater treatment processes; and (b) the Generator desires that its biosolids be used beneficially as defined by WAC 173-350-100, i.e., in a manner that does not pose a threat to human health or the environment.

3. Contract to Transport and Compost Biosolids Beneficially. In consideration of the mutual promises and covenants in this Contract, and on the terms and conditions of this Contract, Barr-Tech agrees to receive, transport, and compost Generator's biosolids.

4. Scope of Services. Barr-Tech will accept and transport biosolids generated by Generator to the Barr-Tech composting site. All management and operational activities of the biosolids composting will be the responsibility of Barr-Tech and coordinated through the following person:

Scott Deathridge
Operations Manager,
Phone Number 509-590-0437
Email: Scottd@Barr-tech.com

5. Barr-Tech Services. With respect to any biosolids tendered by the Generator to Barr-Tech shall:

a. Load Generator's biosolids at Generator's facilities using Generator's loading equipment and transport the Generator biosolids to Barr-Tech facilities or other locations for beneficial use through composting of the biosolids, which may

include use thereof on agricultural lands, generally in Washington as a nutrient based soil amendment or compost ingredient;

b. Provide and furnish at Barr-tech's cost and expense, all materials, machinery, equipment, tools, superintendence, labor, insurance and other accessories and services necessary to provide the beneficial use services in strict conformance with the conditions and prices stated in this Contract;

c. Collect and test all necessary soil samples on biosolids compost;

d. Provide information to complete all required biosolids reports, annual or otherwise, related to composting as required by any governing agency, including, but not limited to, the State of Washington Department of Ecology, State of Idaho and the United States Environmental Protection Agency;

e. Obtain and maintain in good standing all applicable and necessary permits, licenses and approvals of any federal, state, and local government, including and especially a permit to operate a Beneficial Use Facility from the Washington State Department of Ecology;

f. Provide copies of the above data, tests and reports to the Generator to document compliance;

g. Barr-Tech shall operate the Beneficial Use Facility to meet all governing agency requirements, including, but not limited to, the State of Washington Department of Ecology and the United States Environmental Protection Agency as well as WAC 173-308.

h. Pay all costs for mobilization, demobilization, transportation, and composting. This will include all cost associated to fuel, labor, repairs, maintenance, permit fees, insurance and other associated costs.

i. Biosolids will be picked up by Barr-Tech or assigned common carrier at the Generator's facility during the hours of 7:30 a.m. and 3:00 p.m., Monday through Friday with at least a twenty-four (24) hour notice given between the Generator and Barr-Tech. Once the Generator has given Barr-Tech notice for biosolids pick up, Barr-Tech will pick up the Generator biosolids within seventy- two (72) hours.

j. Barr-Tech shall use a Barr-Tech Facility truck scale to determine the weight of biosolids in each load. Barr-Tech will provide the Generator a copy of the truck scale weights. Barr-Tech will provide proof of third-party certification of scale accuracy upon the request of Generator.

k. Barr-Tech will provide an annual report to Generator for the biosolids Barr-Tech has received. The annual report shall include the wet tons of biosolids processed for the calendar year. The annual biosolids report shall be submitted to Generator office by January 31.

l. Contractor shall notify Generator in writing within thirty (30) calendar days after the annual Contract anniversary date of those holidays that Barr-Tech will not work or pick up biosolids for that year.

m. Title to all biosolids shall pass to Barr-Tech at the time and point of pickup at Generator's wastewater plant location. Barr-Tech shall dispose of all wastes picked up under this Contract. Barr-Tech is permitted to combine Generator's biosolids with any and all other sewage and industrial biosolids, or other organic matter provided such combination does not violate any law or regulation.

6. Tender of Biosolids. The Generator will regularly tender its biosolids to Barr-Tech. With respect to any biosolids tendered by the Generator to Barr-Tech, the Generator shall:

a. Dewater the biosolids and provide loading equipment at Generator's facility for Barr-Tech's use to properly and evenly load the biosolids into transport vehicles provided by Barr-Tech;

b. Prior to tender, test the tendered biosolids in accordance with testing procedures that are required by any applicable federal, state, and local law and regulations and provide Barr-Tech all information required by law or that otherwise is necessary for Barr-Tech to use and compost the biosolids in a safe, consistent, and reliable manner. Such information may include test results that show on a dry weight basis, the level of trace metals and pathogens for which testing is required, the percentage of solids by weight, and nitrogen content as expressed in terms of total Kjeldahl nitrogen (TKN), ammonium or ammonia and nitrates and nitrites.

c. Generator is not obligated to provide any minimum amount of wastewater biosolids to Barr-Tech.

7. Barr-Tech Warranties. Barr-Tech warrants and represents that it has sufficient facilities, equipment, and personnel, who are sufficiently trained, skilled, knowledgeable, and experienced, to perform all functions that are reasonably necessary to lawfully and effectively transport biosolids, operate a beneficial use facility and compost biosolids in a beneficial manner. Barr-Tech warrants that its equipment and facilities are and will be maintained in a safe condition, and that they are and will be fit for the particular purposes

for which they are used or operated. Barr-Tech warrants that its personnel will work in a prudent and workmanlike manner. In addition, Barr-Tech warrants that it has a permit to operate a Beneficial Use Facility from the Washington State Department of Ecology, and that it shall maintain the permit in good standing. In the event Barr-Tech's permit is suspended or revoked for any reason without having other permitted options available for biosolids composting, Barr-Tech shall notify the Generator within 48 hours of the time of suspension or revocation and the Generator/Composter shall have the option of terminating this Agreement immediately.

8. Initial Term and Renewal Term. This contract extends beyond one fiscal year and is subject to approval of the annual biosolids disposal budgets by the City of Post Falls City Council. The initial term of this Agreement shall commence on the later of the date when both Parties have executed this Contract (Effective & Start Date), and shall expire on the fifth (5th) anniversary of the Effective Date (Initial Term), unless terminated earlier as provided in this Contract.

After the Initial Term, this contract shall automatically renew for two (2) consecutive five (5) year terms under the same terms and conditions of the contract, or amendments thereto.

9. Compensation for Services. The Generator shall pay Barr-Tech a base fee plus a fuel adjustment for diesel fuel price per wet ton of biosolids. The initial Contract base biosolids fee will be $65.00 per biosolids wet ton. The diesel fuel price will be based on the U.S. Department of Energy-Energy Information Administration Weekly Retail On-Highway Diesel Prices for the West Coast region.

Compensation shall be based on wet ton for each scaled ton of biosolids tendered by the Generator to Barr-Tech. Barr-Tech may provide scales on site to maximize tonnage per load.

10. Adjustment of Compensation. In January of each year, except January, 2012, of this Contract, the base compensation amount will be adjusted on the basis of changes in the previous annual CPI for Urban Wage Earners and Clerical Workers for the Seattle-Tacoma-Bremerton Area (CPI-STBA). The Contract initial CPI-STBA for 2011 is 226.693. Succeeding annual adjustments will be made based on the previous year annual average. Any adjustment based on the CPI shall occur only in whole cents. Specifically, any adjustment shall be rounded down to the nearest whole cent. In the event the parties cannot reach a mutually agreeable compensation adjustment, either party may exercise its right to terminate this Agreement in accordance with paragraph 20(a). During the 180 day termination period of Paragraph 20.b, the compensation amounts shall not change. For example, the 2009 CPI-STBA was 226.026. The 2010 CPI-STBA of 226.693 was a

0.30% increase over 2009. If applied to a $65 base fee, the new base fee would be $65.19 per ton.

In addition to the Fee, the Generator shall pay Contractor, or Contractor shall credit Generator a fuel adjustment, which shall be indexed on a diesel fuel price, West Coast, of $4.107 per gallon, and based upon the U.S. Department of Energy-Energy Information Administration Weekly Retail On-Highway Diesel Prices for the West Coast region (the "Fuel Adjustment"). The Fuel Adjustment will be based upon the monthly price of diesel fuel as it deviates from $4.107/gal in ten-cent increments. ($4.00, $4.20, etc). The adjustment will be the percent increase or decrease of diesel fuel price relative to $4.107/gallon multiplied by 10 percent times the tonnage fee. An example of fuel adjustments follow:

Fuel $	% Change	Adjustment	Rate	
$3.80	-7.48%	$0.49	$64.51	
3.90	-5.04	0.33	64.67	
4.00	-2.61	0.17	64.83	
4.107 $65			65.00	computed on a base fee of
4.20	+2.26	0.15	65.15	
4.30	+4.70	0.31	65.31	
4.40	+7.13	0.46	65.46	

The above calculation will be made as of the last day of each month and the rate computed will be the base fee for the following month.

11. Billing. Barr-Tech shall provide to the Generator, a monthly invoice or billing statement that details the services that it has provided hereunder, including the amount of the Generator's biosolids received by Barr-Tech during the billing period and year to date, relevant load scale documentation, and any other information that the Generator may reasonably require.

12. Payment. The Generator shall pay to Barr-Tech the above-identified compensation within forty-five (45) days after Barr-Tech provides an invoice for such services to the Generator. Any payment not made when due shall accrue interest at the rate of one percent (1%) per month or the highest rate permitted by applicable law, whichever is less.

All amounts payable under this Contract are denominated in United States dollars and the Generator shall pay all amounts payable under this Contract in lawful money of the United States. All payments shall be subject to adjustment for any amounts, upon audit or otherwise, determined to have been improperly invoiced.

13. Taxes. Each Party shall be responsible for the payment of all taxes of whatever nature and source, to the extent that each Party is responsible for the payment of any such taxes pursuant to law.

14. Notices. All notices required under this Contract shall be personally delivered or mailed by certified mail, postage prepaid to the following address or to such other address as either party shall specify in a written notice so given:

Contractor:

Barr-Tech, LLC
Ted Condon, Owner
9117 Kallenberger Road North
Sprague, WA 99032
509-496-1111
ted@americanonsite.net

Generator:

City of Post Falls
Erik Keck, City Administrator
408 N Spokane Street
Post Falls, ID 83854
(208) 773-3511
ekeck@postfallsidaho.org

15. Safety. Barr-Tech shall comply with all applicable safety rules and regulations adopted by the United States Department of Labor Occupational Safety and Health Administration (OSHA) or the Industrial Commission of the State of Washington, whichever is most restrictive. The Generator assumes no duty to insure that Barr-Tech follows the safety regulations issued by OSHA.

16. Regulations, Orders and Conditions. Barr-Tech shall comply with all applicable state, federal, or local laws, regulations, rules, or any other sources of authority, including, but not limited to, court orders, administrative rulings, the regulations in WAC 173-308 and 40 CFR Part 503, the conditions of any applicable beneficial use permit, and so forth.

17. Insurance. Throughout the term of this agreement, Barr-Tech shall obtain and maintain sufficient levels of liability insurance for bodily injury, death and property damage, and any other insurance that is reasonably necessary to effectuate the purpose of this Contract when required by the Generator. Such liability insurance coverage shall extend to or cover the Generator events related to this Contract with Barr-Tech.

a. Minimum Scope of Insurance. Barr-Tech shall obtain insurance of the types described below:

i. Automobile Liability insurance covering all owned non-owned, hired and leased vehicles. Coverage shall be written on Insurance Services Office (ISO) form CA00 01 or a substitute form that provides equivalent liability coverage. If necessary, the policy shall be endorsed to provide contractual liability coverage.

ii. Commercial General Liability insurance shall be written on ISO occurrence form CG 00 01 and shall cover liability arising from premises, operations, independent contractors, products-completed operations, stop gap liability, personal injury and advertising injury, and liability assumed under an insured contract. The Commercial General Liability insurance shall be endorsed to provide the Aggregate per Project Endorsement ISO form CG 25 03 11 85. There shall be no endorsement or modification of the Commercial General Liability insurance for liability arising from explosion, collapse or underground property damage. The Generator shall be named as an insured under Barr-Tech's Commercial General Liability insurance policy using ISO Additional Insured endorsement CG 20 10 10 01 and Additional Insured-Completed Operations endorsement CG 20 37 10 01 or substitute endorsements providing equivalent coverage.

b. Minimum Amounts of Insurance. Barr-Tech shall maintain the following insurance limits:

i. Automobile Liability insurance with a minimum combined single limit for bodily injury and property damage of $500,000 per accident.

ii. Commercial General Liability insurance shall be written with limits no less than $1,000,000 for each occurrence, $1,000,000 general aggregate and a $1,000,000 products-completed operations aggregate limit.

c. Other Insurance Provisions. The insurance policies are to contain, or be endorsed to contain, the following provisions for Automobile Liability and Commercial General Liability insurance:

i. Barr-Tech's insurance coverage shall be primary insurance as respect the Generator. Any insurance that might cover this Contract which is maintained by the Generator shall be in excess of Barr-Tech's insurance and shall not contribute with Barr-Tech's insurance.

ii. Barr-Tech's insurance shall be endorsed to state that coverage shall not be cancelled by either party, except after delivery of thirty (30) days prior written notice by certified mail, return receipt requested, to the Generator.

d. Workers Compensation. Barr-Tech shall procure and maintain, at its own expense, during the term of this Contract, in accordance with the provisions of the laws of the State of Washington, Workmen's Compensation Insurance, including occupational disease provisions for all of its employees engaged in work under this Contract and in the case that any work is sublet, the Contractor shall require such subcontractor similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all the latter's employees unless such employees are covered by the protection afforded by the Contractor. In case any class of employees engaged in hazardous work under this Contract is not protected under Workmen's Compensation statute, the Contractor shall provide, and shall cause each subcontractor to provide adequate and suitable insurance for the protection of its employees not otherwise protected. Proof of such coverage shall be provided to the Generator.

18. Force Majeure. Neither Party shall be liable to the other for, or be considered to be in breach of or default under this Contract because of, any delay or failure in performance by such Party under this Contract to the extent such delay or failure is due to any cause or condition beyond such Party's reasonable control, including, but not limited to, failure or threat of failure of facilities or equipment; fire, lightning, flood, earthquake, volcanic activity, wind, drought, storm and other acts of the elements; court order and act, or failure to act, of civil, military or governmental authority; strike, lockout and other labor dispute; epidemic, riot, insurrection, sabotage, war and other civil disturbance or disobedience; labor or material shortage; and act or omission of any person or entity (other than such Party, its contractors or suppliers of any tier or anyone acting on behalf of such Party). Each Party shall exercise reasonable diligence to overcome the cause of such delay; provided, however, that to the extent the cause of such delay arises from any breach of, or failure by the other Party to perform any of its obligations under this Agreement, the costs and expenses incurred by the Party that has delayed or failed in its performance under this Contract to overcome the cause of such delay shall be for the account of such other Party. Nothing contained in this Contract shall be construed to require either Party to prevent or settle any strike, lockout or other labor dispute in which it may be involved. Notwithstanding the foregoing, nothing in this paragraph shall apply to any delay or failure by either Party to pay any amounts due and owing to the other Party pursuant to this Agreement.

19. Material Change in Circumstances. If a material change in circumstances occurs, such as, but not limited to, a change in operating costs, applicable law, licensing or permitting requirements, or a change that results from decisions of tribunals, either judicial or administrative, and such change materially impacts the costs of transportation, storage, land application or other aspects of the beneficial use of the Generator's

biosolids, then the Parties may renegotiate the affected provisions in this Contract. The parties shall negotiate in good faith; however any modifications of this Contract shall occur only by mutual agreement of both parties.

20. Termination.

a. Termination for Breach or Default. If either Party commits a material breach of or default under this Contract, then the Non-Breaching Party may give the Breaching Party written notice of the breach or default (including a statement of the facts relating to the breach or default and the provisions of this Contract that are applicable to such breach or default). If the Breaching Party fails to cure the specified breach or default within thirty (30) days after receipt of such notice (or such later date as may be specified in such notice), then the Non-Breaching Party may elect to immediately terminate this Agreement. If the Generator or Barr-Tech purports to terminate or cancel all or any part of this Contract for the other Party's breach or default when the other Party is not in breach or default that would permit such termination or cancellation, such termination or cancellation shall be deemed to have been a Termination Without Cause by the Generator or Barr-Tech, as the case may be, and the rights of the Parties shall be determined accordingly.

b. Generator may terminate this Contract with one hundred eighty (180) days written notice to Barr-Tech if it is determined by Generator that this Contract is no longer in the best interest of the Generator, however this provision does not apply to the initial five-year term of the contract. The earliest date that written notice may be made is one hundred eighty (180) days prior to the fifth (5th) anniversary of the Effective Date (Initial Term) of this Contract.

21. Indemnification. Barr-Tech will defend, protect, indemnify and hold harmless the Generator its officers, directors, agents, employees and invitees from and against any and all liability, claims, demands, losses and expenses of every kind and description including, without limitation, attorney's fees, caused by arising out of, resulting from, or in any way incidental to the performance of this Contract, provided that any such liability, claim, demand, damage, loss or expense is attributable to or caused in whole or in part by any wrongful intentional act or by the negligent act or omission of Barr-Tech, anyone directly or indirectly employed by or otherwise associated with Barr-Tech or is caused in whole or in part by Barr-Tech's failure to perform its obligations under this Contract. Barr-Tech assumes potential liability for actions brought by its own employees against the generator and solely for the purpose of this indemnification and defense; Barr-Tech waives any immunity under Washington State industrial insurance laws, RCW Title 51. This waiver was the subject of mutual negotiation.

Likewise, to the extent possible allowed by law and without waiving any defenses or protection under statutory or common law immunities, the Generator will defend, protect, indemnify and hold harmless Barr-Tech its members, officers, directors, agents, employees and invitees from and against any and all liability, claims, demands, losses and expenses of every kind and description including, without limitation, attorney's fees, caused by, arising out of, resulting from, or in any way incidental to the performance of this Contract, provided that any such liability, claim, demand, damage, loss or expense is attributable to or caused in whole or in part by any wrongful intentional act or by the negligent act or omission of the Generator, anyone directly employed by (excluding Barr-Tech its officers, directors, agents and employees) the Generator or is caused in whole or in part by the Generator's failure to perform its obligations under this contract.

22. Governing Law. The obligations of each Party under this Contract shall in all respects, including all matters of construction, validity and performance, be governed by and construed in accordance with the laws of the State of Idaho, without reference to any rules governing conflict of laws, except to the extent such laws may be preempted by the laws of the United States of America.

23. Venue. The venue for any action that arises from or out of this Contract shall be the Kootenai County, Idaho.

24. Severability. The invalidity or unenforceability of any provision of this Contract shall not affect the other provisions hereof, and this Contract shall be construed in all respects as if such invalid or unenforceable provisions were omitted, unless such invalidity or unenforceability destroys the purpose and intent of this Agreement.

25. Independent Contractor, No Partnership. As between Barr-Tech and the Generator, Barr-Tech shall maintain full and complete control and responsibility for its services and the performance thereof; provided, however, the services contemplated herein shall be subject to the Generator's general rights of direction and must be approved in advance by the Generator. Notwithstanding the foregoing, the Barr-Tech acknowledges and agrees that it is dealing with the Generator as an independent contractor. Nothing contained in this Contract shall be interpreted as constituting either Party as the joint venture, agent, employee, franchisee or partner of the other Party or as conferring upon either Party the power of authority to bind the other Party in any transaction with third parties. Employees or contractors of Barr-Tech are not employees of the Generator and such employees are not entitled to any of the benefits the Generator provides to its employees. Barr-Tech shall be solely and entirely responsible for the acts of its employees during the performance of this Contract and shall provide at its sole expense all materials, equipment and facilities, and other necessities to perform its duties under this Agreement, unless otherwise specified in writing. All rights and obligations of

the Parties under this Contract are intended to be several, not joint or, collective, and neither Party shall be jointly or severally liable for the acts, omissions or obligations under this Contract of the other Party.

26. Subcontracting. Barr-Tech may subcontract or delegate performance of its services hereunder to any entity, including any Barr-Tech subsidiary or related company, or common carrier without prior written authorization from the Generator. Any such delegation or subcontracting shall not relieve Barr-Tech of its obligation to perform in accordance with the provisions of this Agreement.

27. Non-Waiver. A party's failure to strictly enforce its rights under any provision of this Contract shall not be construed to be a waiver of that provision. No waiver of any breach of this Contract shall be held to be a waiver of any other breach.

28. No Third Party Beneficiary. This Contract is entered into solely for the benefit of the parties hereto. This Contract shall confer no benefits, direct or indirect, on any third persons, including employees of the parties. No person or entity other than the parties themselves may rely upon or enforce any provision of this Contract.

29. Assignment. Neither Party shall voluntarily assign or otherwise transfer any of its rights, interests or obligations in, to or under this Contract without the prior written consent of the other Party.

30. Cumulative Rights. The rights and remedies of each Party set forth in any provision of this Contract are in addition to and do not in any way limit any other rights or remedies afforded to such Party by law.

31. Survival. The obligations of the Parties under the provisions of this Contract that may reasonably be interpreted or construed as surviving the completion, termination or cancellation of this Contract shall survive the completion, termination or cancellation of this Agreement.

32. Entire Contract, Amendment. This Contract constitutes the entire agreement between the parties concerning the subject matter hereof and supersedes any and all other communications, representations, proposals, understandings or agreements, either written or oral, between the parties with respect to such subject matter. No amendment or modification of any provision of this Contract shall be valid unless set forth in a written amendment to this Agreement. This Contract may be amended only with the express written consent of both of the Parties and no provision of this Contract shall be varied or contradicted by any oral agreement, course of dealing or performance or any other matter not set forth hereafter in a written agreement signed by both of the Parties.

33. Counterparts. This Contract may be executed in any number of counterparts, each of which so executed shall be deemed to be an original, and such counterparts together shall constitute one and the same instrument.

This contract is APPROVED by the undersigned parties, representing that they have the legal authority to bind their respective entities.

CONTRACTOR
BARR-TECH, LLC

Ted Condon, Owner

Date: 11/28/11

GENERATOR
CITY OF POST FALLS

Mayor Clay Larkin

Clay Larkin, Mayor

Date: 12/6/11

CITY OF POST FALLS INCORPORATED POST FALLS MAY 25, 1892 IDAHO

ATTEST:

Charity Cynova, City Clerk

Biosolids Management Alternatives: Ranking Worksheet

Name:

Date:

Instructions:

This ranking and scoring method is intended to help you scrutinize each alternative against the criteria that were considered important by the group. Sometimes this analytical method of ranking can produce a different result than your "gut feeling" because it lets you emphasize criteria that are more important to you.

If you do not wish to use this method you can simply rank each alternative by writing 1 through 6 above each alternative. Use 1 = worst to 6 = best.

Instructions:

1. Assign a weighting factor to each criteria. The weighting factor lets you assign more weight to a criteria that you consider to be more important.
Each criteria starts with a weighting factor of 1.0. You can go up or down from 1.0.
If you want to emphasize the importance of the criteria, increase the weighting factor.
A weighting factor of 1.1 means that you consider that criteria to be 10% more important than a criteria with a weight of 1.0
A weighting factor of 2.0 means that you consider that criteria to be twice as important than a criteria with a weight of 1.0
Weighting factors less than 1.0 decrease the importance of that criteria.
If a criteria has no influence on your selection of an alternative, you can give it a weighting factor of 0.0

2. Rank each alternative from 1 to 10: 1 = worst, 5 = average, 10 = best.
Alternatives can have the same rank if you consider them equal.

3. The cost of each alternative has been ranked for you. The cost ranking has been normalized so that the relative difference is considered.

Mike Neher, Scot and Mike Conn

Criteria	Weighting Factor	Alternative 1 Current Operation	Alternative 2 Aerobic Digestion	Alternative 3 Lime Stabilization	Alternative4 Heat Drying	Alternative 5 Composting	Alternative 6 Anaerobic Digestion
Does this alternative allow us to control our own destiny?	4	16	20	4	8	12	24
Cost	1	4.1	3.4	2.1	2.5	1.3 (most expensive)	5.0 (least expensive)
Odors and impacts to surrounding neighbors	3	12	15	3	6	9	18
Ability to provide a long term solution	3	12	15	3	6	9	18
Compatibility with BNR process currently operated at the treatment plant	2	8	10	2	4	6	12
Ease with which the ultimate product can be disposed	1	4	5	1	2	3	6
		56.1	68.4	15.1	28.5	39	78
		4	5	1	2	3	6

Dick's 1st

Criteria	Weighting Factor	Alternative 1 Current Operation	Alternative 2 Aerobic Digestion	Alternative 3 Lime Stabilization	Alternative4 Heat Drying	Alternative 5 Composting	Alternative 6 Anaerobic Digestion
Does this alternative allow us to control our own destiny?	2	4	3	1	6	5	2
Cost	1	4.1	3.4	2.1	2.5	1.3 (most expensive)	5.0 (least expensive)
Odors and impacts to surrounding neighbors	3	4	3	1	6	5	2
Ability to provide a long term solution	3	2	3	1	6	5	2
Compatibility with BNR process currently operated at the treatment plant	2	4	3	1	5	6	1
Ease with which the ultimate product can be disposed	2	4	3	1	5	6	1
		22.1	18.4	7.1	30.5	27	8
		4	3	1	6	5	2

Dick's 2nd

Criteria	Weighting Factor	Alternative 1 Current Operation	Alternative 2 Aerobic Digestion	Alternative 3 Lime Stabilization	Alternative4 Heat Drying	Alternative 5 Composting	Alternative 6 Anaerobic Digestion
Does this alternative allow us to control our own destiny?	1.2	5	2	1	10	2	3
Cost	1	4.1	3.4	2.1	2.5	1.3 (most expensive)	5.0 (least expensive)
Odors and impacts to surrounding neighbors	3	5	5	5	5	5	5
Ability to provide a long term solution	2	5	2	1	10	5	5
Compatibility with BNR process currently operated at the treatment plant	1.5	5	5	5	8	5	1
Ease with which the ultimate product can be disposed	2	5	5	1	10	5	5
		29.1	22.4	15.1	45.5	22	19
		5	4	1	6	3	2

Criteria	Weighting Factor	Alternative 1 Current Operation	Alternative 2 Aerobic Digestion	Alternative 3 Lime Stabilization	Alternative4 Heat Drying	Alternative 5 Composting	Alternative 6 Anaerobic Digestion
Mike Neher		4	5	1	2	3	6
Scott		4	5	1	2	3	6
Mike C		4	5	1	2	3	6
Dick's 2nd		5	4	1	6	3	2
total		17	19	4	12	12	20

Biosolids Management Alternatives: Ranking Worksheet

Name:

Date:

Instructions:

This ranking and scoring method is intended to help you scrutinize each alternative against the criteria that were considered important by the group. Sometimes this analytical method of ranking can produce a different result than your "gut feeling" because it lets you emphasize criteria that are more important to you.

If you do not wish to use this method you can simply rank each alternative by writing 1 through 6 above each alternative. Use 1 = worst to 6 = best.

Instructions:

1. Assign a weighting factor to each criteria. The weighting factor lets you assign more weight to a criteria that you consider to be more important.
Each criteria starts with a weighting factor of 1.0. You can go up or down from 1.0.
If you want to emphasize the importance of the criteria, increase the weighting factor.
A weighting factor of 1.1 means that you consider that criteria to be 10% more important than a criteria with a weight of 1.0
A weighting factor of 2.0 means that you consider that criteria to be twice as important than a criteria with a weight of 1.0
Weighting factors less than 1.0 decrease the importance of that criteria.
If a criteria has no influence on your selection of an alternative, you can give it a weighting factor of 0.0

2. Rank each alternative from 1 to 10: 1 = worst, 5 = average, 10 = best.
Alternatives can have the same rank if you consider them equal.

3. The cost of each alternative has been ranked for you. The cost ranking has been normalized so that the relative difference is considered.

Criteria	Weighting Factor	Alternative 1 Current Operation	Alternative 2 Aerobic Digestion	Alternative 3 Lime Stabilization	Alternative4 Heat Drying	Alternative 5 Composting	Alternative 6 Anaerobic Digestion
Does this alternative allow us to control our own destiny?							
Cost		4.1	3.4	2.1	2.5	1.3 (most expensive)	5.0 (least expensive)
Odors and impacts to surrounding neighbors							
Ability to provide a long term solution							
Compatibility with BNR process currently operated at the treatment plant							
Ease with which the ultimate product can be disposed							

	Sludge Thickening	Digection			Dewatering				Processes to further Stabilize			Final disposal	Total	Normalized Cost Rank
	Gravity Belt Thickener	Holding tank (no digestion)	Aerobic digestion	Anaerobic Digestion	Belt Filter Press	Screw Press	Centrifuge	Electro-Kinetic enhancement	Alkali Stabilization	Heat Drying	Composting	Contracted Disposal	Total	
Alternative 1 Current Operation	$ 473,580	$ 1,160,000			$ 1,097,000							$ 12,440,000	$ 15,170,580	4.0
Alternative 2 Aerobic Digestion	$ 473,580		$ 11,240,000		$ 1,097,000							$ 4,730,000	$ 17,540,580	3.4
Alternative 3 Lime Stabilization	$ 473,580		$ 11,240,000		$ 1,097,000				$ 8,542,000			$ 7,830,000	$ 29,182,580	2.1
Alternative 4 Heat Drying	$ 473,580		$ 11,240,000		$ 1,097,000					$ 10,290,000		$ 1,300,000	$ 24,400,580	2.5
Alternative 5 Composting	$ 473,580				$ 1,097,000						$ 28,816,000	$ 18,253,000	$ 48,639,580	1.2
Alternative 6 Anaerobic Digestion	$ 473,580			$ 6,960,000	$ 1,097,000							$ 3,560,000	$ 12,090,580	5.0

Belt filter Press estimate				
Post Falls Facilities Plan 20-11-022				
Date:				
By STK				
Inputs:				
	Qty	Unit	Unit cost	Cost
Huber RoS3	3	ls	$ 225,000	$ 675,000
Huber dewatered sludge screw conveyor	1	ls	$ 70,000	$ 70,000
feed pumps	1	ls	$ 30,000	$ 30,000
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 793,000
Installation	1	%	15%	$ 118,950
Site work and piping	$ 1	%	10%	$ 79,300
Electrical and instrumentation	$ 1	%	20%	$ 158,600
Subtotal				$ 1,149,850
Contractor markup	$ 114,985	%	10%	$ 11,499
Construction total				$ 1,161,349
Bonding, Administration	$ 1,161,349	%	12%	$ 139,362
Engineering and Administration	$ 1,161,349	%	25%	$ 290,337
Contingency	$ 1,161,349	%	20%	$ 232,270
Total capital costs	(present worth)			**$ 1,823,000**

Belt filter Press estimate				
Post Falls Facilities Plan 20-11-022				
Date:				
By STK				
Inputs:				
	Qty	Unit	Unit cost	Cost
Andritz D7L centrifiuge	1	ls	$ 787,000	$ 787,000
sludge conveyor	1	ls	$ 90,000	$ 90,000
feed pumps	1	ls	$ 30,000	$ 30,000
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 925,000
Installation	1	%	15%	$ 138,750
Site work and piping	$ 1	%	10%	$ 92,500
Electrical and instrumentation	$ 1	%	20%	$ 185,000
Subtotal				$ 1,341,250
Contractor markup	$ 134,125	%	10%	$ 13,413
Construction total				$ 1,354,663
Bonding, Administration	$ 1,354,663	%	12%	$ 162,560
Engineering and Administration	$ 1,354,663	%	25%	$ 338,666
Contingency	$ 1,354,663	%	20%	$ 270,933
Total capital costs	(present worth)			**$ 2,127,000**

Belt filter Press estimate				
Post Falls Facilities Plan 20-11-022				
Date:				
By STK				
Inputs:				
	Qty	Unit	Unit cost	Cost
2m BDP belt filter press	1	ls	$ 339,000	$ 339,000
sludge conveyor	1	ls	$ 90,000	$ 90,000
feed pumps	1	ls	$ 30,000	$ 30,000
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 477,000
Installation	1	%	15%	$ 71,550
Site work and piping	$ 1	%	10%	$ 47,700
Electrical and instrumentation	$ 1	%	20%	$ 95,400
Subtotal				$ 691,650
Contractor markup	$ 69,165	%	10%	$ 6,917
Construction total				$ 698,567
Bonding, Administration	$ 698,567	%	12%	$ 83,828
Engineering and Administration	$ 698,567	%	25%	$ 174,642
Contingency	$ 698,567	%	20%	$ 139,713
Total capital costs	(present worth)			**$ 1,097,000**

Composting based on ECS proposal					
Post Falls Facilities Plan 20-11-022					
Date:					
By STK					
	Qty	Unit	Unit cost	Cost	
Capital costs					
Land: (20 acres + 75ft buffer = 27 acres)	27	acre	$ 30,000	$ 810,000	
Office bldg on site	2,000	sf	$ 100	$ 200,000	
Asphalt paving on site	10,000	sf	$ 8	$ 80,000	
Engineered Compost System: bunkers with in-floor aeration	1	ls	$ 510,000	$ 510,000	
biosolids mixer	1	ls	$ 200,000	$ 200,000	
Screening system (from Cheney WWTP experience)	1	ls	$ 185,000	$ 185,000	
Front end loader	1	ls	$ 100,000	$ 100,000	
Bunker walls	255	cy	$ 1,000	$ 255,000	
Compost area slab with in floor aeration	342	cy	$ 1,000	$ 342,000	
biofilter walls	50	cy	$ 1,000	$ 50,000	
biofilter slab	70	cy	$ 800	$ 56,000	
Subtotal				$ 2,788,000	
Site work and piping	$ 2,788,000	%	20%	$ 557,600	
Electrical and instrumentation	$ 2,788,000	%	20%	$ 557,600	
Subtotal				$ 3,903,200	
Contractor markup	$ 390,320	%	10%	$ 39,032	
Construction total				$ 3,942,232	
Bonding, Administration	$ 3,942,232.00	%	12%	$ 473,068	
Engineering and Administration	$ 3,942,232.00	%	25%	$ 985,558	
Contingency	$ 3,942,232.00	%	20%	$ 788,446	
Total capital costs (present worth)				**$ 6,189,304**	

Cost to truck sludge to compost site

Annual cost escalation	3.0%		
Interest rate	3.0%		
round trip truck time to compost site		1.25	/hr
trucking cost		$ 100.00	/hr
Tuck capacity		12.00	cy

Year	Period	Annual Dewatered Wet tons	Sludge vol @ 1600 lbs/cy	Truck time	Trucking cost	trucking cost to compost site	Present worth of trucking cost to compost site
		[Wtons/yr]	[cy/yr]	hr/yr	[$/hr]	[$/yr]	[$/year]
2011	0	5,790	7,238	754	$ 100.00	$ 75,391	$75,391
2012	1	6,128	7,660	798	$ 103.00	$ 82,182	$79,788
2013	2	6,466	8,082	842	$ 106.09	$ 89,313	$84,186
2014	3	6,803	8,504	886	$ 109.27	$ 96,798	$88,584
2015	4	7,141	8,926	930	$ 112.55	$ 104,652	$92,982
2016	5	7,479	9,348	974	$ 115.93	$ 112,890	$97,380
2017	6	7,817	9,771	1,018	$ 119.41	$ 121,528	$101,777
2018	7	10,080	12,601	1,313	$ 122.99	$ 161,429	$131,256
2019	8	10,498	13,123	1,367	$ 126.68	$ 173,159	$136,693
2020	9	10,916	13,644	1,421	$ 130.48	$ 185,447	$142,130
2021	10	11,333	14,166	1,476	$ 134.39	$ 198,317	$147,566
2022	11	11,751	14,688	1,530	$ 138.42	$ 211,792	$153,003
2023	12	12,168	15,210	1,584	$ 142.58	$ 225,897	$158,440
2024	13	12,586	15,732	1,639	$ 146.85	$ 240,658	$163,876
2025	14	13,003	16,254	1,693	$ 151.26	$ 256,101	$169,313
2026	15	13,421	16,776	1,747	$ 155.80	$ 272,254	$174,750
2027	16	13,838	17,298	1,802	$ 160.47	$ 289,146	$180,186
2028	17	14,256	17,820	1,856	$ 165.28	$ 306,807	$185,623
2029	18	14,673	18,342	1,911	$ 170.24	$ 325,266	$191,060
2030	19	15,091	18,864	1,965	$ 175.35	$ 344,557	$196,496
2031	20	15,508	19,386	2,019	$ 180.61	$ 364,713	$201,933
					total present value		$ 2,952,414

Cost of bulking agent

Bulking agent ratio	3.90	to 1, volume
Bulking agent	$ 22.00	/cy (CDA's cost per email)

Period	Bulking agent Volume	Bulking agent Cost	Bulking agent Cost	Present worth cost of bulking agent
	[cy/yr]	[$/cy]	[$/yr]	[$/year]
0	22,581	$ 22.00	$ 496,782	$496,782
1	23,898	$ 22.66	$ 541,534	$525,761
2	25,215	$ 23.34	$ 588,524	$554,740
3	26,533	$ 24.04	$ 637,846	$583,719
4	27,850	$ 24.76	$ 689,597	$612,698
5	29,167	$ 25.50	$ 743,880	$641,677
6	30,484	$ 26.27	$ 800,798	$670,656
7	39,314	$ 27.06	$ 1,063,726	$864,906
8	40,942	$ 27.87	$ 1,141,019	$900,731
9	42,571	$ 28.71	$ 1,221,992	$936,555
10	44,199	$ 29.57	$ 1,306,797	$972,380
11	45,827	$ 30.45	$ 1,395,591	$1,008,204
12	47,456	$ 31.37	$ 1,488,536	$1,044,029
13	49,084	$ 32.31	$ 1,585,801	$1,079,853
14	50,713	$ 33.28	$ 1,687,563	$1,115,678
15	52,341	$ 34.28	$ 1,794,003	$1,151,503
16	53,969	$ 35.30	$ 1,905,311	$1,187,327
17	55,598	$ 36.36	$ 2,021,683	$1,223,152
18	57,226	$ 37.45	$ 2,143,322	$1,258,976
19	58,855	$ 38.58	$ 2,270,441	$1,294,801
20	60,483	$ 39.73	$ 2,403,257	$1,330,625
		total present value		$ 19,454,754

Cost of aeration power				
Cost of electricity		$ 0.08	/kWhr	
Avg continuous fan power		$ 20.00	hp	
Period	Power [kWhr/yr	Elect Unit Cost [$/kWhr]	Elect Unit Cost [$/yr]	Present worth of Elec cost [$/yr]
0	130,699	$ 0.080	$ 10,456	$10,456
1	130,699	$ 0.082	$ 10,770	$10,456
2	130,699	$ 0.085	$ 11,093	$10,456
3	130,699	$ 0.087	$ 11,425	$10,456
4	130,699	$ 0.090	$ 11,768	$10,456
5	130,699	$ 0.093	$ 12,121	$10,456
6	130,699	$ 0.096	$ 12,485	$10,456
7	130,699	$ 0.098	$ 12,859	$10,456
8	130,699	$ 0.101	$ 13,245	$10,456
9	130,699	$ 0.104	$ 13,643	$10,456
10	130,699	$ 0.108	$ 14,052	$10,456
11	130,699	$ 0.111	$ 14,473	$10,456
12	130,699	$ 0.114	$ 14,908	$10,456
13	130,699	$ 0.117	$ 15,355	$10,456
14	130,699	$ 0.121	$ 15,816	$10,456
15	130,699	$ 0.125	$ 16,290	$10,456
16	130,699	$ 0.128	$ 16,779	$10,456
17	130,699	$ 0.132	$ 17,282	$10,456
18	130,699	$ 0.136	$ 17,801	$10,456
19	130,699	$ 0.140	$ 18,335	$10,456
20	130,699	$ 0.144	$ 18,885	$10,456
		total present value		$ 219,575

Cost to dispose of compost

ratio of finished compost to initial sludge			2.3	tons compost/ton starting wet sludge
Disposal cost			$ 35.00	per wet ton

Period	Tons of compost	Disposal Unit Cost	Disposal Unit Cost	Present worth of Elec cost
	[tons/yr]	[$/wet ton]	[$/yr]	[$/yr]
0	13,317	$ 35.00	$ 466,095	$466,095
1	14,094	$ 36.05	$ 508,083	$493,284
2	14,871	$ 37.13	$ 552,170	$520,473
3	15,647	$ 38.25	$ 598,445	$547,662
4	16,424	$ 39.39	$ 647,000	$574,851
5	17,201	$ 40.57	$ 697,929	$602,040
6	17,978	$ 41.79	$ 751,332	$629,229
7	23,185	$ 43.05	$ 998,018	$811,480
8	24,145	$ 44.34	$ 1,070,536	$845,091
9	25,106	$ 45.67	$ 1,146,508	$878,703
10	26,066	$ 47.04	$ 1,226,074	$912,314
11	27,026	$ 48.45	$ 1,309,383	$945,926
12	27,987	$ 49.90	$ 1,396,586	$979,538
13	28,947	$ 51.40	$ 1,487,844	$1,013,149
14	29,907	$ 52.94	$ 1,583,320	$1,046,761
15	30,868	$ 54.53	$ 1,683,185	$1,080,372
16	31,828	$ 56.16	$ 1,787,617	$1,113,984
17	32,788	$ 57.85	$ 1,896,801	$1,147,596
18	33,749	$ 59.59	$ 2,010,926	$1,181,207
19	34,709	$ 61.37	$ 2,130,192	$1,214,819
20	35,669	$ 63.21	$ 2,254,804	$1,248,430
		total present value		$ 18,253,003

Total Life Cycle cost (present value)		
Capital cost	$	6,189,304
Haul cost to site	$	2,952,414
bulking agent	$	19,454,754
Power cost	$	219,575
Total	$	28,816,000
Disposal cost	$	18,253,000
Total	$	47,069,000

20-11-022 PF Facilities Plan
Purpose: Estimated **average** sludge production by adding alum at 3 location

STK		MW Al		27
March 2, 2011		MW P		31
		MW alum: Al2(SO4)3-14H2O		594
user Inputs in shaded cells		MW AlPO4		122
		MW Al(OH)3		78
Total solids produced		233 mg/l	avg	
Influent TP	7.0 mg/l			
TP after BPR	1.0 mg/l			
Excess Bio-P removal	6.0			
mg solids/mg P removed	4.5			
Additional Solids from BPR			<<<<<<	
1st alum dose	50 mg/l			
Aluminum dosage	4.5 mg Al /l			
TP after this alum dose	0.1 mg/l			
P to be removed chemically	0.9 mg/l			
Molar Ratio AL:P	5.2			
ALPO4 Precip	3.5 mg/l	<		
alum used	8.6 mg/l			
unused alum	41.4 mg/l			
AL(OH)3 Precip	10.9 mg/l	<		
Alum sludge from this dose		14.41 mg/l	<<	
2nd alum dose	50 mg/l			
Aluminum dosage	4.5 mg Al /l			
TP after this alum dose	0.05 mg/l			
P to be removed chemically	0.050 mg/l			
Molar Ratio AL:P	52			
ALPO4 Precip	0.2 mg/l	<		
alum used	0.5 mg/l			
unused alum	49.5 mg/l			
AL(OH)3 Precip	13.0 mg/l	<		
Alum sludge from this dose		13.20 mg/l	<<	

3rd alum dose	50	mg/l			
Aluminum dosage	4.5	mg Al /l			
TP after this alum dose	0.030	mg/l			
P to be removed chemically	0.020	mg/l			
Molar Ratio AL:P	52				
ALPO4 Precip	0.1	mg/l		<	
alum used	0.2	mg/l			
unused alum	49.8	mg/l			
AL(OH)3 Precip	13.1	mg/l		<	
Alum sludge from this dose			13.16	mg/l	<<
Total Sludge from alum			41	mg/l	
SF			35%		35% SF is recommended by the EPA Design Manual - Phosphorus Removal, p. 90
Estimated total sludge from alum w/SF			55	mg/l	
Est. Total Sludge Produced			288	mg/l	

Flow, mgd [mgd]	Est. Total Sludge Produced [dry lbs/day]	Estimated Year	
2.40	4,664	2011	
2.54	4,936	2012	
2.68	5,208	2013	
2.82	5,480	2014	
2.96	5,752	2015	
3.10	6,024	2016	
3.24	6,296	2017	
3.38	8,120	2018	begin alum addiiton
3.52	8,456	2019	
3.66	8,792	2020	
3.80	9,129	2021	
3.94	9,465	2022	
4.08	9,801	2023	
4.22	10,138	2024	
4.36	10,474	2025	
4.50	10,810	2026	
4.64	11,146	2027	
4.78	11,483	2028	
4.92	11,819	2029	
5.06	12,155	2030	
5.20	12,492	2031	

Sludge Projection

dewatered cake solids >>> 0.147 [enter as a decimal]

Year	Flow	Dry Solids Wasted	WAS Volume @ 10,000 mg/L	Dewatered Sludge [1]	Dewatered Sludge	Dewatered Sludge	
	[mgd]	[dry lbs/day]	[gpd]	[wet lbs/day]	[wet tons/day]	[wet tons/yr]	
2011	2.40	4,664	55,920	31,726	15.9	5,790	
2012	2.54	4,936	59,182	33,577	16.8	6,128	
2013	2.68	5,208	62,444	35,427	17.7	6,466	
2014	2.82	5,480	65,706	37,278	18.6	6,803	
2015	2.96	5,752	68,968	39,129	19.6	7,141	
2016	3.10	6,024	72,230	40,979	20.5	7,479	
2017	3.24	6,296	75,492	42,830	21.4	7,817	
2018	3.38	8,120	97,358	55,236	27.6	10,080	begin alum addiiton
2019	3.52	8,456	101,390	57,523	28.8	10,498	
2020	3.66	8,792	105,423	59,811	29.9	10,916	
2021	3.80	9,129	109,455	62,099	31.0	11,333	
2022	3.94	9,465	113,488	64,387	32.2	11,751	
2023	4.08	9,801	117,521	66,675	33.3	12,168	
2024	4.22	10,138	121,553	68,963	34.5	12,586	
2025	4.36	10,474	125,586	71,251	35.6	13,003	
2026	4.50	10,810	129,618	73,538	36.8	13,421	
2027	4.64	11,146	133,651	75,826	37.9	13,838	
2028	4.78	11,483	137,683	78,114	39.1	14,256	
2029	4.92	11,819	141,716	80,402	40.2	14,673	
2030	5.06	12,155	145,748	82,690	41.3	15,091	
2031	5.20	12,492	149,781	84,978	42.5	15,508	

1 Assumes dewatered sludge cake of 14.7%

Gravity belt thickener estimate					
Post Falls Facilities Plan 20-11-022					
Date: 12/15/2011					
By STK					
Inputs:					
Initial Equipment Cost, 2 meter with appurtenances	$ 200,000				
Equipment installation (15%)	$ 30,000		15%		
Support equipment (20%)	$ 40,000		20%		
Subtotal		$ 270,000			
Electrical, Controls (20%)	$ 54,000		20%		
Site work and piping (20%)	$ 54,000		20%		
Mobilization, Bonding, Administration (12%)	$ 32,400		12%		
Subtotal		$ 140,400			
Engineering and Administration	$ 35,100		25%		
Contingency	$ 28,080		20%		
Subtotal		$ 63,180			
Total capital costs		$ 473,580	(present worth)		

Aerobic Holding Tank							
Post Falls Facilities Plan 20-11-022							
Date: 11/23/2011							
By STK							
Thickening the sludge reduces the volume enough that the existing two holding tanks have adequate volume.							
The aertion system in both tanks must replaced with a larger system							
Blowers (2 + redundant for each tank)			$ 180,000		6	ea	$ 30,000.00
Diffuser system			$ 100,000		2	ea	$ 50,000.00
Subtotal			$ 280,000				
Misc equipment (5%)			$ 14,000				5%
Site work (10%)			$ 28,000				10%
Electrical, Controls (20%)			$ 56,000				20%
Mobilization, Bonding, Administration (12%)			$ 33,600				12%
Subtotal			$ 131,600				
Construction subtotal			$ 411,600				
Engineering and Administration			$ 102,900.00				25%
Contingency			$ 82,320.00				20%
Subtotal			$ 185,220				
Total capital costs			**$ 596,820**	(present worth)			

Annual cost escalation	3.0%		Elec cost per kWhr	$ 0.08				
Interest rate	3.0%							
VSS		78%		blower discharge pressure		7.0	psi	
VSS destruction		20%		blower mechanical efficiency		70%		
O2 reqd/lb solids destroyed		2.3	table 12-24, M&E					
AOR/SOR ratio		0.33						
O2 transfer efficiency per foot		2%						
diffuser submergence depth		14.00	ft					
Year	Flow		Dry Solids Wasted w/o alum	VSS destroyed		TSS remaining after minimal digestion during holding		
	[mgd]		[ppd]	[lbs/day]		[lbs/day]		
2011	2.40		4,664	728		3,936		
2012	2.54		4,936	770		4,166		
2013	2.68		5,208	812		4,395		
2014	2.82		5,480	855		4,625		
2015	2.96		5,752	897		4,855		
2016	3.10		6,024	940		5,084		
2017	3.24		6,296	982		5,314		
2018	3.38		8,120	1,267		6,853		
2019	3.52		8,456	1,319		7,137		
2020	3.66		8,792	1,372		7,421		
2021	3.80		9,129	1,424		7,705		
2022	3.94		9,465	1,477		7,988		
2023	4.08		9,801	1,529		8,272		
2024	4.22		10,138	1,581		8,556		
2025	4.36		10,474	1,634		8,840		
2026	4.50		10,810	1,686		9,124		
2027	4.64		11,146	1,739		9,408		
2028	4.78		11,483	1,791		9,691		
2029	4.92		11,819	1,844		9,975		
2030	5.06		12,155	1,896		10,259		
2031	5.20		12,492	1,949		10,543		

	AOR	SOR	Vol air Req'd	BHP req'd		Elect Unit Cost	Elec cost	Present worth of Elec cost
	[lbs O2/day]	[lbs O2/day]	[SCFM]	[BHP]	[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
0	1,673	5,071	723	28	180,835	$ 0.080	$ 14,466.81	$14,466.81
1	1,771	5,367	765	29	191,384	$ 0.082	$ 15,770.03	$15,310.71
2	1,869	5,662	807	31	201,933	$ 0.085	$ 17,138.42	$16,154.60
3	1,966	5,958	849	33	212,481	$ 0.087	$ 18,574.72	$16,998.50
4	2,064	6,254	891	34	223,030	$ 0.090	$ 20,081.77	$17,842.40
5	2,161	6,550	934	36	233,579	$ 0.093	$ 21,662.54	$18,686.29
6	2,259	6,846	976	37	244,127	$ 0.096	$ 23,320.07	$19,530.19
7	2,913	8,828	1,258	48	314,837	$ 0.098	$ 30,976.78	$25,186.96
8	3,034	9,194	1,310	50	327,878	$ 0.101	$ 33,227.64	$26,230.21
9	3,155	9,560	1,363	52	340,918	$ 0.104	$ 35,585.67	$27,273.45
10	3,275	9,925	1,415	54	353,959	$ 0.108	$ 38,055.28	$28,316.70
11	3,396	10,291	1,467	56	366,999	$ 0.111	$ 40,641.03	$29,359.95
12	3,517	10,657	1,519	58	380,040	$ 0.114	$ 43,347.69	$30,403.19
13	3,637	11,022	1,571	60	393,081	$ 0.117	$ 46,180.16	$31,446.44
14	3,758	11,388	1,623	62	406,121	$ 0.121	$ 49,143.57	$32,489.69
15	3,879	11,754	1,675	64	419,162	$ 0.125	$ 52,243.22	$33,532.94
16	3,999	12,119	1,727	66	432,202	$ 0.128	$ 55,484.62	$34,576.18
17	4,120	12,485	1,780	68	445,243	$ 0.132	$ 58,873.49	$35,619.43
18	4,241	12,851	1,832	70	458,283	$ 0.136	$ 62,415.75	$36,662.68
19	4,361	13,216	1,884	72	471,324	$ 0.140	$ 66,117.56	$37,705.92
20	4,482	13,582	1,936	74	484,365	$ 0.144	$ 69,985.31	$38,749.17
							present value	$ 566,542

%TS of dewatered sludge			15%					
Initial contracted hauling/disposal cost per wet ton			$ 65.00					
Period		Weight of digested sludge to BFP [dry lbs/day]	Weight of dewatered sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]	Present worth of disposal cost $/year		
0		3,936	4,887	$ 65.00	$ 317,640	$317,640		
1		4,166	5,172	$ 66.95	$ 346,254	$336,169		
2		4,395	5,457	$ 68.96	$ 376,299	$354,697		
3		4,625	5,742	$ 71.03	$ 407,835	$373,226		
4		4,855	6,027	$ 73.16	$ 440,924	$391,755		
5		5,084	6,312	$ 75.35	$ 475,632	$410,284		
6		5,314	6,597	$ 77.61	$ 512,026	$428,813		
7		6,853	8,508	$ 79.94	$ 680,140	$553,016		
8		7,137	8,860	$ 82.34	$ 729,561	$575,922		
9		7,421	9,213	$ 84.81	$ 781,334	$598,828		
10		7,705	9,565	$ 87.35	$ 835,558	$621,734		
11		7,988	9,918	$ 89.98	$ 892,332	$644,640		
12		8,272	10,270	$ 92.67	$ 951,761	$667,546		
13		8,556	10,622	$ 95.45	$ 1,013,952	$690,452		
14		8,840	10,975	$ 98.32	$ 1,079,018	$713,358		
15		9,124	11,327	$ 101.27	$ 1,147,075	$736,264		
16		9,408	11,680	$ 104.31	$ 1,218,245	$759,170		
17		9,691	12,032	$ 107.44	$ 1,292,652	$782,076		
18		9,975	12,384	$ 110.66	$ 1,370,427	$804,982		
19		10,259	12,737	$ 113.98	$ 1,451,706	$827,888		
20		10,543	13,089	$ 117.40	$ 1,536,628	$850,794		
				present value		$ 12,439,252		

	Total Life Cycle cost (present value)							
	Capital cost	$ 596,820						
	Elec cost	$ 566,542						
	Total	$ 1,160,000						
	Hauling/disposal	$ 12,440,000						
	Total	$ 13,600,000						

Anerobic digester estimated costs

Post Falls Facilities Plan 20-11-022

By STK

	Qty	Unit	Unit cost	Cost
Excavation	8000	cy	$ 4	$ 32,000
Primary tank; 300,000 gal				
Walls (30 ft x 2ft)	377	cy	$ 1,000	$ 377,000
Bottom (1.5ft)	220	cy	$ 800	$ 176,000
Secondary tank; 300,000 gal				
Walls (30 ft x 2ft)	377	cy	$ 1,000	$ 377,000
Bottom (1.5ft)	220	cy	$ 800	$ 176,000
Building : Pumping/piping/compressors/biolers	3000	sf	$ 220	$ 660,000
Steel covers	2	ea	$ 90,000	$ 180,000
Paint covers	1	ls	$ 100,000	$ 100,000
Piping	1	ls	$ 105,000	$ 105,000
Heat exchangers	2	ea	$ 25,000	$ 50,000
Boilers and piping	2	ea	$ 100,000	$ 200,000
Gas mixing system and gas equipment	1	ls	$ 500,000	$ 500,000
Sludge pumping	1	ls	$ 75,000	$ 75,000
Subtotal				$ 3,008,000
Site work	20%			$ 601,600
Electrical, controls and instrumentation	20%			$ 601,600
Mobilization, Bonding, Administration	12%			$ 360,960
Subtotal				$ 1,564,160
Construction subtotal				$ 4,572,160
Engineering and Administration	25%			$ 1,143,040.00
Contingency	20%			$ 914,432.00
Subtotal				$ 2,057,472
Total capital costs			(present worth)	$ 6,629,632

Mixing electrical cost							
Annual cost escalation	3.0%						
Interest rate	3.0%						
Elec cost per kWhr	$ 0.08						
Digester liquid volume	600,000	gallons					
Mixing energy input	$ 0.05	hp/1000 gal					
Total mixing hp	$ 30.00	hp/1000 gal					
Year	Period		Elect Unit Cost	Elec cost	Present worth of Elec cost		
		[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]		
2011	0	196,049	$ 0.080	$ 15,683.90	$15,683.90		
2012	1	196,049	$ 0.082	$ 16,154.42	$15,683.90		
2013	2	196,049	$ 0.085	$ 16,639.05	$15,683.90		
2014	3	196,049	$ 0.087	$ 17,138.23	$15,683.90		
2015	4	196,049	$ 0.090	$ 17,652.37	$15,683.90		
2016	5	196,049	$ 0.093	$ 18,181.94	$15,683.90		
2017	6	196,049	$ 0.096	$ 18,727.40	$15,683.90		
2018	7	196,049	$ 0.098	$ 19,289.22	$15,683.90		
2019	8	196,049	$ 0.101	$ 19,867.90	$15,683.90		
2020	9	196,049	$ 0.104	$ 20,463.94	$15,683.90		
2021	10	196,049	$ 0.108	$ 21,077.86	$15,683.90		
2022	11	196,049	$ 0.111	$ 21,710.19	$15,683.90		
2023	12	196,049	$ 0.114	$ 22,361.50	$15,683.90		
2024	13	196,049	$ 0.117	$ 23,032.34	$15,683.90		
2025	14	196,049	$ 0.121	$ 23,723.31	$15,683.90		
2026	15	196,049	$ 0.125	$ 24,435.01	$15,683.90		
2027	16	196,049	$ 0.128	$ 25,168.06	$15,683.90		
2028	17	196,049	$ 0.132	$ 25,923.10	$15,683.90		
2029	18	196,049	$ 0.136	$ 26,700.80	$15,683.90		
2030	19	196,049	$ 0.140	$ 27,501.82	$15,683.90		
2031	20	196,049	$ 0.144	$ 28,326.88	$15,683.90		
				present value	$ 329,362		

Haul and disposal cost							
VSS			78%				
Average VSS destruction			50%				
%TS of dewatered sludge			20%				
Initial contracted hauling/disposal cost per wet ton			$ 35.00				
Period	Dry Solids Wasted to digester	VSS destroyed in digestion	TSS after Digestion	Weight of dewatered sludge	Disposal Unit Cost	Disposal Cost	Present worth of disposal cost
	[ppd]	[ppd]	[lbs/day]	[wet tons/year]	[$/wet ton]	[$/year/wet ton]	$/year
0	4664	1,819	2,845	2,596	$ 35.00	$ 90,858	$90,858
1	4936	1,925	3,011	2,747	$ 36.05	$ 99,043	$96,158
2	5208	2,031	3,177	2,899	$ 37.13	$ 107,637	$101,458
3	5480	2,137	3,343	3,050	$ 38.25	$ 116,658	$106,758
4	5752	2,243	3,509	3,202	$ 39.39	$ 126,123	$112,058
5	6024	2,349	3,675	3,353	$ 40.57	$ 136,051	$117,358
6	6296	2,455	3,841	3,505	$ 41.79	$ 146,461	$122,659
7	8120	3,167	4,953	4,520	$ 43.05	$ 194,548	$158,186
8	8456	3,298	5,158	4,707	$ 44.34	$ 208,685	$164,738
9	8792	3,429	5,363	4,894	$ 45.67	$ 223,494	$171,290
10	9129	3,560	5,568	5,081	$ 47.04	$ 239,005	$177,842
11	9465	3,691	5,774	5,268	$ 48.45	$ 255,244	$184,394
12	9801	3,822	5,979	5,456	$ 49.90	$ 272,243	$190,946
13	10138	3,954	6,184	5,643	$ 51.40	$ 290,033	$197,498
14	10474	4,085	6,389	5,830	$ 52.94	$ 308,644	$204,050
15	10810	4,216	6,594	6,017	$ 54.53	$ 328,111	$210,602
16	11146	4,347	6,799	6,204	$ 56.16	$ 348,469	$217,154
17	11483	4,478	7,005	6,392	$ 57.85	$ 369,752	$223,706
18	11819	4,609	7,210	6,579	$ 59.59	$ 391,999	$230,258
19	12155	4,741	7,415	6,766	$ 61.37	$ 415,249	$236,810
20	12492	4,872	7,620	6,953	$ 63.21	$ 439,540	$243,362
						present value	$ 3,558,145

	Total Life Cycle cost (present value)						
	Capital cost	$ 6,629,632					
	Mixing costs	$ 329,362					
	Total	$ 6,960,000					
	Haul/disposal cost	$ 3,560,000					
	Total	$ 10,520,000					

Aerobic digester estimated costs							
Post Falls Facilities Plan 20-11-022							
Date: 11/23/2011							
By STK							
Inputs:							
Tank (1$/gal , 3690000gal)		$ 3,690,000		1.00	$/gal	3,690,000	gallons
Blowers		$ 250,000		5	ea	$ 50,000.00	
Diffuser system		$ 234,000		2	ea	$ 117,000.00	
Misc equipment (10%)		$ 369,000				10%	
Building to house blowers and equipment (1500sf at $ 200/sf)		$ 300,000		1500	sf	$ 200.00	
Subtotal		$ 4,843,000					
Site work (10%)		$ 484,300				10%	
Electrical, Controls (20%)		$ 968,600				20%	
Mobilization, Bonding, Administration (12%)		$ 581,160				12%	
Subtotal		$ 2,034,060					
Construction subtotal		$ 6,877,060					
Engineering and Administration		$ 1,719,265.00				25%	
Contingency		$ 1,375,412.00				20%	
Subtotal		$ 3,094,677					
Total capital costs		**$ 9,971,737**	(present worth)				

Annual cost escalation	3.0%		Elec cost per kWhr	$ 0.08				
Interest rate	3.0%							
		78%		blower discharge pressure		7.0	psi	
Average VSS destruction		45%		blower mechanical efficiency		70%		
O2 reqd/lb solids destroyed		2.3	table 12-24, M&E					
AOR/SOR ratio		0.33						
O2 transfer efficiency per foot		2%						
diffuser submergence depth		14.00	ft					
Year	Flow	Dry Solids Wasted	VSS destroyed		TSS after Digestion			
	[mgd]	[ppd]	[lbs/day]		[lbs/day]			
2011	2.40	4664	1,637		3,027			
2012	2.54	4936	1,732		3,203			
2013	2.68	5208	1,828		3,380			
2014	2.82	5480	1,923		3,556			
2015	2.96	5752	2,019		3,733			
2016	3.10	6024	2,114		3,910			
2017	3.24	6296	2,210		4,086			
2018	3.38	8120	2,850		5,270			
2019	3.52	8456	2,968		5,488			
2020	3.66	8792	3,086		5,706			
2021	3.80	9129	3,204		5,924			
2022	3.94	9465	3,322		6,143			
2023	4.08	9801	3,440		6,361			
2024	4.22	10138	3,558		6,579			
2025	4.36	10474	3,676		6,798			
2026	4.50	10810	3,794		7,016			
2027	4.64	11146	3,912		7,234			
2028	4.78	11483	4,030		7,452			
2029	4.92	11819	4,149		7,671			
2030	5.06	12155	4,267		7,889			
2031	5.20	12492	4,385		8,107			

Period	AOR	SOR	Vol air Req'd	BHP req'd		Elect Unit Cost	Elec cost	Present worth of Elec cost
	[lbs O2/day]	[lbs O2/day]	[SCFM]	[BHP]	[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
0	3,765	11,409	1,626	62	406,879	$ 0.080	$ 32,550.32	$32,550.32
1	3,985	12,075	1,721	66	430,614	$ 0.082	$ 35,482.56	$34,449.09
2	4,204	12,740	1,816	70	454,348	$ 0.085	$ 38,561.44	$36,347.86
3	4,424	13,406	1,911	73	478,083	$ 0.087	$ 41,793.12	$38,246.62
4	4,644	14,071	2,006	77	501,817	$ 0.090	$ 45,183.99	$40,145.39
5	4,863	14,737	2,101	80	525,552	$ 0.093	$ 48,740.71	$42,044.16
6	5,083	15,402	2,195	84	549,287	$ 0.096	$ 52,470.16	$43,942.93
7	6,555	19,864	2,831	108	708,383	$ 0.098	$ 69,697.76	$56,670.66
8	6,826	20,686	2,949	113	737,725	$ 0.101	$ 74,762.19	$59,017.97
9	7,098	21,509	3,066	117	767,066	$ 0.104	$ 80,067.76	$61,365.27
10	7,370	22,332	3,183	122	796,407	$ 0.108	$ 85,624.38	$63,712.58
11	7,641	23,155	3,300	126	825,749	$ 0.111	$ 91,442.33	$66,059.88
12	7,913	23,977	3,418	131	855,090	$ 0.114	$ 97,532.29	$68,407.19
13	8,184	24,800	3,535	135	884,431	$ 0.117	$ 103,905.36	$70,754.49
14	8,456	25,623	3,652	140	913,772	$ 0.121	$ 110,573.03	$73,101.80
15	8,727	26,446	3,769	144	943,114	$ 0.125	$ 117,547.25	$75,449.10
16	8,999	27,268	3,887	149	972,455	$ 0.128	$ 124,840.40	$77,796.41
17	9,270	28,091	4,004	153	1,001,796	$ 0.132	$ 132,465.35	$80,143.72
18	9,542	28,914	4,121	158	1,031,138	$ 0.136	$ 140,435.44	$82,491.02
19	9,813	29,737	4,239	162	1,060,479	$ 0.140	$ 148,764.52	$84,838.33
20	10,085	30,559	4,356	167	1,089,820	$ 0.144	$ 157,466.95	$87,185.63
							present value	$ 1,274,720

	%TS of dewatered sludge		16%			
Period		Weight of digested sludge to BFP [dry lbs/day]	Weight of dewaterd sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]	Present worth of disposal cost $/year
0		3,027	3,452.4	$ 35.00	$ 120,834	$120,834
1		3,203	3,653.8	$ 36.05	$ 131,719	$127,883
2		3,380	3,855.2	$ 37.13	$ 143,149	$134,931
3		3,556	4,056.6	$ 38.25	$ 155,145	$141,980
4		3,733	4,258.0	$ 39.39	$ 167,733	$149,028
5		3,910	4,459.3	$ 40.57	$ 180,936	$156,077
6		4,086	4,660.7	$ 41.79	$ 194,781	$163,126
7		5,270	6,010.7	$ 43.05	$ 258,733	$210,374
8		5,488	6,259.6	$ 44.34	$ 277,534	$219,088
9		5,706	6,508.6	$ 45.67	$ 297,229	$227,801
10		5,924	6,757.6	$ 47.04	$ 317,856	$236,515
11		6,143	7,006.5	$ 48.45	$ 339,454	$245,229
12		6,361	7,255.5	$ 49.90	$ 362,061	$253,942
13		6,579	7,504.5	$ 51.40	$ 385,719	$262,656
14		6,798	7,753.4	$ 52.94	$ 410,471	$271,370
15		7,016	8,002.4	$ 54.53	$ 436,361	$280,084
16		7,234	8,251.4	$ 56.16	$ 463,435	$288,797
17		7,452	8,500.3	$ 57.85	$ 491,740	$297,511
18		7,671	8,749.3	$ 59.59	$ 521,327	$306,225
19		7,889	8,998.2	$ 61.37	$ 552,246	$314,938
20		8,107	9,247.2	$ 63.21	$ 584,552	$323,652
				present value		$ 4,732,041

Total Life Cycle cost (present value)	
Capital cost	$ 9,970,000
Elec cost	$ 1,270,000
Total	$ 11,240,000
Disposal cost	$ 4,730,000
Total	$ 15,970,000

Alkaline Stabilization to Class A

Post Falls Facilities Plan 20-11-022
Date: 11/15/2011
By STK

Inputs:

Initial Equipment Cost	$ 688,200		
Equipment installation (15%)	$ 103,230		15%
Support equipment (20%)	$ 137,640		20%
Building to house equipment, 3000sf @ $200/sf	$ 600,000		
Subtotal		$ 1,529,070	
Electrical, Controls (20%)	$ 305,814		20%
Mobilization, Bonding, Administration (12%)	$ 183,488		12%
Subtotal		$ 489,302	
Construction subtotal		$ 2,018,372	
Engineering and Administration	$ 504,593.10		25%
Contingency	$ 403,674.48		20%
Engr and admin subtotal		$ 908,268	
Total capital costs		$ 2,926,640	(present worth)

Operating costs								
Annual cost escalation	3.0%							
Interest rate	3.0%							
Operating cost from manf. Proposal		$ 23.51	per wet ton					
Year	Flow	Dry Solids Wasted	Dewatered Sludge	Annual Dewatered Wet tons	Operating cost per wet ton	Annual operating cost	PW period	Present worth of operating cost
	[mgd]	[ppd]	[Wet tons/day]	[Wet tons/yr]	$	$/year		$/year
			14.7%					
2011	2.4	4,664	15.9	5,790	$ 23.51	$ 136,123	0	$136,123
2012	2.54	4,936	16.8	6,128	$ 24.22	$ 148,385	1	$144,063
2013	2.68	5,208	17.7	6,466	$ 24.94	$ 161,261	2	$152,004
2014	2.82	5,480	18.6	6,803	$ 25.69	$ 174,776	3	$159,944
2015	2.96	5,752	19.6	7,141	$ 26.46	$ 188,956	4	$167,885
2016	3.1	6,024	20.5	7,479	$ 27.25	$ 203,830	5	$175,825
2017	3.24	6,296	21.4	7,817	$ 28.07	$ 219,426	6	$183,766
2018	3.38	8,120	27.6	10,080	$ 28.91	$ 291,471	7	$236,992
2019	3.52	8,456	28.8	10,498	$ 29.78	$ 312,650	8	$246,809
2020	3.66	8,792	29.9	10,916	$ 30.68	$ 334,837	9	$256,625
2021	3.8	9,129	31.0	11,333	$ 31.60	$ 358,075	10	$266,441
2022	3.94	9,465	32.2	11,751	$ 32.54	$ 382,405	11	$276,257
2023	4.08	9,801	33.3	12,168	$ 33.52	$ 407,873	12	$286,074
2024	4.22	10,138	34.5	12,586	$ 34.53	$ 434,524	13	$295,890
2025	4.36	10,474	35.6	13,003	$ 35.56	$ 462,408	14	$305,706
2026	4.5	10,810	36.8	13,421	$ 36.63	$ 491,574	15	$315,522
2027	4.64	11,146	37.9	13,838	$ 37.73	$ 522,073	16	$325,339
2028	4.78	11,483	39.1	14,256	$ 38.86	$ 553,960	17	$335,155
2029	4.92	11,819	40.2	14,673	$ 40.02	$ 587,290	18	$344,971
2030	5.06	12,155	41.3	15,091	$ 41.22	$ 622,122	19	$354,787
2031	5.2	12,492	42.5	15,508	$ 42.46	$ 658,515	20	$364,604
				226,745				
							present value	$5,330,784

Cost to pre heat sludge before lime stabilizing

Mnf. Proposal assumed the sludge initial temp was 85F.
This is an estimate of energy cost to raise temp from avg of 16C to 29.4C

delta Temp	13.4	degrees C
cost of electricity	$ 0.080	per kWhr

PW Period	Annual Dewatered sludge [Wet lbs/yr]	Annual Dewatered sludge [Wet kg/yr]	joules to raise temp from 16C to 29.4C [J/year]	electricity used with 90% eff [kWhrs]	cost of electricity [$/kWhrs]	cost [$/year]	Present worth [$/year]
0	11,580,005	5,239,821	293,914,147,845	90,714.24	$ 0.080	$ 7,257	$7,257
1	12,255,505	5,545,477	311,059,139,803	96,005.91	$ 0.082	$ 7,911	$7,680
2	12,931,005	5,851,134	328,204,131,761	101,297.57	$ 0.085	$ 8,597	$8,104
3	13,606,506	6,156,790	345,349,123,718	106,589.24	$ 0.087	$ 9,318	$8,527
4	14,282,006	6,462,446	362,494,115,676	111,880.90	$ 0.090	$ 10,074	$8,950
5	14,957,506	6,768,102	379,639,107,634	117,172.56	$ 0.093	$ 10,867	$9,374
6	15,633,007	7,073,759	396,784,099,591	122,464.23	$ 0.096	$ 11,698	$9,797
7	20,160,987	9,122,618	511,709,559,317	157,935.05	$ 0.098	$ 15,539	$12,635
8	20,996,057	9,500,478	532,904,629,822	164,476.74	$ 0.101	$ 16,668	$13,158
9	21,831,128	9,878,338	554,099,700,326	171,018.43	$ 0.104	$ 17,851	$13,681
10	22,666,198	10,256,198	575,294,770,830	177,560.11	$ 0.108	$ 19,090	$14,205
11	23,501,268	10,634,058	596,489,841,334	184,101.80	$ 0.111	$ 20,387	$14,728
12	24,336,339	11,011,918	617,684,911,839	190,643.49	$ 0.114	$ 21,745	$15,251
13	25,171,409	11,389,778	638,879,982,343	197,185.18	$ 0.117	$ 23,166	$15,775
14	26,006,480	11,767,638	660,075,052,847	203,726.87	$ 0.121	$ 24,652	$16,298
15	26,841,550	12,145,498	681,270,123,351	210,268.56	$ 0.125	$ 26,207	$16,821
16	27,676,621	12,523,358	702,465,193,856	216,810.25	$ 0.128	$ 27,833	$17,345
17	28,511,691	12,901,218	723,660,264,360	223,351.93	$ 0.132	$ 29,533	$17,868
18	29,346,762	13,279,078	744,855,334,864	229,893.62	$ 0.136	$ 31,310	$18,391
19	30,181,832	13,656,938	766,050,405,369	236,435.31	$ 0.140	$ 33,167	$18,915
20	31,016,902	14,034,798	787,245,475,873	242,977.00	$ 0.144	$ 35,107	$19,438
					present value		$284,201

Cost to haul and dispose of stabilized sludge

%TS of processed sludge	28.97%	%
Weight of lime and acid added	0.139	lbs/lb wet sludge
Initial contracted hauling/disposal cost	$ 35.00	per wet ton

	Weight of Lime and Acid Added [dry lbs/day]	Wet wt of stablized Sludge [wet lbs/day]	Wet wt of stablized Sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year	Present worth of disposal cost $/year
0	4,410	31,321	5,716	$ 35.00	$ 200,062	$200,062
1	4,667	33,148	6,049	$ 36.05	$ 218,084	$211,732
2	4,924	34,975	6,383	$ 37.13	$ 237,008	$223,402
3	5,182	36,802	6,716	$ 38.25	$ 256,870	$235,073
4	5,439	38,629	7,050	$ 39.39	$ 277,711	$246,743
5	5,696	40,456	7,383	$ 40.57	$ 299,572	$258,413
6	5,953	42,283	7,717	$ 41.79	$ 322,494	$270,084
7	7,678	54,530	9,952	$ 43.05	$ 428,379	$348,311
8	7,996	56,789	10,364	$ 44.34	$ 459,506	$362,738
9	8,314	59,047	10,776	$ 45.67	$ 492,115	$377,165
10	8,632	61,306	11,188	$ 47.04	$ 526,267	$391,592
11	8,950	63,565	11,601	$ 48.45	$ 562,026	$406,019
12	9,268	65,823	12,013	$ 49.90	$ 599,456	$420,447
13	9,586	68,082	12,425	$ 51.40	$ 638,627	$434,874
14	9,904	70,341	12,837	$ 52.94	$ 679,608	$449,301
15	10,222	72,599	13,249	$ 54.53	$ 722,473	$463,728
16	10,540	74,858	13,662	$ 56.16	$ 767,298	$478,155
17	10,858	77,117	14,074	$ 57.85	$ 814,163	$492,582
18	11,176	79,375	14,486	$ 59.59	$ 863,149	$507,009
19	11,494	81,634	14,898	$ 61.37	$ 914,342	$521,436
20	11,812	83,892	15,310	$ 63.21	$ 967,829	$535,863
			223,849	present value>>		$ 7,834,730

Total Life Cycle cost (present value)		
Capital cost	$	2,927,000
O&M costs	$	5,331,000
pre-heating cost	$	284,000
Total	$	8,542,000
Dispoal costs	$	7,830,000
Total	$	**16,372,000**

Spreadsheet to calculate annual and total cost of sludge treatment by Drying for Class A							
Post Falls Facilities Plan 20-11-022							
Date: 11/14/2011							
By STK							
Inputs:							
Initial Equipment Cost			$ 2,420,700				
Equipment installation (15%)			$ 363,105		15%		
Support equipment (20%)			$ 484,140		20%		
Building to house equipment, 3000sf @ $200/sf			$ 600,000				
Subtotal				$ 3,867,945			
Electrical, Controls (20%)			$ 773,589		20%		
Mobilization, Bonding, Administration (12%)			$ 464,153		12%		
Subtotal				$ 1,237,742			
Construction costs				$ 5,105,687			
Engineering and Administration			$ 1,276,421.85		25%		
Contingency			$ 1,021,137.48		20%		
Engr and admin costs				$ 2,297,559			
Total capital costs				$ 7,403,247	(present worth)		

Annual cost escalation	3.0%		Elec cost per kWhr	$ 0.08		
Interest rate	3.0%		NG cost per Mmbtu	$ 6.70	$ 0.67	$/therm
Hp	118		Btu/lb H2O	1500	(1400 to 1700 Btu/lb H2O is typical)	
Hp utilized	70%					
Hp utilized	82.6	61.6	kW			
				1 therm = 100,000 Btu		
hourly feed rate	8,400	wet lbs/hr		1 therm = 0.1 MMBtu		

Year	Flow	Dry Solids Wasted	Dewatered Sludge	Annual Dewatered Wet tons		Weight of H2O in Dewatered Sludge
	[mgd]	[ppd]	[Wtons/day]	[Wtons/yr]		[ppd]
			14.7%			
2011	2.40	4,664	15.9	5,790		27,062
2012	2.54	4,936	16.8	6,128		28,641
2013	2.68	5,208	17.7	6,466		30,220
2014	2.82	5,480	18.6	6,803		31,798
2015	2.96	5,752	19.6	7,141		33,377
2016	3.10	6,024	20.5	7,479		34,955
2017	3.24	6,296	21.4	7,817		36,534
2018	3.38	8,120	27.6	10,080		47,116
2019	3.52	8,456	28.8	10,498		49,067
2020	3.66	8,792	29.9	10,916		51,019
2021	3.80	9,129	31.0	11,333		52,971
2022	3.94	9,465	32.2	11,751		54,922
2023	4.08	9,801	33.3	12,168		56,874
2024	4.22	10,138	34.5	12,586		58,825
2025	4.36	10,474	35.6	13,003		60,777
2026	4.50	10,810	36.8	13,421		62,728
2027	4.64	11,146	37.9	13,838		64,680
2028	4.78	11,483	39.1	14,256		66,631
2029	4.92	11,819	40.2	14,673		68,583
2030	5.06	12,155	41.3	15,091		70,535
2031	5.20	12,492	42.5	15,508		72,486

	run time per day [hrs/day]	Elect Unit Cost [$/kWhr]	Elec cost [$/day]	Elec cost [$/year]	Present worth of Elec cost [$/year]
0	3.8	$ 0.080	$ 18.61	$ 6,793.03	$6,793.03
1	4.0	$ 0.082	$ 20.29	$ 7,404.97	$7,189.29
2	4.2	$ 0.085	$ 22.05	$ 8,047.51	$7,585.55
3	4.4	$ 0.087	$ 23.90	$ 8,721.94	$7,981.81
4	4.7	$ 0.090	$ 25.83	$ 9,429.59	$8,378.07
5	4.9	$ 0.093	$ 27.87	$ 10,171.86	$8,774.33
6	5.1	$ 0.096	$ 30.00	$ 10,950.17	$9,170.59
7	6.6	$ 0.098	$ 39.85	$ 14,545.45	$11,826.78
8	6.8	$ 0.101	$ 42.75	$ 15,602.37	$12,316.65
9	7.1	$ 0.104	$ 45.78	$ 16,709.60	$12,806.52
10	7.4	$ 0.108	$ 48.96	$ 17,869.23	$13,296.38
11	7.7	$ 0.111	$ 52.28	$ 19,083.40	$13,786.25
12	7.9	$ 0.114	$ 55.77	$ 20,354.33	$14,276.12
13	8.2	$ 0.117	$ 59.41	$ 21,684.35	$14,765.99
14	8.5	$ 0.121	$ 63.22	$ 23,075.84	$15,255.85
15	8.8	$ 0.125	$ 67.21	$ 24,531.32	$15,745.72
16	9.0	$ 0.128	$ 71.38	$ 26,053.35	$16,235.59
17	9.3	$ 0.132	$ 75.74	$ 27,644.62	$16,725.45
18	9.6	$ 0.136	$ 80.30	$ 29,307.93	$17,215.32
19	9.8	$ 0.140	$ 85.06	$ 31,046.15	$17,705.19
20	10.1	$ 0.144	$ 90.03	$ 32,862.29	$18,195.05
				present value	$ 266,026

	H2O to be evaporated for 90% TS	Btus needed to evaporate H2O	therms needed to evaporate H2O	NG cost to evaporate H2O	NG cost to evaporate H2O	Present worth of NG cost
	[lbs H2O/day]	[MMBtu/day]	[therms/day]	[$/day]	[$/year]	[$/year]
0	24,356	36.5	365.34	$ 244.78	$ 89,344.20	$89,344
1	25,777	38.7	386.65	$ 259.06	$ 94,555.94	$91,802
2	27,198	40.8	407.96	$ 273.34	$ 99,767.69	$94,041
3	28,618	42.9	429.28	$ 287.61	$ 104,979.43	$96,071
4	30,039	45.1	450.59	$ 301.89	$ 110,191.18	$97,903
5	31,460	47.2	471.90	$ 316.17	$ 115,402.92	$99,548
6	32,881	49.3	493.21	$ 330.45	$ 120,614.66	$101,013
7	42,404	63.6	636.07	$ 426.16	$ 155,549.77	$126,476
8	44,161	66.2	662.41	$ 443.82	$ 161,992.66	$127,879
9	45,917	68.9	688.76	$ 461.47	$ 168,435.55	$129,092
10	47,674	71.5	715.10	$ 479.12	$ 174,878.44	$130,126
11	49,430	74.1	741.45	$ 496.77	$ 181,321.33	$130,990
12	51,186	76.8	767.79	$ 514.42	$ 187,764.22	$131,694
13	52,943	79.4	794.14	$ 532.07	$ 194,207.11	$132,246
14	54,699	82.0	820.49	$ 549.73	$ 200,650.00	$132,653
15	56,456	84.7	846.83	$ 567.38	$ 207,092.89	$132,925
16	58,212	87.3	873.18	$ 585.03	$ 213,535.78	$133,068
17	59,968	90.0	899.52	$ 602.68	$ 219,978.67	$133,091
18	61,725	92.6	925.87	$ 620.33	$ 226,421.56	$132,999
19	63,481	95.2	952.22	$ 637.98	$ 232,864.45	$132,799
20	65,237	97.9	978.56	$ 655.64	$ 239,307.34	$132,499
					present value	$ 2,508,259

Mnf. Proposal assumed the sludge initial temp was 70F.
This is an estimate of energy cost to raise temp from avg of 16C to 21.1C

specific heat of water, [J/kg*C] =		4186		delta T, [C] =	5.1		
Joules per kWhr =	3,600,000						
heating efficiency =	90%						
	Annual Dewatered sludge	Annual Dewatered sludge	joules to heat sludge	electricity used	cost of electricity	cost	Present worth of Energy cost
	[Wet lbs/yr]	[Wet kg/yr]	[J/year]	[kWhrs]		$	$/year
0	11,580,005	5,239,821	111,862,847,314	34,526	$ 0.080	$ 2,762	$2,762
1	12,255,505	5,545,477	118,388,180,074	36,540	$ 0.082	$ 3,011	$2,923
2	12,931,005	5,851,134	124,913,512,834	38,554	$ 0.085	$ 3,272	$3,084
3	13,606,506	6,156,790	131,438,845,594	40,568	$ 0.087	$ 3,546	$3,245
4	14,282,006	6,462,446	137,964,178,354	42,582	$ 0.090	$ 3,834	$3,407
5	14,957,506	6,768,102	144,489,511,114	44,596	$ 0.093	$ 4,136	$3,568
6	15,633,007	7,073,759	151,014,843,874	46,610	$ 0.096	$ 4,452	$3,729
7	20,160,987	9,122,618	194,755,130,785	60,110	$ 0.098	$ 5,914	$4,809
8	20,996,057	9,500,478	202,821,911,350	62,599	$ 0.101	$ 6,344	$5,008
9	21,831,128	9,878,338	210,888,691,915	65,089	$ 0.104	$ 6,794	$5,207
10	22,666,198	10,256,198	218,955,472,480	67,579	$ 0.108	$ 7,266	$5,406
11	23,501,268	10,634,058	227,022,253,045	70,069	$ 0.111	$ 7,759	$5,605
12	24,336,339	11,011,918	235,089,033,610	72,558	$ 0.114	$ 8,276	$5,805
13	25,171,409	11,389,778	243,155,814,175	75,048	$ 0.117	$ 8,817	$6,004
14	26,006,480	11,767,638	251,222,594,740	77,538	$ 0.121	$ 9,383	$6,203
15	26,841,550	12,145,498	259,289,375,305	80,028	$ 0.125	$ 9,974	$6,402
16	27,676,621	12,523,358	267,356,155,870	82,517	$ 0.128	$ 10,593	$6,601
17	28,511,691	12,901,218	275,422,936,436	85,007	$ 0.132	$ 11,240	$6,801
18	29,346,762	13,279,078	283,489,717,001	87,497	$ 0.136	$ 11,917	$7,000
19	30,181,832	13,656,938	291,556,497,566	89,987	$ 0.140	$ 12,623	$7,199
20	31,016,902	14,034,798	299,623,278,131	92,476	$ 0.144	$ 13,362	$7,398
						present value	$ 108,166

Cost to haul and dispose

%TS of dried sludge 90%

Initial contracted hauling/disposal cost per wet ton $ 35.00

	Weight of Processed Sludge [wet lbs/day]	Weight of Processed Sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]	Present worth of disposal cost $/year
0	5,182	946	$ 35.00	$ 33,100	$33,100
1	5,484	1,001	$ 36.05	$ 36,081	$35,030
2	5,786	1,056	$ 37.13	$ 39,212	$36,961
3	6,089	1,111	$ 38.25	$ 42,498	$38,892
4	6,391	1,166	$ 39.39	$ 45,946	$40,823
5	6,693	1,222	$ 40.57	$ 49,563	$42,754
6	6,996	1,277	$ 41.79	$ 53,355	$44,684
7	9,022	1,646	$ 43.05	$ 70,874	$57,627
8	9,395	1,715	$ 44.34	$ 76,024	$60,014
9	9,769	1,783	$ 45.67	$ 81,419	$62,401
10	10,143	1,851	$ 47.04	$ 87,069	$64,788
11	10,517	1,919	$ 48.45	$ 92,985	$67,174
12	10,890	1,987	$ 49.90	$ 99,178	$69,561
13	11,264	2,056	$ 51.40	$ 105,658	$71,948
14	11,638	2,124	$ 52.94	$ 112,439	$74,335
15	12,011	2,192	$ 54.53	$ 119,531	$76,722
16	12,385	2,260	$ 56.16	$ 126,947	$79,109
17	12,759	2,328	$ 57.85	$ 134,700	$81,496
18	13,132	2,397	$ 59.59	$ 142,805	$83,883
19	13,506	2,465	$ 61.37	$ 151,275	$86,270
20	13,880	2,533	$ 63.21	$ 160,124	$88,657
			present value		$ 1,296,228

Total Life Cycle cost (present value)		
Capital cost	$	7,403,247
Elec cost	$	266,026
NG cost	$	2,508,259
pre-heating cost	$	108,166
Total	$	10,290,000
Dispoal costs	$	1,300,000
Total	$	11,590,000

Spreadsheet to calculate annual and total cost of Composting for Class A					
Post Falls Facilities Plan 20-11-022					
Date: 11/14/2011					
By STK					
					0.15
Inputs:					
Capital costs					
Covered operations building; 50,000 sf		$ 2,500,000		$ 50.00	per sf
10,000 sf of paving on site		$ 18,000			
Odor control slab		$ 14,000			
50 cy sludge hopper		$ 85,000			
25 cy sludge/bulking agent mixer		$ 114,000			
Aeration blowers (14 @ 1200 cfm)		$ 36,000			
Odor control blowers (2 @ 4000 cfm)		$ 6,000			
Odor control containers (2 @ 20 cy)		$ 16,000			
Screening system (from Cheney WWTP experience)		$ 185,000			
Subtotal			$ 2,974,000		
Site work and piping (20%)		$ 594,800		20%	
Electrical and instrumentation (20%)		$ 594,800		20%	
Subtotal			$ 1,189,600		
Total			$ 4,163,600		
Contractor markup (10%)		$ 416,360		10%	
Construction total			$ 4,579,960		
Mobile equipment (front end loader)		$ 80,000			
Bonding, Administration (12%)		$ 549,595.20		12%	
Engineering and Administration		$ 1,144,990.00		25%	
Contingency		$ 915,992.00		20%	
Total capital costs			$ 7,270,537	(present worth)	

Annual cost escalation	3.0%		
Interest rate	3.0%		
Bulking agent ratio	6.00	to 1	
Bulking agent	$ 5.00	/cy	
round trip truck time to compost site	1.25	/hr	
trucking cost	$ 100.00	/hr	
Tuck capacity	12.00	cy	

Year	Flow	Dry Solids Wasted	Dewatered Sludge	Annual Dewatered Wet tons	Sludge vol @ 1600 lbs/cy	trucking cost to compost site	Power cost	Bulking Agent	Operating Cost	Operating Cost
	[mgd]	[ppd]	[Wtons/day]	[Wtons/yr]	[cy/day]	[$/day]	[$/day]	[$/day]	[$/day]	[$/yr]
			14.7%							
2011	2.40	4664	15.9	5,790	19.8	$ 250	$ 3,000.00	$ 595	3,845	$ 1,403,375.09
2012	2.54	4936	16.8	6,128	21.0	$ 250	$ 3,090.00	$ 630	3,970	$ 1,448,890.72
2013	2.68	5208	17.7	6,466	22.1	$ 250	$ 3,182.70	$ 664	4,097	$ 1,495,391.85
2014	2.82	5480	18.6	6,803	23.3	$ 250	$ 3,278.18	$ 699	4,227	$ 1,542,908.05
2015	2.96	5752	19.6	7,141	24.5	$ 375	$ 3,376.53	$ 734	4,485	$ 1,637,094.76
2016	3.10	6024	20.5	7,479	25.6	$ 375	$ 3,477.82	$ 768	4,621	$ 1,686,733.35
2017	3.24	6296	21.4	7,817	26.8	$ 375	$ 3,582.16	$ 803	4,760	$ 1,737,481.14
2018	3.38	8120	27.6	10,080	34.5	$ 375	$ 3,689.62	$ 1,036	5,100	$ 1,861,605.38
2019	3.52	8456	28.8	10,498	36.0	$ 375	$ 3,800.31	$ 1,079	5,254	$ 1,917,664.31
2020	3.66	8792	29.9	10,916	37.4	$ 500	$ 3,914.32	$ 1,121	5,536	$ 2,020,560.28
2021	3.80	9129	31.0	11,333	38.8	$ 500	$ 4,031.75	$ 1,164	5,696	$ 2,079,079.65
2022	3.94	9465	32.2	11,751	40.2	$ 500	$ 4,152.70	$ 1,207	5,860	$ 2,138,884.87
2023	4.08	9801	33.3	12,168	41.7	$ 500	$ 4,277.28	$ 1,250	6,027	$ 2,200,014.53
2024	4.22	10138	34.5	12,586	43.1	$ 500	$ 4,405.60	$ 1,293	6,199	$ 2,262,508.34
2025	4.36	10474	35.6	13,003	44.5	$ 500	$ 4,537.77	$ 1,336	6,374	$ 2,326,407.24
2026	4.50	10810	36.8	13,421	46.0	$ 500	$ 4,673.90	$ 1,379	6,553	$ 2,391,753.39
2027	4.64	11146	37.9	13,838	47.4	$ 500	$ 4,814.12	$ 1,422	6,736	$ 2,458,590.19
2028	4.78	11483	39.1	14,256	48.8	$ 625	$ 4,958.54	$ 1,465	7,048	$ 2,572,587.37
2029	4.92	11819	40.2	14,673	50.3	$ 625	$ 5,107.30	$ 1,508	7,240	$ 2,642,540.98
2030	5.06	12155	41.3	15,091	51.7	$ 625	$ 5,260.52	$ 1,550	7,436	$ 2,714,123.48
2031	5.20	12492	42.5	15,508	53.1	$ 625	$ 5,418.33	$ 1,593	7,637	$ 2,787,383.72
		total (future values)				$ 9,375				$ 43,325,579
		present value				$5,191				$23,988,322

%TS of dried sludge	0.5	%		
	Weight of Processed Sludge [wet lbs/day]	Weight of Processed Sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]
	9,327	1,702	$ 35.00	$ 59,579
	9,872	1,802	$ 36.05	$ 64,946
	10,416	1,901	$ 37.13	$ 70,582
	10,960	2,000	$ 38.25	$ 76,497
	11,504	2,099	$ 39.39	$ 82,703
	12,048	2,199	$ 40.57	$ 89,214
	12,592	2,298	$ 41.79	$ 96,040
	16,239	2,964	$ 43.05	$ 127,573
	16,912	3,086	$ 44.34	$ 136,842
	17,585	3,209	$ 45.67	$ 146,554
	18,257	3,332	$ 47.04	$ 156,724
	18,930	3,455	$ 48.45	$ 167,373
	19,602	3,577	$ 49.90	$ 178,520
	20,275	3,700	$ 51.40	$ 190,185
	20,948	3,823	$ 52.94	$ 202,390
	21,620	3,946	$ 54.53	$ 215,155
	22,293	4,068	$ 56.16	$ 228,504
	22,966	4,191	$ 57.85	$ 242,461
	23,638	4,314	$ 59.59	$ 257,049
	24,311	4,437	$ 61.37	$ 272,294
	24,983	4,559	$ 63.21	$ 288,223
			total (future values)	$ 3,349,407
			present value	$1,854,486

Total Life Cycle cost (present value)	
Capital cost	$ 7,270,537
Operating Cost	$ 23,988,322
Total	$ 31,260,000
Dispoal costs	$ 1,850,000
Total	$ 33,110,000

Spreadsheet to calculate annual and total cost of sludge disposal by a third party

Post Falls Facilities Plan 20-11-022

Date: 11/14/2011

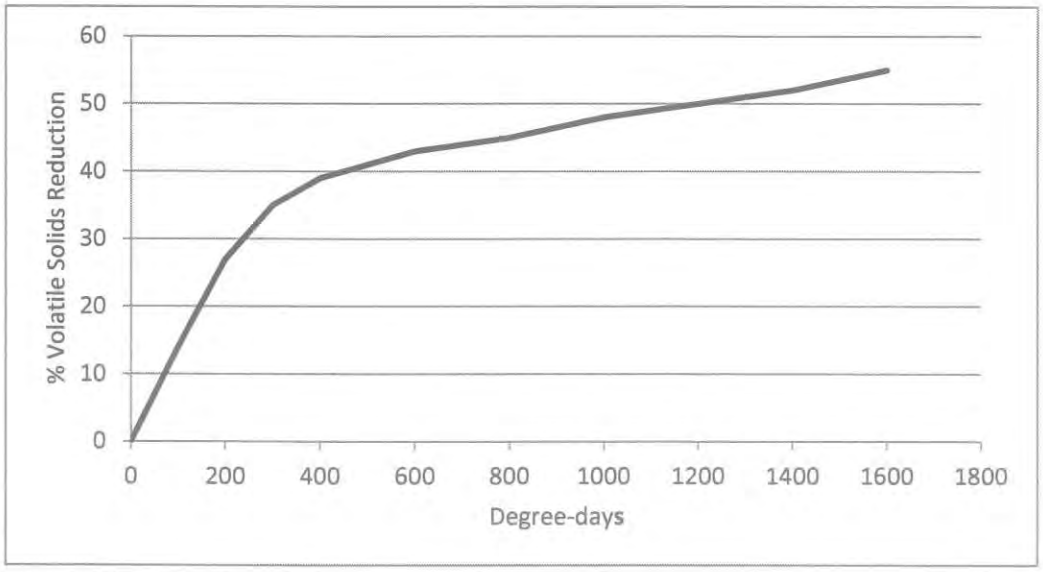
By STK

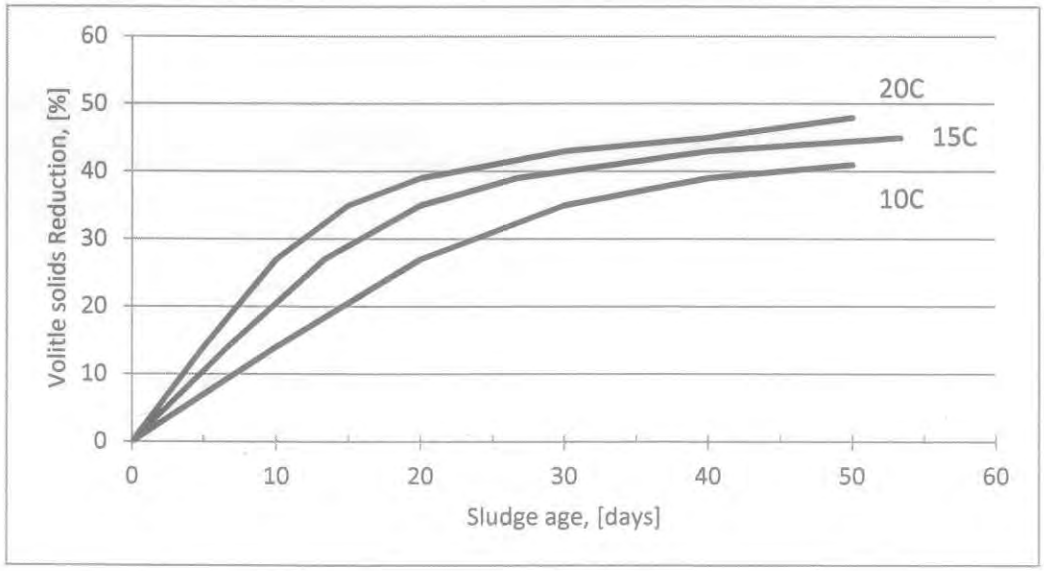
Inputs:

Beginning cost per wet ton	$ 65.00
Interest rate	3.0%
Annual cost escalation	3.0%

Year	Flow	Dry Solids Wasted	Dewatered Sludge	Dewatered Sludge	Disposal cost per ton	Disposal cost	PW period	Present worth of disposal cost
			14.7%					
	[mgd]	[ppd]	[Wtons/day]	[Wtons/yr]	[$]	[$/year]		[$/year]
2011	2.40	4663.7	15.9	5,790	$ 65.00	$ 376,350	0	$376,350
2012	2.54	4935.8	16.8	6,128	$ 66.95	$ 410,253	1	$398,304
2013	2.68	5207.8	17.7	6,466	$ 68.96	$ 445,851	2	$420,258
2014	2.82	5479.9	18.6	6,803	$ 71.03	$ 483,216	3	$442,211
2015	2.96	5751.9	19.6	7,141	$ 73.16	$ 522,422	4	$464,165
2016	3.10	6024.0	20.5	7,479	$ 75.35	$ 563,545	5	$486,119
2017	3.24	6296.0	21.4	7,817	$ 77.61	$ 606,665	6	$508,073
2018	3.38	8119.6	27.6	10,080	$ 79.94	$ 805,853	7	$655,232
2019	3.52	8455.9	28.8	10,498	$ 82.34	$ 864,408	8	$682,372
2020	3.66	8792.3	29.9	10,916	$ 84.81	$ 925,752	9	$709,512
2021	3.80	9128.6	31.0	11,333	$ 87.35	$ 989,998	10	$736,651
2022	3.94	9464.9	32.2	11,751	$ 89.98	$ 1,057,266	11	$763,791
2023	4.08	9801.2	33.3	12,168	$ 92.67	$ 1,127,679	12	$790,931
2024	4.22	10137.5	34.5	12,586	$ 95.45	$ 1,201,365	13	$818,071
2025	4.36	10473.8	35.6	13,003	$ 98.32	$ 1,278,457	14	$845,211
2026	4.50	10810.2	36.8	13,421	$ 101.27	$ 1,359,093	15	$872,350
2027	4.64	11146.5	37.9	13,838	$ 104.31	$ 1,443,418	16	$899,490
2028	4.78	11482.8	39.1	14,256	$ 107.44	$ 1,531,578	17	$926,630
2029	4.92	11819.1	40.2	14,673	$ 110.66	$ 1,623,729	18	$953,770
2030	5.06	12155.4	41.3	15,091	$ 113.98	$ 1,720,031	19	$980,910
2031	5.20	12491.7	42.5	15,508	$ 117.40	$ 1,820,649	20	$1,008,049
				226,745		total present value		$ 14,740,000

Degree-days	% VSS reduction	SRT at T 20	SRT at T 15	SRT at T 10
0	0	0	0	0
100	14	5	7	10
200	27	10	13	20
300	35	15	20	30
400	39	20	27	40
500	41	25	33	50
600	43	30	40	60
800	45	40	53	80
1000	48	50	67	100
1200	50	60	80	120
1400	52	70	93	140
1600	55	80	107	160





Anaerobic Digester Sizing

Volume digester #1	220000	gal
Volume digester #2	115000	gal
total	335000	

Year	Flow	Dry Solids Wasted	WAS Volume @ 10,000 mg/L	HRT of Holding tank
0	[mgd]	[dry lbs/day]	[gpd]	[days]
0	0	0	0	
2011	2.4	4,664	55,920	6.0
2012	2.54	4,936	59,182	5.7
2013	2.68	5,208	62,444	5.4
2014	2.82	5,480	65,706	5.1
2015	2.96	5,752	68,968	4.9
2016	3.1	6,024	72,230	4.6
2017	3.24	6,296	75,492	4.4
2018	3.38	8,120	97,358	3.4
2019	3.52	8,456	101,390	3.3
2020	3.66	8,792	105,423	3.2
2021	3.8	9,129	109,455	3.1
2022	3.94	9,465	113,488	3.0
2023	4.08	9,801	117,521	2.9
2024	4.22	10,138	121,553	2.8
2025	4.36	10,474	125,586	2.7
2026	4.5	10,810	129,618	2.6
2027	4.64	11,146	133,651	2.5
2028	4.78	11,483	137,683	2.4
2029	4.92	11,819	141,716	2.4
2030	5.06	12,155	145,748	2.3
2031	5.2	12,492	149,781	2.2

Aerobic digester sizing

degree days req'd for 38% VSR	400	C-days
Xi	25,000	mg/l
f	0.7	
Xi	17,500	mg/l
Kd	0.06	
Pv, volatile fraction	0.8	
SRT needed at 10C	40.0	days

maximum temperature =	22	C
degree days at max temp and SRT=	880	
VSR from M&E fig 12-25 =	45%	
Oxygen requirment from M&E table 12-24 =	2.3	lbs O2/lb VSR

$$Req'd\ Volume = \frac{Q_i\,(Xi + YQ_i)}{X\,(Kd\,Pv + 1/\Theta_c)}$$

Year	Thickened WAS Volume [gpd]	Q was [cf/day]	Req'd Vol at 10C [cf]	Req'd Vol at 10C [Mgal]	VSR lbs/d	O2 Reqd at max temp lbs O2/d
2011	22,368	2,990	58,520	0.44	1,679	3,862
2012	23,673	3,165	61,934	0.46	1,777	4,087
2013	24,978	3,339	65,347	0.49	1,875	4,312
2014	26,282	3,514	68,761	0.51	1,973	4,537
2015	27,587	3,688	72,175	0.54	2,071	4,763
2016	28,892	3,863	75,588	0.57	2,169	4,988
2017	30,197	4,037	79,002	0.59	2,267	5,213
2018	38,943	5,206	101,884	0.76	2,923	6,723
2019	40,556	5,422	106,104	0.79	3,044	7,002
2020	42,169	5,638	110,325	0.83	3,165	7,280
2021	43,782	5,853	114,545	0.86	3,286	7,558
2022	45,395	6,069	118,765	0.89	3,407	7,837
2023	47,008	6,285	122,985	0.92	3,528	8,115
2024	48,621	6,500	127,205	0.95	3,650	8,394
2025	50,234	6,716	131,425	0.98	3,771	8,672
2026	51,847	6,931	135,645	1.01	3,892	8,951
2027	53,460	7,147	139,865	1.05	4,013	9,229
2028	55,073	7,363	144,085	1.08	4,134	9,508
2029	56,686	7,578	148,305	1.11	4,255	9,786
2030	58,299	7,794	152,525	1.14	4,376	10,065
2031	59,912	8,010	156,745	1.17	4,497	10,343

SEPARATION TECHNOLOGIES

ANDRITZ

December, 20, 2007

CCI 12/2007 = 4556

6/2011 = 5059

$\frac{5059}{4556} = 1.11$

Scott Krallman

J-U-B Engineers, Inc

7825 Meadowlark Way

Coeur d'Alene, ID 83815

Dear, Scott

Andritz Separation is supplying the following information for the Post Falls WWTP

As Dale explained the difference between the SMX – 8 roll and the SMX -14 roll belt press could be up to 2% greater cake with the 14 roll. The difference between the belt press and the centrifuge is normally 3 to 5% drier cake.

For the 140,000 gpd (980,000 gpw) operating at 8hrs/day 6 days per week would be 340 gpm per unit. I would recommend the D7L centrifuge for this application. The budget price for the D7L centrifuge is $709,000.00 with a complete package as described in the specifications and attached information.

$709,000 x 1.11 = $787,276

The Andritz Decanter Centrifuge Comes Standard With:

Scroll/Bowl:	316L stainless steel cast
Wetted Parts:	316L stainless steel
Centrifuge Operating Panel:	NEMA 4X stainless steel completely wired per specification. Terminal connection between machine and control panel to be provided by others.
Sludge Inlet:	Flanged inlet pipe header with polymer and wash water injection taps.
Control System Interface:	Fully automatic PLC with touch screen:
Drive:	VFD control.
Spare Parts:	Per specification.
Foundation:	Anchor bolts. Vibration Isolation.

ANDRITZ SEPARATION INC.

1010 Commercial Blvd. S.
Arlington, Texas 76001
Tel. (817) 465-5611
Fax (817) 468-3961
environ.us@andritz.com

Tools:	One (1) set
Other Services:	Field & Performance testing as specified Shop test – dry & wet operation with report
Lubrication:	High speed grease lubrication system

2. Engineering and Documentation:
(Includes the following)

- Arrangement drawings and dimensions for the Andritz scope (as required by specifications)
- Foundation drawings showing details needed for building work (as required by specifications)
- Motor list
- Written sequence of operation including all interlocks (as required by specifications)
- Control panel layout
- Electrical and pneumatic schematics
- Terminal box details
- Erection, operating and maintenance manuals

3. The following items are furnished as a standard.

- Spare parts and tools (As defined in the attached Andritz specification)
- Warranty – 12 months from start up or 18 months from delivery whichever occurs first.
- Shop test – dry and wet demonstration with report

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E. *Scope Not Included in Andritz Centrifuge Price*
(To be provided by others)

- Field Services
- Access platforms (if required)
- Sludge feed pumps
- Polymer systems
- Sludge discharge conveyors
- Flow meters and related field instruments
- Wash water booster pumps (if required)
- Air compressors (if required)
- Freight to job site
- Civil and structural engineering work including preparation of foundations, platforms, and channels
- Static calculations of foundations, building and building plans (Andritz will furnish load data)
- Building modifications
- All utilities required for operation and erection
- Cranes or other lifting devices
- Unloading and unpacking at site
- Flush water connections
- Oil and grease
- Electrical field wiring and connections to main and field panels or junction boxes
- Equipment installation
- Local pressure gauges and other instruments not specified in our scope of supply

If you require any feed pumps, polymer systems or solids transportation systems we would be capable of supplying those also.

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Another feature that Andritz has available to our customers is free testing. Andritz maintains a fully staffed Laboratory in our Arlington TX facility. You can send in a 5 gallon sludge sample and we would perform a complete test for not only the belt press but the centrifuge also. With these results you would have a good understanding of what performance your sludge is capable of obtaining. With this data Andritz would guaranty the performance on any of our equipment that you decide upon. I am also attaching the forms and instructions for this option.

Dale has also asked for information on the 2.8m SMX –S8 belt press. The specs and drawings are also attached. The budget price for these units is $315,000.00 ea.

If you have any further questions please feel free to contact either Dale or myself at (925) 216-9881.

Regards,

Brian Lent

Brian Lent

Andritz Separation Inc

Western Regional Sales

brian.lent@Andritz.com

SCHWING BIOSET

350 SMC Drive
Somerset WI 54025
Phone: (715) 247-3433
Fax: (715) 247-3438

November 8, 2011

JUB Engineering
250 S. Beechwood Ave. Suite 201
Boise, ID 83709

Attention: Scott Krallman

Subject: Post Falls, ID Bioset TM Process – Class A/EQ Biosolids Stabilization System
Schwing Bioset, Inc. Quotation No. 2011094

Dear Mr. Krallman,

Schwing Bioset, Inc. is pleased to propose the following as our budgetary scope of supply for the above referenced System.

BIOSOLIDS PROCESSING SUMMARY

Process Material Description:	Municipal Sewage Biosolids
Process Material Solids Content:	14.7% Total Dry Solids
Process Material Density:	65 lb/ft^3
Bioset System Operation Schedule:	35 hours/week
Design Biosolids Processing Rate:	11905 wet-lb/hr
Estimated Lime Feed Rate:	1010 lb/hr (16% of wet sludge cake mass)
Estimated Sulfamic Acid Feed Rate:	7 lb/hr (0.1% of wet sludge cake mass)
Pump Flowrate (includes added chemicals):	13830 wet-lb/hour (27 GPM)

BIOSET SYSTEM EQUIPMENT SUMMARY

A. Lime Silo & Feeder – Provides storage and metering of quicklime (calcium oxide) into the Twin-Screw Mixer inlet hopper.
B. Sulfamic Acid Feeder – Provides storage and accurate metering of dry sulfamic acid into the Twin-Screw Mixer inlet hopper.
C. Twin-Screw Mixer – The Twin-Screw Mixer allows for the blending of the sludge, lime, and acid into a homogenous mixture. It also helps feed this mixture into the Reactor Feed Pump.
D. Reactor Feed Pump – The Reactor Feed pump moves the sludge/lime/acid mixture through the Reactor Vessel.
E. Hydraulic Power Unit - Reactor Feed Pump – The Hydraulic Power Unit drives the Reactor Feed Pump.
F. Reactor Vessel – The insulated plug-flow reactor is used to achieve the required time and temperature to meet EPA regulations for Class A/EQ biosolids.
G. Ammonia Scrubber – Captures and treats ammonia emissions at the reactor discharge outlet.
H. Control Panel - Bioset Process – Used to operate and monitor all Bioset System equipment and instrumentation.
I. Testing Kit – Portable instrument is provided to measure the pH and temperature of material generated by the Bioset System.

A. LIME SILO & FEEDER

Quantity:	One (1)
Material of Construction:	A36 carbon steel
Material Storage:	Quicklime (Calcium Oxide)
Design Storage Capacity:	30 tons (980 ft^3 @ 60 lbs/ft^3) (alternate sizes available)
Diameter:	8 feet
Height (Vertical Sidewall):	20 feet
Height (Overall):	30 feet

Scope includes:

1. Silo sidewalls and discharge cone shall be fabricated from A36 carbon steel plate. Roof shall be minimum 7ga [5 mm] carbon steel.
2. Silo shall be furnished with a 60° discharge cone and Vibrating Bin Activator. Electric motor for Bin Activator shall be 3/4HP [1/2 kW].
3. A variable speed Lime Screw Feeder shall be furnished to meter and discharge lime into the Twin-Screw Mixer hopper. Electric motor for screw shall be 1HP [3/4 kW].
4. Roof railings, toe board, and access ladder with safety cage shall be furnished.
5. A shaker type dust collector shall be mounted at the roof of the lime silo. Electric motor for shaker shall be 1/3HP [1/4 kW].
6. PVR valve and 20-inch [500 mm]diameter manway shall be furnished at silo roof.
7. Fill pipe shall be 4-inches [100 mm] in diameter with long radius elbow and target box.
8. Three (3) RF type level switches shall be furnished.

9. Lime truck unloading controls shall be furnished. Panel enclosure shall be NEMA 4X, 304 stainless steel. This control enclosure shall be used to activate the silo dust filter when the silo is being filled with lime.
10. Lime silo exterior shall be painted with standard enamel finish. Interior shall be unpainted mill finish. Interior of skirting shall be standard epoxy finish.
11. Silo will require on-site assembly by installing contractor. On-site assembly includes installation, erection, and field welding.

B. SULFAMIC ACID FEEDER

Quantity:	One (1)
Motor size:	1/4 HP [0.18 kW], 90VDC

Scope includes:

1. A variable speed chemical feeder shall be furnished to discharge dry sulfamic acid into the mixing feed hopper.
2. A stainless steel feed hopper shall be furnished with storage capacity for approximately 50 lbs [20 kg] of dry sulfamic acid.
3. A platform and support legs shall be provided to elevate the sulfamic Acid Feeder into position next to the mixing feed hopper.

C. TWIN-SCREW MIXER

Quantity:	One (1)
Model:	SD 250
Material of Construction:	A36 Carbon Steel
Auger Diameter:	9.6 inches [244 mm]
Inlet Opening Size:	Approx. 60 inches x 17 inches [1524 x 430]
Motor size:	25 HP [18.75 kW], 480V / 3∅ / 60Hz

Scope includes:

1. The Twin-Screw Mixer shall mix biosolids, lime, and acid into a homogenous mixture and feed that mixture into the Reactor Feed Pump. The augers shall be intermeshing and counter-rotating, with a combination of paddle flights and full flights.
2. The Twin-Screw Mixer shall be furnished with inboard bearings to support the end of the screw auger shafts.
3. Carbon steel Feed Hopper shall be supplied with the Twin-Screw Mixer. Inlet for sludge, lime feed, and acid feed shall be provided.
4. A "guided wave radar" type level sensor shall be included with the Feed Hopper, mounted over the Twin-Screw Mixer inlet opening. Field wiring to the Bioset Process Control Panel shall be completed by installing contractor.

D. REACTOR FEED PUMP

Quantity:	One (1)
Model:	KSP 12 V(K) L
Design Flowrate:	27 GPM [101 LPM]
Pumping Stroke Length:	19 inches [500 mm]
Diameter - Material Cylinders:	7.09 inches [180 mm]
Diameter – Hydraulic Cylinders/rod:	3.54/1.97 inches [90/50 mm]
Cylinder Ratio:	4
Diameter - Suction Poppets:	8 inches [210 mm]
Diameter – Discharge Poppets:	5.9 inches [150 mm]
Diameter – Discharge Outlet:	7.09 inches [180 mm]

Scope includes:

1. The Reactor Feed Pump shall be a hydraulically driven, twin-cylinder, reciprocating piston pump equipped with poppet valves.
2. The Reactor Feed Pump shall be equipped with a single discharge outlet. An adapter to the pipeline shall be furnished at the discharge outlet, and shall consist of a quick-connect coupling, 4" spool piece, 2" pressure bleed valve, and 4" ANSI 150# flange.
3. One (1) ball valve shall be supplied in this pipeline to isolate the Reactor Feed Pump for maintenance.
4. The Reactor Feed Pump water box shall have 1" connections for water supply and overflow and 1½" for drain line. Water lines and valves shall be supplied by installing contractor.
5. Maintenance Mode Controls shall be factory mounted at the Reactor Feed Pump. Maintenance Mode Controls include a MAINTENANCE MODE ON / OFF switch, FORWARD / OFF / REVERSE switch, PUMP JOG pushbutton, and EMERGENCY STOP pushbutton. Field wiring to the Bioset Process Control Panel shall be completed by installing contractor.

E. REACTOR FEED PUMP HYDRAULIC POWER UNIT

Quantity:	One (1)
Model:	230L-25HP
Reservoir Size:	61 Gal.
Motor Size:	25 HP, 480V / 3∅ / 60Hz
Hydraulic Pump (Reactor Feed Pump):	Rexroth AA11VO40

Scope includes:

1. The structural frame and oil reservoir shall be fabricated from A36 carbon steel.
2. Rexroth variable displacement axial piston pump shall be supplied to drive the hydraulic circuit for the Reactor Feed Pump.
3. The Power Unit shall include an initial fill of oil, pressure gauge, pressure switch, relief valve, clean-out cover, 10-micron return line oil filter, and combination temperature and sight gauge.
4. A premium efficient, TEFC motor shall be supplied.

5. A junction box shall be factory mounted on the Power Unit.
    - The junction box enclosure shall be NEMA 4X, 304 stainless steel.
    - An EMERGENCY STOP pushbutton and circuit breaker disconnect switch shall be mounted on the front of the enclosure.
    - Field wiring to the Bioset Process Control Panel shall be completed by the Installing Contractor.

F. REACTOR VESSEL

Quantity:	One (1)
Material of construction:	A36 carbon steel
Diameter:	48 inches
Length:	16 feet (excluding the tapered ends)
Design Residence Time:	60 minutes

Scope includes:

1. Previously operating under the time/temperature formula of option 1B of the 503 rule for pathogen destruction (70C/30minutes), on August 16, 2011 the Bioset process was accepted as a PFRP process and can now operate at 55C for 40 minutes. The reactor is designed for 60 minutes retention time for a 50% safety factor.
2. The Reactor Vessel shall be constructed from welded A36 carbon steel pipe. The Reactor Vessel shape shall be cylindrical with tapered ends, designed to facilitate plug-flow of material.
3. Insulation shall be 2 inches [50 mm] thick with aluminum jacketing. Insulating services for the Reactor Vessel shall be provided by Schwing Bioset.
4. One (1) pressure sensor shall be furnished at the Reactor Vessel inlet.
5. Five (5) temperature sensors shall be installed along the length of the Reactor Vessel and piping. Output shall be displayed locally and at the Bioset Process Control Panel.
6. The Reactor Vessel shall include a self-supporting discharge assembly for truck loading. The discharge assembly shall consist of a vertical riser and a horizontal arm terminating in the discharge outlet. A swivel joint shall be furnished so that the horizontal section can be manually pivoted.
7. A collection hood shall be furnished at the discharge outlet to collect vapor for the Ammonia Scrubber. The hood shall be furnished with a neoprene chute, 8" discharge and 6" connection to the Ammonia Scrubber suction piping.

G. AMMONIA SCRUBBER

Quantity:	One (1)
Motor Size:	1 HP [3/4 kW], 480V / 3∅ / 60Hz

Scope includes:

1. Ammonia and water vapor at the Reactor Vessel discharge outlet shall be captured by a wet scrubber.
2. The scrubber shall be of fiberglass, corrosion-resistant construction.

3. A 500 CFM [14 m^3/min] blower shall maintain negative pressure at the vapor collection hood, TEFC motor.
4. Scrubber flushing requires 8 GPM [30 LPM] clean non-potable water.

H. CONTROL PANEL – BIOSET PROCESS

Quantity:	One (1)

Scope includes:

1. The Bioset Process Control Panel enclosure shall be NEMA 4X, 304 stainless steel, mounting Reactor Feed pump Hydraulic Power unit.
2. External power supply shall be 480V / 3∅ / 60Hz. A circuit breaker disconnect switch shall be provided at the front of the panel.
3. SBI PLC shall be used to control all panel functions.
4. Touch-screen interface shall be used for all operator input, status monitoring, local controls, and alarm notification.
5. The following shall be monitored using the touchscreen interface:
    - REACTOR PRESSURE SENSOR. Measures material pressure at the Reactor Vessel inlet.
    - REACTOR TEMPERATURE SENSORS. Measures the temperature profile of the sludge/lime/acid mixture as it moves through the Reactor Vessel.
6. The following shall be controlled/adjusted/monitored using the touchscreen interface:
    - LIME FEED RATE INTO THE MIXER HOPPER. In Automatic Mode, the lime feed rate shall be adjusted as a fixed percentage of the sludge cake feed rate, based on Reactor Vessel temperature measurements.
    - SULFAMIC ACID FEED RATE INTO THE MIXER HOPPER. In Automatic Mode, sulfamic acid feed rate shall be a fixed percentage of the lime feed rate.
    - PUMPING RATE FOR THE REACTOR FEED PUMP.
    - OPERATION OF THE AMMONIA SCRUBBER. In Automatic Mode, the Ammonia Scrubber shall run whenever the Reactor Feed Pump is in operation.
7. A POWER ON/OFF indicator light, EMERGENCY STOP pushbutton, ALARM indicator light, and ALARM RESET pushbutton shall be provided at the front of the panel.
8. Full-voltage motor starters for the following equipment shall be included:
    - Hydraulic Power Unit.
    - Ammonia Scrubber Fan.
9. Variable speed drives for the following equipment shall be furnished by Schwing Bioset and factory-mounted in the Bioset Process Control Panel:
    - Twin-Screw Mixer.
    - Lime Feed Screw.
    - Sulfamic Feed Screw.

I. TESTING KIT

Quantity:	One (1)
Model:	Oakton pH Meter 110

Scope includes:

1. A portable pH meter shall be provided to measure the pH and temperature of treated biosolids discharged from the Reactor Vessel.

SPECIAL TOOLS

One (1) set of Schwing Bioset standard tools is included.

SPARE PARTS

During commissioning, Schwing Bioset recommends changing out the hydraulic oil filter after the first 50 hours of Hydraulic Power Unit operation. The following spare part shall be furnished for this purpose.

Item:	Quantity:
Hydraulic Oil Filter	One (1) set

No other spare parts are included with this quotation.

FIELD SERVICE

Schwing Bioset shall provide a trained service technician to supervise system installation, assist start-up, and / or to train the owner's personnel in the operation and maintenance of the Schwing Bioset supplied equipment.

The service technician shall be made available for Sixteen (16) days over Four (4) trips.

If required, additional service may be purchased at the prevailing rates at the time service is performed. Current service rates are as follows:

- US $115.00 per hour – standard eight (8) hour day.
- US $172.50 per hour – overtime (over and above the standard eight (8) hour day.)
- US $230.00 per hour – Sundays and holidays.
- Travel and per diem (i.e., hotel, food, car) expenses at cost + 15%.

SCOPE OF SUPPLY SUMMARY

A. Lime Silo & Feed Screw:	One (1)
B. Sulfamic Acid Feeder:	One (1)
C. Twin-Screw Mixer [SD 250]:	One (1)
D. Reactor Feed Pump [KSP 12 V(K) L]:	One (1)
E. Hydraulic Power Unit- Reactor Feed Pump [Model 230-25 HP]:	One (1)
F. Reactor Vessel [16' x 48" diameter]:	One (1)
G. Ammonia Scrubber:	One (1)
H. Control Panel - Bioset Process:	One (1)

I. Testing Kit:	One (1)
Spare Parts:	One (1) lot
Special Tools:	One (1) lot
Field Service:	Sixteen (16) days, four (4) trips

Total price for the above listed scope of supply..... **$ 688,200.00**

All prices are quoted:
F.O.B. Factory
Full Freight Allowed to jobsite
Price is valid for 60 days
Price is in US dollars.

INSTALLATION AND OPERATION ESTIMATE

The following estimated values may be used to assist in evaluating the installation and operating costs of the Schwing Bioset Alkaline Stabilization System. The values presented are nominal only, and adjustment as necessary must be considered to suit unique site conditions and operating requirements.

Building Requirements: Lime Feeder, Mixer, Pump, Reactor, and ancillary equipment need a footprint of 1200 square feet.

Installation: Installation of the mechanical equipment may be estimated as 160 man-hours. Electrical and Instrumentation installation may be estimated as 160 hours for that trade. Installation may be completed with typical tools, along with rigging equipment capable of 4 ton capacity.

Operating Personnel: The Bioset equipment does not require more than 1 attendant during operation. Typically the attendant of the Bioset equipment assumes other operating duties at the plant in parallel with Bioset operation.

Maintenance Costs: Owners should expect downtime of 10 days or less per year for maintenance activities. Wear parts cost may be estimated as approximately $3,000 per year.

TAXES

No taxes are included in this quote. The amount of any applicable present or future state/local sales/use tax or other government charge upon the production, sale, shipment, and/or use of the goods covered by this quotation shall be paid directly to the taxing authorities by purchaser, and paid tax receipts will be furnished to Schwing Bioset, Inc. upon request, unless purchaser provides us with an exemption certificate acceptable to the taxing authorities.

TERMS

10% with purchase order.
10% upon approval of submittals, net 30 days.
75% upon shipment, net 30 days.
5% upon final acceptance, not to exceed 90 days from delivery.

Payment terms offered are subject to final credit approval

SUBMITTALS

Submittals shall be delivered eight (8) to ten (10) weeks after receipt of approved order. Four (4) hard copies shall be furnished.

O&M MANUALS

Five (5) final copies shall be furnished.

DELIVERY

Equipment shall be delivered eighteen (18) to twenty-four (24) weeks after submittals are approved.

PAINTING

Schwing Bioset standard primer and finish coatings shall be factory applied as follows, unless otherwise noted above:

- Surface Preparation – Sandblast SSPC-SP6
- 1st Coat – Red oxide primer, 2-3 mils DFT
- 2nd Coat – Tnemec 135 Chembuild, 3-5 mils DFT
- 3rd Coat – Tnemec N69 Hi-Build Epoxoline II, 3-5 mils DFT

All field touch-up painting of equipment shall be performed by installing contractor.

WARRANTY

Schwing Bioset, Inc. warrants its new equipment against defects in material and workmanship under normal use and service, and which shall not have been subject to misuse, negligence or accident, for a period of 1 year to start from beneficial use or 90 days from delivery, whichever comes first. Due to the specialized nature of Schwing Bioset material handling equipment, Schwing Bioset field service engineers shall not be restricted in adjusting or repairing Schwing Bioset-furnished equipment, regardless of collective bargaining agreements entered into by other parties.

Schwing Bioset, Inc. will replace or repair free of charge, FOB Job Site, such part or parts thereof as in its sole judgment deemed defective.

This warranty shall not apply to any equipment manufactured by us which shall have been loaded or operated beyond its rated capacity as specified by Schwing Bioset, Inc. Damage resulting from improper installations or alterations outside our plant will be considered as misuse and not as a defect. Certain parts of the equipment provided by Schwing Bioset such as the pumping cylinders, valves, pumping rams, screw flights, sliding frame components, trough liners for screws etc. in contact with material, are subject to normal wear. This normal wear is not covered under this warranty. Schwing Bioset, Inc. shall not be liable for consequential, incidental or any damages or injuries of any kind, or for expenses, losses or delays incidental to any failure. Schwing Bioset, Inc. reserves the right to make changes and improvements in its product without incurring any obligations to install any such changes or improvements in its products previously manufactured.

This warranty is in lieu of any other warranty expressed or implied or any other obligation or liability on the part of Schwing Bioset, Inc., and no other person is authorized to make any representations or warranties beyond those herein expressed.

Without limiting the generalities of the foregoing, THERE IS NO IMPLIED WARRANTY OF MARKETABILITY AND NO IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

EQUIPMENT AND SERVICES TO BE PROVIDED BY OTHERS

1. Installation, offloading, field assembly, and erection of the Schwing Bioset, Inc. (SBI) supplied equipment.
2. Storage of equipment and/or costs for long-term storage (longer than 3 months).
3. Racks, trays or supports for hydraulic lines, sludge lines, or control wiring.
4. Miscellaneous metal.
5. Field painting of any of the SBI supplied equipment. All touch up painting required due to normal wear and tear during shipping shall the responsibility of others.
6. Field wiring of any kind.
7. Labor and material for preliminary, final field, system performance, and system integrity tests (SBI shall supervise only).
8. It is the contractor's responsibility to field verify building dimensions, equipment access, and that equipment layout/dimensions are suitable to accommodate the SBI supplied equipment.
9. Water and drain piping of any kind.
10. Spare parts not specifically mentioned in this scope.
11. Anchor bolts, nuts, and washers for the SBI supplied equipment.
12. Cost for Engineer, Owner, or Contractor to witness any shop test.
13. Additional costs to supply alternate products other than specifically mentioned in this scope.
14. Networking, hardware, communication modules, or power supplies not specifically mentioned in this scope.
15. PLC programming software or software licenses not specifically mentioned in this scope.
16. Field service technicians or special tools not specifically mentioned in this scope.
17. Motor starters or variable frequency drives not specifically mentioned in this scope.
18. After equipment is delivered to site, disposal of any hydraulic oil shall be by others.

If you have any further questions, please feel free to contact me at (203) 744-2100, fax (203) 744-2837, or email jdivalentino@schwingbioset.com.

Yours truly,
Schwing Bioset, Inc.

Joshua R. Di Valentino
Western Regional Sales Manager
cc: Chuck Wanstrom - SBI

DATA INPUT

Sludge Input	208	Wet tons per Week
Solids Content	15%	
Weekly Operation	5	Days per Week
Daily Operation	7	Hours per Day
Sludge Density	65	lbs per cu.ft
Lime Density	60	lbs per cu.ft
Acid Density	80	lbs per cu.ft
Mix Density	65	lbs per cu.ft
Initial Temp - Sludge	85	Degrees F (29.4 degrees C)
Initial Temp - Lime	85	Degrees F (29.4 degrees C)
Sludge Flow Rate	**182.86**	cu.ft sludge per hour
	22.80	gpm
	198.10	Lbs per minute

PROJECT: Post Falls, ID
Rep:
Contact:
Telephone:
Fax:
E-mail

Schwing Sales: Joshua DiValentino
Telephone: 612-867-4429

PEC APPROVED OPERATION

Required Retention Time	**30**	Minutes
Thermodynamic		
Target Temp (Per PEC)	55.00	Degrees C
	131.00	Degrees F

To Meet the Target Temperature Wet lb basis

Lime Required	0.085	Lbs lime per Lb Total
Acid Required	0.00055	Lbs of acid per Lb Total
TOTAL WEIGHT	0.086	Lbs of Lime & Acid per Lb

Mass Flow

Sludge Cake	**91.45%**	of INCOMING PRODUCT
Lime and Acid	**8.55%**	
Sludge Cake	**198.10**	Lbs per minute
Lime	**16.83**	Lbs per minute
Acid	**0.11**	Lbs per minute
TOTAL	**215.04**	Lbs per minute

STANDARD EPA APPROVED PROCESS

Retention Time	30	Minutes
Thermodynamic		
Target Temp (EPA 503)	70.01	Degrees C
	158.01	Degrees F

To Meet the Target Temperature

Lime Required	0.138	Lbs lime per Lb Total
Acid Required	0.00090	Lbs of acid per Lb Total
TOTAL WEIGHT	0.139	Lbs of Lime & Acid per Lb

Mass Flow

Sludge Cake	**86.14%**	
Lime and Acid	**13.86%**	of INCOMING PRODUCT
Sludge Cake	**198.10**	Lbs per minute
Lime	**27.28**	Lbs per minute
Acid	**0.18**	Lbs per minute
TOTAL	**225.55**	Lbs per minute

Volumetric Flow Rate		
TOTAL FLOW RATE	3.3	cu.ft/ min (See Density)
	24.7	gpm (See Density)
	198.5	cu.ft/ hour

Equipment Selection		
Reactor Selection	BR06	
Pump Selection	KSP 17	
Reactor Retention Vol	226.19	cu.ft
Specified Flow Rate	**198.50**	cu.ft sludge per hour
Reactor Retention Time	68.37	Minutes
Safety Factor @ Temp	127.91%	

SUMMARY		
Final Product		
Solids Content	23.94%	Solids
Temperature	131.00	Degrees F
pH	12.00	
Production		
Sludge Production	416,000	Lbs per Week
Lime Usage	35,350	Lbs per Week
Acid Usage	230	Lbs per Week
Lime Cost	$150.00	per Ton
Acid Cost	$2,800.00	per Ton
Weekly Lime Cost	$2,651.27	per Week
Weekly Acid Cost	$321.69	Per Week
Power Consumption	26	kW per Hour
	893.88	kWHr per week
Power Cost	$0.08	per kWHr
Weekly Cost	$71.51	

TOTAL ESTIMATED ANNUAL (Chemical & Power)	
OPERATING COST	$158,312.53

Volumetric Flow Rate		
TOTAL FLOW RATE	3.5	cu.ft/ min (See Density)
	26.0	gpm (See Density)
	208.2	cu.ft/ hour

Equipment Selection		
Reactor Selection	BR06	
Pump Selection	KSP 17	
Reactor Retention Vol	226.19	cu.ft
Specified Flow Rate	**208.20**	cu.ft sludge per hour
Reactor Retention Time	65.19	Minutes
Safety Factor @ Temp	117.28%	
Minimum Temp to meet	67.61	Degrees C
EPA 503 Regs with Reactc	153.69	Degrees F

SUMMARY		
Final Product		
Solids Content	28.97%	Solids
Temperature	158.01	Degrees F
pH	12.00	
Production		
Sludge Production	416,000	Lbs per Week
Lime Usage	57,287	Lbs per Week
Acid Usage	372	Lbs per Week
Lime Cost	$150.00	per Ton
Acid Cost	$2,800.00	per Ton
Weekly Lime Cost	$4,296.54	per Week
Weekly Acid Cost	$521.31	Per Week
Power Consumption	26	kW per Hour
	893.88	kWHr per week
Power Cost	$0.08	per kWHr
Weekly Cost	$71.51	

TOTAL ESTIMATED ANNUAL (Chemical & Power)	
OPERATING COST	$254,247.12

12/12

1/22

Proposal
Q21508
R0

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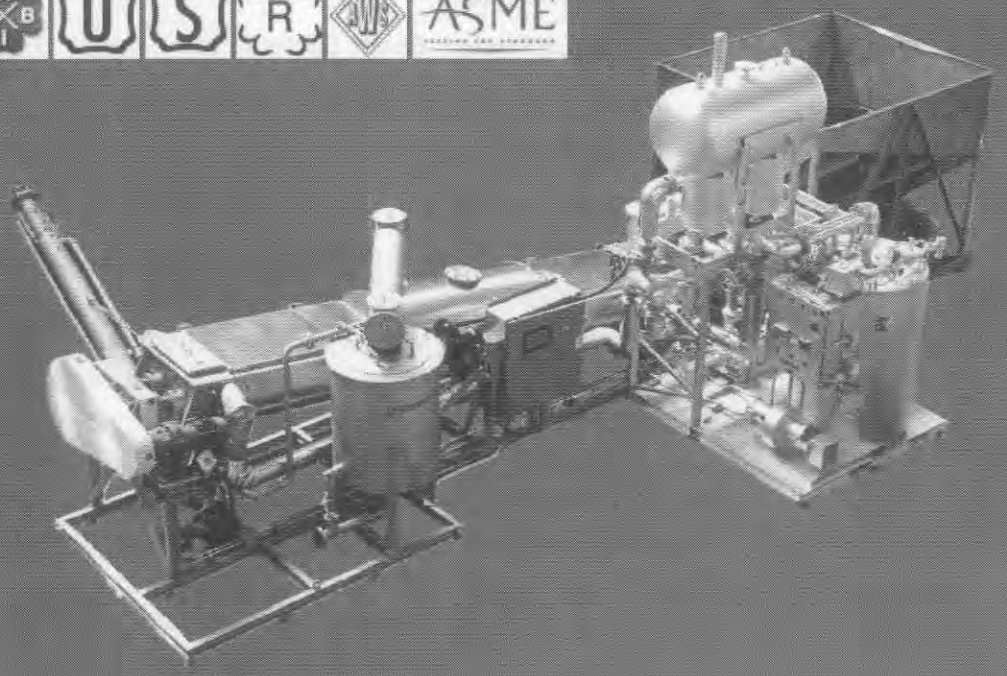
info@Therma-Flite.com
www.Therma-Flite.com
Corporate Headquarters
P.O. Box 847
849 Jackson St.
Benicia, CA 94510

IC 7000

Bio-Scru® Dryer System

Prepared for: Goble Sampson Associates - Post Falls, ID Project
Prepared by: Michael Stone
Municipal Sales Manager
November 03, 2011

Therma-Flite
The Screw Heat Exchanger Company



IC BIO-SCRU®

1 OVERVIEW

1.1 Description:

Therma-Flite, IC 7000 is an automated, indirectly heated, continuous flow biosolids dryer system with an ASME code-stamped thermal fluid heating module and dryer module. The IC series dryers are complete turnkey biosolids dryer systems, modularly designed for ease of installation. Programmable logic controller (PLC) automation and control of the IC series system insures meeting 40 CFR, 503, Class A requirements while processing on a continuous basis with minimal operator attention.

1.2 Scope:

The scope of this proposal includes the design and furnishing of a complete sludge dryer system. The sludge dryer system shall consist of 1 unit, each consisting of the following components:

1.2.1 Feed Hopper with Integrated Feed Extruder Screw and PC Pump

1.2.2 BIO-SCRU ® Dryer with integrated HOLO-SCRU ® Rotors

1.2.3 Thermal Fluid Heater

1.2.4 Cooling Screw or Rotary Discharge Valve

1.2.5 Scrubber / Condenser

1.2.6 Control Panel

1.2.7 Odor Control System (Optional)

1.3 How the IC-7000 BIO-SCRU® Biosolids Dryer System Works:

The BIO-SCRU's® drying chamber is a sealed, sub-ambient pressure, anaerobic atmosphere. The drying chamber is kept constantly full to minimize head space in the chamber and to maximize the thermal operating efficiency. The BIO-SCRU's® heat energy is provided by the thermal fluid circulating through the hollow rotor flighting, rotor shaft and dryer chamber housing. This method of heating is indirect, meaning the heating medium is not in contact with the product being heated. The BIO-SCRU's® independently driven, variable speed, dual-rotor design includes proprietary features which make the rotors self-clearing. This feature breaks up any sludge that may bake onto the rotors and form clumps. The BIO-SCRU® dryer design can also incorporate mixing blades, which break up any large clumps and homogenize the particle size to insure the sludge is uniformly heated throughout the unit.

The BIO-SCRU® dryer utilizes a multi-sensing-point method for failsafe operation. The PLC-controlled scrubber/condenser insures that small particulate blow-off is captured within the condensate stream to minimize odors.

2 PERFORMANCE AND CAPACITY

2.1 IC 7000 OPERATION PARAMETERS:

2.1.1 Method: Automated, indirectly heated, continuous flow dehydration system.

2.1.2 Capacity: 6800 to 7000 pounds of water removed per hour.

2.1.3 Hopper: 35 cubic yards standard, other options are available.

IC 7000					
Water Removal Capacity (Maximum) 7000 Lbs Hr					
Hourly feed rate drying to 75% solids	8333	8750	9211	9722	10500
Hourly feed rate drying to 90% solids	8077	8400	8750	9130	9692
% Solids in feed (minimum 12%)	12	15	18	21	25

2.1.4 Process feeds can include digested, waste-activated bio-sludge, or a mixture of multiple types of sludge as is common in regional facilities.

2.1.5 Designed for variable processing rates up to continuous 24/7 operation.

2.2 Energy Utilization:

2.2.1 Dryer chamber efficiency: 96%

2.2.2 Thermal fluid heater efficiency:

2.2.2.1 86.5% (LHV) with natural gas or fuel oil.

2.2.2.2 Optional High Efficiency Thermal Fluid Heater 91% (LHV)

2.2.3 Thermal fluid heater maximum heat output: 10 MMBtu (LHV)

2.2.4 Natural gas fuel consumption: Nominal 1350 Btu/pound of water removed. Primary sludge or sludge heavy in fats, greases, and oil will require a few percentage points more energy for drying.

2.3 Electrical Motors:

2.3.1	Dryer screws drive	20 hp
2.3.2	PC Pump Feed System	20 hp
2.3.3	Hopper drive	10 hp
2.3.4	Combustion fan	15 hp
2.3.5	Thermal fluid pump	50 hp
2.3.6	Condenser fan motor	1 hp
2.3.7	Cooling screw conveyor	2 hp
		118 total hp

Note: Horsepower ratings are for the standard BIO-SCRU® System. Final layout and auxiliary equipment may change the total connected horsepower.

2.4 Utilities:

2.4.1 Natural gas pressure required: 120" wc

2.4.2 Fuel input: Natural gas (@1000BATU/CU.FT.) 12496 cu.ft/hr

2.4.3 Condenser water required: (cooling water is included) 350 gpm at 45 psi, not to exceed 60 psi of water flow. If process water is used, it must be filtered through a 30 mesh filter before delivery to the condenser/scrubber. Filtration and shut off valve supplied by Owner

2.4.4 Main electrical disconnect: 200 amp

2.5 Miscellaneous:

2.5.1 The flue gasses are to be exhausted in an 22" diameter duct provided by Owner

3 COMPLIANCE WITH 40 CFR 503 RULES TO PRODUCE CLASS A BIOSOLIDS

3.1 The Therma-Flite Sludge Dryer is a unique continuous processor that can produce Class A biosolids reliably while complying with the 40 CFR 503 regulations. Compliance with both the pathogen reduction and vector attraction reduction requirements for Class A biosolids is met with different operating regimen and compliance logging options.

3.2 By residence time and temperature, the pathogen reduction requirement 503.32(a)(2) is met using time and temperature regimen A Alternative 1 for "every particle" in the sludge mass. This requirement is for the temperature to equal or exceed 167 degrees F for 20 minutes for every particle. The residence time at greater than 167 degrees F is determined by the transport rate of the screw. The MINIMUM residence time is measured between the point where the temperature of the material is measured to be greater than 167 degrees F and the first edge of the discharge port. Test ports are provided for manual verification of the temperature at the initiation of the residence time.

3.3 Temperature and the machine speed/residence time are recorded automatically with a time stamp; it is a compliance record.

3.4 The vector attraction reduction requirement is met by Option 8 503.33(b)(8) for any sludge by drying to greater than 90% solids. A sludge that is fully digested and does not contain any undigested solids may meet this requirement under Option 7 503.33(b)(7) by only being dried to greater than 75% solids.

3.5 The Therma-Flite Sludge Dryer qualifies as a PFRP (Processes to Further Reduce Pathogens) 503.32(2)(7) Appendix B, Heat Drying. Using this alternative, the sludge is dried to less than 10% moisture and the temperature of the exiting material is greater than 176 degrees F. The compliance logging for this alternative records the temperature of the exiting material with a date stamp. This complies with both the pathogen reduction and the vector attraction reduction requirements for class A biosolids. For many operators this may be the preferred method of compliance.

4 MAJOR COMPONENTS

4.1 System:

4.1.1 Method: Automated continuous process.

4.2 Feed Hopper:

4.2.1 Fabricated from 3/8" thick mild steel.

4.2.2 Includes independent gear motors driving twin paddle bridge breakers.

4.2.3 Includes one (1) plug flow wet sludge extruder conveyors fabricated from mild steel with Coal Tar epoxy coating.

4.3 Dehydration Chamber:

4.3.1 Material of construction is SA-516 Grade 70 Boiler Plate.

4.3.2 Each Therma-Flite IC dehydrator section is in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, latest edition and was fabricated by certified welders.

4.3.3 ASME code stamped housing.

4.3.4 ASME code stamped HOLO-SCRU® auger/blender.

4.3.5 Omega trough type dehydration chamber is insulated with high density fiberglass insulation as required to maintain a surface temperature of below 140F

4.3.6 Omega trough includes sample ports located near the product thermal couples, for calibrating the thermal couples and taking grab samples.

4.3.7 The dehydrator top is furnished with an inspection cover.

4.3.8 One (1) steel dehydration chamber with a smooth inner surface and a thermal fluid external jacket integrally welded to the dehydration chamber for heat transfer to the dehydration chamber wall.

4.3.9 Two (2) thermal fluid heated BIO-SCRU® auger/blenders fabricated from 1/4" and 5/16" steel, complete with lifters to enhance particle redistribution and heat transfer.

4.3.10 Two (2) dual pass rotary unions provide the thermal fluid inlet and outlet to the rotating auger/blenders.

4.3.11 Dual powered, variable speed, independently driven, gear motor driven dehydrator package, complete with drive trains and bearings.

4.3.12 Multiple thermocouple probes located along the length of the dryer for temperature readings and control, including thermal fluid, dehydration vapor, thermal fluid expansion tank, and thermal fluid return from the shell and BIO-SCRU® rotors.

4.4 Frames & Support Structure:

4.4.1 One (1) structural steel frame designed and fabricated to support the dehydration chamber and drive train.

4.5 Discharge Cooling Screw:

4.5.1 One (1) dried sludge discharge system consisting of an enclosed auger, with cooling jacket, to convey the dried sludge to a discharge point on one side of the dehydration chamber.

4.6 Thermal Fluid Heater:

4.6.1 One (1) ASME code stamped (See Performance for Sizing).

4.6.2 All necessary thermocouples and instrumentation for the heater are included in this proposal.

4.6.3 Actual natural gas usage will vary depending on the amount of water being evaporated.

4.6.4 Fuel burner's gas train: Arranged and piped to ASME CSD 1.

4.6.5 Heating oil burner: Arranged and piped to factory mutual standards.

4.6.6 Hot air/thermal fluid, ASME Section 1 code stamped heat exchanger.

4.6.7 Internals of the thermal fluid heat exchanger are steel and designed for industrial use. The outer shell of the thermal fluid heater is painted with high temperature paint.

4.6.8 An industrial burner system will be supplied with fuel burning units consisting of burners appropriate to customer's selected fuel source, control valves, temperature controls and piping.

4.6.9 A special thermal fluid pump, filter, and valves will be furnished to circulate the thermal fluid through the dehydrator system.

4.6.10 A thermal fluid expansion tank, complete with a relief port, is mounted in an elevated position.

4.6.11 Dry catch tank with integrated plumbing and valves as required.

4.6.12 The entire unit will be fabricated, assembled and tested before shipment.

4.6.13 Thermal fluid: Paratherm NF or better.

4.7 Burner System:

4.7.1 One (1) industrial burner system consisting of one (1) natural gas burner with modulating controls configured to meet ASME CSD 1.

4.7.2 The system is pre-piped and pre-mounted.

4.7.3 The included programmable controller will run various time/temperature regimes for total control of the dehydration process.

4.7.4 Times and temperature regimes will be established during machine startup and entered into the programmable controller.

4.7.5 All necessary thermocouples and instrumentation are furnished in this proposal.

4.7.6 Actual gas usage will vary depending on the amount of actual water being evaporated. Customer to provide fuel type with order.

4.8 Electrical:

4.8.1 **Control Panel:**

4.8.1.1 Control enclosure: Stainless steel, NEMA 12, UL labeled for industrial enclosures. UL stamped Industrial control enclosure.

4.8.1.2 Allen Bradley programmable controller with touch panel HMI display is provided complete with internal timers to control the time/temperature regimes and machine functions.

4.8.1.3 Thermal magnetic contactors.

4.8.1.4 One (1) main disconnect is provided in the enclosed cabinet.

4.8.1.5 I/O devices are included in the PLC panel to provide output to a customer supplied historian system or paper charter, for continuous monitoring to certify that the dried sludge meets the requirements for Class A sludge.

4.8.1.6 Outputs for additional recorders, for record keeping, or SCADA systems, can be furnished at an additional cost.

4.8.2 **Wiring:**

4.8.2.1 Machine wiring: Wired to national electrical codes.

4.8.2.2 Conduit: All conduits will be rigid except where liquid tight is required and approved.

4.8.3 **Supplied Manuals and Diagrams:**

4.8.3.1 Therma-Flite will supply ladder logic diagrams and initial cycle programming for one (1) time temperature dehydration cycle.

4.8.3.2 All hard wiring schematics are furnished.

4.9 Condenser/Scrubber:

4.9.1 Brass valves.

4.9.2 304 SS nozzles.

4.9.3 Water shut-off valves, pressure-reducing valves or flow meters supplied by Owner.

4.9.4 A high efficiency enclosed wet Venturi type scrubber is provided to remove airborne particulate.

4.9.5 Condenser water will be piped back to the waste treatment system by the Owner.

4.10 Odor Control: (Optional)

4.10.1 Airflow Rate : up to 450 cfm if open to vent. Typical is between 10-50 cfm.

4.10.2 Average/ peak H2S Loading : 20 ppm/50 ppm (actual values not known at this time)

4.10.3 One (1) Reactor: Reactors contain multiple biologically active media layers in series and an irrigation system. The vessels are constructed of corrosion resistant fiberglass reinforced plastic (FRP) and shipped with the synthetic media pre-installed. The reactors quickly treat H2S in their lower layers and can effectively treat "residual" odor-producing compounds in the upper media layer(s).

4.10.4 The control panel includes a PLC to provide all the necessary controls required to control the odor control system including irrigation system, nutrient injection system and fan blower. The combination control panel is pre-wired and supplied loose to be mounted by others next to, but at least 3 feet from reactor, and requires utility connections and electrical connections be provided by others.

4.10.5 One (1) FRP Blower Fan: The blower is used to supply the foul air to the Bio-filter for treatment. The blower will be FRP construction, belt driven, centrifugal type, and manufactured by New York Blower (or equal). Blower sizing is based upon the pressure drop through the discharge side or tower. The engineer is responsible for checking the size of the blower to ensure the design meets the suction side pressure drop requirements. Pressure loss in reactor is approx. 1"wc

5 OPERATIONAL SAFETY

5.1 Dryer Chamber:

5.1.1 The drying chamber includes purge gas connections to supply inerting gas padding to the system during startup and shutdown or while steam production is below what is required for normal operation. Gas feed is controlled automatically via a solenoid valve.

5.1.2 Drying chamber will include water nozzles along the length of the dryer. In the event of an over-temperature, a solenoid valve will actuate, initiating a saturation of the bio-solids in the drying chamber. After completion of the saturation cycle, the dryer will initiate a slow heat up and bake out to insure the product in the chamber is thoroughly dried before discharge.

5.1.3 Dryer chamber covers and access ports include breach sensors which will initiate an audible alarm sequence if someone attempts to open the drying chamber while at temperature.

5.2 Feed Hopper:

5.2.1 Feed hopper includes a level sensor to initial a shutdown sequence if the feed hopper runs low on feed.

6 MANPOWER & MAINTENANCE

6.1 Dryer System Operation:

6.1.1 The system is PLC controlled and automated and does not require a dedicated full time employee. Normal operation requires minimal operator attention.

6.2 Maintenance:

6.2.1 Assuming an operations schedule of 24/7, maintenance would be around 200 hours annually.

6.2.2 Annual replacement parts would average approximately 0.05% cost per year based on the capital cost of the dryer.

7 QUALITY ASSURANCE

7.1 Single Source:

7.1.1 The Therma-Flite IC Series equipment specified in the proposal will be an integrated system. Therma-Flite provides a single source responsibility for all components in the IC Series equipment

7.1.2 Quality: All components of the Therma-Flite IC dehydration system shall be engineered for long continuous and uninterrupted service. Provisions will be made for easy lubrication, adjustment or replacement of all parts.

7.2 Standards:

7.2.1 Thermal fluid heating equipment, drying chamber and BIO-SCRU® heat exchanger rotors are ASME code stamped pressure vessels, insuring optimum safety and longevity of operation.

7.3 Qualification for Welding Work:

7.3.1 Welding Procedures Specifications (WPS) and Procedure Qualification Records (PQR) shall be in accordance with AWS D1.1 and ASME Sec. IX as applicable.

7.3.2 Certifications for welder qualification shall include the type of welding and positions each operator is qualified for, the code and procedure qualified under, date qualified, and the certifying activity.

7.4 Welding Documentation:

7.4.1 Therma-Flite shall qualify the welding procedures and welders by tests prescribed in the applicable Code of Construction.

7.5 Heat Input Requirements:

7.5.1 Welding shall not be done at ambient temperature below 32 degrees F, or when the surfaces are wet or exposed to rain or high wind. Temperature of the metals in the area where the welding is to be done shall not be less than 50 degrees. F. When the ambient conditions are such that the normal temperature of the base metal is below 50 degrees F, the area surrounding the joint shall be preheated to provide a base metal temperature of 100 degrees F for a distance of at least 3 inches in all directions from the joint to be welded. For ambient temperatures above 50 degrees, the requirements of the applicable WPS shall apply.

7.6 Interpass:

7.6.1 In a multipass weld, the interpass temperature is the temperature of the weld melt before the next pass is started. Proper interpass temperatures are specified on the applicable WPS.

7.7 Postweld Heat Treatment:

7.7.1 Weldments shall be given a postweld heat treatment when noted in the applicable WPS and supporting PQR.

7.8 Inspection/Non Destructive Examination (NDE):

7.8.1 Therma-Flite shall perform fabrication/assembly inspections as necessary prior to assembly, during assembly, during welding, and after welding to ensure that materials and workmanship meet the requirements of the Code of Construction.

7.8.2 Unacceptable welds shall be immediately repaired and made ready for reinspection at no additional cost to the customer.

7.9 Methods of NDE:

7.9.1 Visual inspection (VT) for cracks and other discontinuities of structural steel weldments shall be performed in accordance with the applicable Code of Construction.

7.9.2 Level of examination shall be 100%.

7.9.3 Therma-Flite shall record all inspections on the shop fabrication traveler.

7.10 Quality Control:

7.10.1 Each module of the Therma-Flite IC system will be totally piped, wired, inspected and tested prior to shipment.

7.10.2 Therma-Flite Quality Control will test and document all phases of manufacturing and testing.

8 COMPONENT SPECIFICATIONS

8.1 Code of Construction:

8.1.1 Structural welding shall be in accordance with AWS D1.1-2002 using the shielded metal-arc method or gas-shielded arc method described in the American Welding Society's "Welding Handbook" as supplemented by other AWS standards. Qualification of welders shall comply with AWS Standard AWS B2.1-98.

8.1.2 All pressure vessel construction shall be in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, 2007 edition and shall be fabricated by certified welders.

8.2 Coatings:

8.2.1 Steel fabrications will be sand blasted and coated with one (1) coat of zinc rich primer and a minimum of 3 mill thickness of corrosion resistant coating.

8.2.2 Any defects or damage caused in manufacturing will be thoroughly cleaned, wire brushed, wiped clean with a suitable solvent and dried. The prepared area will be coated with a zinc rich compound specifically formulated for wet environments. The zinc rich coating will be a minimum of 3 mills thick and will be in accordance with SSPC standards.

8.3 Seals:

8.3.1 The thermal fluid pump is manufactured by Dean Pump or equal.

8.3.2 Seal specifications are:

8.3.2.1 Max. pressure- 350 PSIG

8.3.2.2 Max. temperature- 650 degrees F

8.3.2.3 Air cooled seals

8.3.2.4 Stationary seal- silicon carbide, and Viton®

8.3.3 Rotary seal- stainless steel, carbon and Viton®

8.3.4 Thermal fluid rotary joint seals. Rotary joints are Johnson Products, or equivalent.

8.3.4.1 Convex, self-aligning carbon seal ring, for extended life.

8.3.4.2 Internal SS spring

8.3.4.3 Two (2) Internal, extended, carbon guides

8.4 Bearings:

8.4.1 Bearings will be oil or grease lubricated, with lubrication points piped to a central lubrication block for ease of lubrication.

8.4.2 Bearings shall be a minimum of L-10 rated life of 50,000 hours.

8.5 Balance:

8.5.1 Drive motors are manufactured by Baldor or equal.

8.5.1.1 Balancing specifications are:

8.5.1.1.1 To ISO 1940/73

8.5.1.1.2 ISO procedure states the following equation: U=(e X m) /R

8.5.1.1.3 Where e= maximum residual unbalance in function of speed, mass and balance.

8.5.1.1.4 Grade (G) (mm X g/kg)

8.5.1.1.5 m = mass of rigid rotating body (kg)

8.5.1.1.6 R = balancing radius (distance from the center of the shaft to the compensating position (mm)

8.5.2 The condenser blower is manufactured by New York Blower or equal.

8.5.2.1 Balancing specifications are:

8.5.2.1.1 To AMA 204, section 6, quality grade G2.5 standards.

8.5.2.1.2 The thermal fluid heater burner is supplied by Fulton Thermal Corp or equal. Blower balancing specifications are:

8.5.2.1.3 To ISO 1940-73, as stated at 1.05, 8, b & c.

8.6 Equipment guards:

8.6.1 Equipment guards are designed for OSHA regulations and are 18 gauge steel. Guards are designed for easy inspection and removal.

8.6.2 Guards shall be sand blasted to near white and painted with safety yellow

8.6.3 Chemical and fade resistant decals shall be affixed to the equipment. Decals will be displayed in areas that are visually obvious to warn of safety hazards.

8.7 Hardware:

8.7.1 Bolts shall be ASTM Class 449, Type 5 or greater.

8.7.2 Flanges, other than structural connections, shall be ANSI B16, class 150 type, raised face, slip-on weld.

8.7.3 Pipe threads shall be ANSI 11.5 V or 8V, depending on size.

8.8 Electrical:

8.8.1 Contactors shall be thermal magnetic, rated for 30 million operations.

8.8.2 Contactors: UL, ASE, and CSA approved.

8.8.3 Switches: 22 mm Square D

8.8.4 Temperature controller: Fuji model PYX ¼ Din.

9 GENERAL OPERATION: PLC CONTROLLED AUTOMATIC PROCESS

9.1 The Therma-Flite IC:

9.1.1 Under PLC control, started in preheat mode to heat the thermal fluid to a system operating temperature.

9.2 The Feed Hopper:

9.2.1 Hopper receives waste material from others, with a storage capacity as stated above.

9.3 The PLC Automation Control:

9.3.1 Dryer section is preheated to operating temperature.

9.3.2 PLC activates the sludge infeed.

9.3.3 The feed auger feeds biosolids to the dryer chamber

9.3.4 The internal, thermal fluid heated, dual rotor system moves and breaks up the biosolids to create maximum exposure to the heated surface of the rotors and the thermal fluid heated dryer chamber. The intermeshed dual rotor system eliminates clogging during the plastic phase of the drying sludge, and creates maximum particle relocation for release of trapped moisture.

9.3.5 The PLC senses the satisfaction of the time/temperature requirement of the continuous dehydration process.

9.3.6 Material that has met the time and temperature requirement is discharged continuously from the dryer section.

9.3.7 This automatic continuous process continues until the operator stops the sequence and places the system into cool down mode or the system runs out of infeed material.

9.3.8 As an inherent function of the indirectly heated, continuous flow drying process the drying chamber is oxygen deprived and continually steam purged as the water is evaporated from the sludge, creating a safe drying environment.

10 MODULARIZATION

10.1 Main module Dehydration Section, including:

10.1.1 BIO-SCRU® blender heat exchanger.

10.1.2 Jacketed and insulated heat exchanger chamber.

10.1.3 Rotary unions.

10.1.4 Electric motor and gearbox drive system.

10.1.5 Packing gland style seals.

10.1.6 Air scrubber, steam condenser system, including:

10.1.6.1 Venturi scrubber chamber.

10.1.6.2 Impingement/cooler condenser system.

10.1.6.3 Exhaust blower.

10.1.6.4 Integral ducting system.

10.2 Dried solids discharge conveyor, including:

10.2.1 Electric motor and gearbox drive system.

10.2.2 Enclosed auger conveyor

10.3 Electrical enclosures, including:

10.3.1 Main control enclosure

10.3.2 Main wiring conduits and junction boxes.

10.4 Heavy duty equipment skids, designed for easy system erection.

10.5 Thermal fluid heater Section, including:

10.5.1 Thermal fluid heater.

10.5.2 Industrial gas or oil burner.

10.5.3 Prepiped gas control system. ASME CSD 1.

10.5.4 Thermal fluid expansion tank.

10.5.5 Thermal fluid dry catch tank.

10.5.6 Integral piping and valves.

10.5.7 Thermal fluid pump.

10.5.8 Heavy duty equipment skid, designed for easy system erection.

10.6 Hopper infeed, including:

10.6.1 Heavy duty hopper storage/infeed system.

10.6.2 PC pumping system for infeed

10.6.3 Hopper drive system.

10.6.4 Heavy duty equipment skid, designed for easy system erection.

11 MANUALS, DRAWINGS AND SUBMITTAL PACKAGES

11.1 Manuals:

11.1.1 Two (2) Owner's manuals will be provided, complete with as-built drawings. (Additional manuals and drawings will be provided on CD.)

11.2 Submittals:

11.2.1 Two (2) submittal packages will be provided, complete with submittal drawings.

11.3 Installation review and startup assistance:

11.3.1 Therma-Flite will provide a trained technician for three (3) days to review and/or supervise the installation.

11.3.2 Therma-Flite will provide a trained technician for ten (10) days to startup and program the system and train the operators.

11.3.3 Extra days are available at $1200.00 (when included in the same trip) per man-day, plus expenses.

Note: A minimum of 15 days' notice is required to make arrangements for a Therma-Flite technician to startup the drying system.

12 PERFORMANCE AND ACCEPTANCE

12.1 Performance Test:

12.1.1 The performance test shall consist of a minimum of three (3) tests and shall be performed over a minimum of eight (8) hours. All tests shall be averaged to demonstrate compliance with specified performance criteria.

12.1.2 The performance tests will be conducted in accordance with the requirements of 40 CFR Part 503.

12.1.3 The Owner will give acceptance after three consecutive tests meet the performance requirements. The Owner will have a test laboratory available for analysis with no more than a twenty-four (24) hour turnaround on the test samples.

12.1.4 Sampling and testing costs shall be the responsibility of the Owner.

12.1.5 The Owner does have the option of accepting the system per the time/temperature regime and the percent solids.

12.1.6 The performance testing must be arranged and completed during the five (5) day start-up period.

13 STARTUP ASSISTANCE / INSTALLATION SUPPORT

13.1 Startup Support:

13.1.1 Therma-Flite will provide a trained technician for up to ten (10) days to startup and program the system and train the operators.

13.1.2 Extra days are available at $1200.00 (when included in the same trip) per man-day, plus expenses.

13.2 Installation Support:

13.2.1 Therma-Flite will provide a trained technician for three (3) days to review and/or supervise the installation of utility connections.

13.2.2 Extra days are available at $1200.00 (when included in the same trip) per man-day, plus expenses.

14 INSTALLATION (OPTIONAL)

14.1 Scope of Installation Support Provided:

14.1.1 As required to bolt the IC Modules, Condenser, Odor management system and OMS blower to the concrete.

14.1.2 As required to bolt the IC modules together and make the required interconnections for piping, conduit and electrical between the skids.

14.2 Installation Provide by Others:

14.2.1 Placement of the IC Modules in the building near the final installation location. Therma-Flite will utilize equipment dollies to make the adjustments in the equipment placement to finalize the install location.

14.2.2 Utility connections to the skids for process water, power, natural gas, etc.

15 LIMITED WARRANTY

15.1 Limited Warranty:

15.1.1 The Therma-Flite IC Sludge Dehydrator, manufactured by Therma-Flite, is guaranteed to be free from defects in materials and workmanship for a period of one (1) year from date of start-up, or eighteen (18) months from delivery. Therma-Flite's obligation under this warranty shall be limited to the repair or replacement of any part deemed defective under this warranty.

15.2 Conditions of Warranty:

15.2.1 The equipment shall be used only by persons who are considered knowledgeable and properly trained by Therma-Flite, Inc.

15.2.2 Any chemicals present in the sludge being introduced into the dehydrator shall be properly neutralized and rendered harmless.

15.2.3 Any inorganic, indigestible materials or solid objects within the biosolids that could plug or jam the components may affect the performance of the overall system and could affect the warranty.

15.2.4 No highly corrosive compounds, abnormal to typical municipal waste, shall be introduced into the dehydrator;

15.2.5 The equipment shall be used in accordance with local, state and federal rules, regulations, laws, ordinances and guidelines.

15.2.6 All repairs and replacement parts furnished under this warranty shall be FOB point of distribution. This warranty does not cover damages resulting from accident, misuse, abuse, neglect or alteration.

PRICING AND TERMS OF SALE

This proposal covers the requirements to design and furnish a complete IC 7000 sludge dryer. The Sludge dryer system consists of 1 automated dryer system(s). The system shall be a prefabricated unit consisting of a skid mounted dewatered sludge hopper, ASME code stamped sludge dehydration chamber, ASME code stamped thermal fluid heat exchanger, control panel, scrubber/condenser and required integral conveying devices.

Budget Price:	$2,375,200.00
Odor Management System (Optional)	$45,500.00
All Purchases FOB Benicia CA	$ 2,420,700

Terms:

Our normal terms of payment are:

30% with order
60% progress payment. (Based upon milestones created at time of order)
10% upon readiness to ship

Delivery:

Delivery of the BIO-SCRU® Dryer can be accomplished in **30-38 weeks** from our receipt of the approved general arrangement drawing on a standard schedule. The schedule and time of delivery is somewhat flexible and can be discussed based upon the needs of the customer at the time of the purchase order.

Lead Time:

General arrangement drawing — 3 weeks after Purchase Order

Shipping:

Manufacturing will take place at our Fabrication Facility, Benicia, CA. All components shall be shipped from 849 Jackson St., Benicia, CA 94510.

TERMS AND CONDITIONS OF SALE

1. **TERMS APPLICABLE:** The Terms and Conditions of Sale listed below are the exclusive terms and conditions applicable to quotations made and orders acknowledged by Therma-Flite, Inc. ("Seller") for the sales of products, equipment and parts relating thereto ("Products"). This quotation or acknowledgment is expressly made conditional upon Buyer's assent to such terms and conditions. Any of Buyer's terms and conditions which are in addition to or different from those contained herein, which are not separately agreed to by Seller in writing, are hereby objected to and shall be of no effect. Objections to any terms and conditions contained herein shall be deemed waived if Seller does not receive written notice thereof within 20 days of the date of this quotation or acknowledgment. Buyer in any event will be deemed to have assented to the terms and conditions contained herein if delivery of any Product is accepted. The term "this Agreement" as used herein means this quotation or acknowledgment or purchase order, together with Therma-Flite's proposal and any attachment hereto, any documents expressly incorporated by reference and these Standard Terms and Conditions of Sale. Terms are cash unless otherwise agreed upon in writing.
2. **TERMS OF PAYMENT**: All invoices are due and payable in Benicia, CA. All credit sales are due in full according to the following schedule: 30% at the time of the order; 60% progress payment (based upon the agreed upon milestones); and 10% upon readiness to ship. Accounts past due shall accrue interest at the highest lawful rate allowed by applicable law. Prices and design are subject to change without prior notice.
3. **ACCEPTANCE:** The terms and conditions of this Offer shall apply and become a part of the contract between Seller and Buyer unless specifically changed in writing and signed by an executive officer of Seller. The terms and conditions of this Offer shall in all cases, without exception, control and take precedence over any terms and conditions in Buyer's acceptance. Buyer's acceptance of this Offer shall be prima facie evidence of acceptance by Buyer of Seller's terms and conditions as controlling. Any conflicting terms and conditions in any document (including our proposal), Buyer's purchase order, acknowledgement or other document utilized by Buyer in this transaction, are expressly rejected by Seller.
4. **FORCE MAJEURE:** (a) Force Majeure Defined. For the purpose of this Agreement "Force Majeure" will mean all unforeseeable events, beyond the reasonable control of either party which affect the performance of this Agreement, including, without limitation, acts of God, acts or advisories of governmental or quasi-governmental authorities, laws or regulations, strikes, lockouts or other industrial disturbances, acts of public enemy, wars, insurrections, riots, epidemics, pandemics, outbreaks of infectious disease or other threats to public health, lightning, earthquakes, fires, storms, severe weather, floods, sabotage, delays in transportation, rejection of main forgings and castings, lack of available shipping by land, sea or air, lack of dock lighterage or loading or unloading facilities, inability to obtain labor or materials from usual sources, serious accidents involving the work of suppliers or sub-suppliers, thefts and explosions.
   (b) Suspension of Obligations. If Seller is unable to carry out its obligations under this Agreement due to Force Majeure, and the Seller promptly notifies the Buyer of such delay, then all obligation that are affected by Force Majeure will be suspended or reduced for the period of Force Majeure and for such additional time as is required to resume the performance of its obligations, and the delivery schedule will be adjusted to account for the delay.
5. **WARRANTY:** (a) Seller warrants to Buyer that the Products manufactured by it will be delivered free from defects in material and workmanship. This warranty shall commence upon delivery of the Products and shall expire on the earlier to occur of 12 months from initial operation of the Products and 18 months from delivery thereof (the "Warranty Period"). If during the Warranty Period Buyer discovers a defect in material or workmanship and gives Seller written notice thereof within 10 days of such discovery, Seller will either deliver to Buyer, a replacement part or repair the defect FOB Seller's factory. Seller will have no warranty obligations under this paragraph 5(a): (i) if the Products have not been operated and maintained in accordance with generally approved industry practice and with Seller's specific written instructions; (ii) if the Products are used in connection with any mixture or substance or operating condition other than that for which they were designed; (iii) if Buyer fails to give Seller such written 10 day notice; (iv) if the Products are repaired by someone other than Seller or have been intentionally or accidentally damaged, (v) for corrosion, erosion, ordinary wear and tear or in respect of any parts which by their nature are exposed to severe wear and tear or are considered expendable; or (vi) finished materials and accessories purchased from other manufacturers are only warranted to the extent of the original manufacturer's warranty.
   (b) Seller further warrants to Buyer that at delivery, the Products manufactured by it will be free of any liens or encumbrances. If there are any such liens or encumbrances, Seller will cause them to be discharged promptly after notification from Buyer of their existence.
   (c) **THE EXPRESS WARRANTIES SELLER MAKES IN THIS PARAGRAPH 5 ARE THE ONLY WARRANTIES IT WILL MAKE. THERE ARE NO OTHER WARRANTIES, WHETHER STATUTORY, ORAL, EXPRESS OR IMPLIED. IN PARTICULAR, THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SELLER'S LIABILITY FOR WARRANTY REPAIR OR REPLACEMENT SHALL NOT EXCEED THE AMOUNT PAID BY BUYER FOR THE ITEMS PURCHASED.**
   (d) The remedies provided in paragraphs 5(a) and 5(b) are Buyer's exclusive remedy for breach of warranty.
   (e) With respect to any Product or part thereof not manufactured by Seller, Seller shall pass on to Buyer only those warranties made to Seller by the manufacturer of such Product or part which are capable of being so passed on.
6. **LIMITATION OF LIABILITY**: Notwithstanding any other provision in this Agreement, the following limitations of liability shall apply: (a) In no event, whether based on contract,
   tort (including negligence), strict liability or otherwise, shall Seller, its officers, directors, employees, subcontractors, suppliers or affiliated companies be liable to Buyer or any third party for loss of profits, revenue or business opportunity, loss by reason of shutdown of facilities or inability to operate any facility at full capacity, or cost of obtaining other means for performing the functions performed by the Products, loss of future contracts, claims of customers, cost of money or loss of use of capital, in each case whether or not foreseeable, or for any indirect, special, incidental or consequential damages of any nature.
   (b) The aggregate liability of Seller, its officers, directors, employees, subcontractors, suppliers or affiliated companies, for all claims of any kind for any loss, damage, or expense resulting from, arising out of or connected with the Products or this Agreement or from the performance or breach thereof, together with the cost of performing make good obligations to pass performance tests, if applicable, shall in no event exceed the lesser of the amount paid by Buyer or contract price. The foregoing notwithstanding, if applicable, any claims for (a) delay in delivery shall not exceed 5% and (b) breach of performance guarantees (if any apply) shall not exceed 10% of the order price.
   (c) The limitations and exclusions of liability set forth in this paragraph 6 shall take precedence over any other provision of this Agreement and shall apply whether the claim of liability is based on contract, warranty, tort (including negligence), strict liability, indemnity, or otherwise. The remedies provided in this Agreement are Buyer's exclusive remedies.
   (d) All liability of Seller, its officers, directors, employees, subcontractors, suppliers or affiliated companies, resulting from, arising out of or connected with the Products or this Agreement or from the performance or breach thereof shall terminate on the second anniversary of the date of this Agreement.
7. **CANCELLATION BY PURCHASER:** Cancellation of orders cannot be accepted if the processing of the order has been started.
8. **DELIVERY:** The price and delivery of all goods, are FOB Seller's factory. All shipments are made FOB our plant. Title to the goods shall pass to Buyer when the goods are duly delivered to the carrier (Carrier) selected by Buyer or, at Buyer's request, by Seller, at Seller's factory, except where Buyer requests a delay in shipment, in which case the title shall pass to the Buyer when the goods are ready for shipment. If Buyer requests a delay in shipment, then Buyer shall pay Seller's standard storage charges for the period from the date goods are ready for shipment to the actual date of shipment.
9. **RISK OF LOSS:** The risk of loss to the goods shall pass to Buyer when the goods are duly delivered to the Carrier at Seller's factory or earlier if title passes to Buyer as listed above. The processing of freight claims or loss claims is the responsibility of Buyer.

10. **CONFIDENTIALITY:** Buyer acknowledges that the information which Seller submits to Buyer in connection with this quotation or acknowledgment includes Seller's confidential and proprietary information, both of a technical and commercial nature. Buyer agrees not to disclose such information to third parties without Seller's prior written consent. Seller grants to Buyer a non-exclusive, royaltyfree, perpetual license to use Seller's confidential and proprietary information for purposes of this specific order and the Products that are the subject hereof only. Buyer further agrees not to permit any third party to fabricate the Products or any parts thereof from Seller's drawings or to use the drawings other than in connection with this specific order. Buyer will defend and indemnify Seller from any claim, suit or liability based on personal injury (including death) or property damage related to any Product or part thereof which is fabricated by a third party without Seller's prior written consent and from and against related costs, charges and expenses (including attorneys fees). All copies of Seller's drawings shall remain Seller's property and may be reclaimed by Seller at any time.
11. **Law:** The rights and obligations of the parties shall be governed by the domestic laws of the State of California without regard to its conflict of law rules or the United Nations Convention for the International Sale of Goods.
12. **ARBITRATION:** Any dispute, controversy or claim arising under this agreement shall be settled by arbitration in Oakland, CA, pursuant to the American Arbitration Association Commercial Arbitration rules. The decision of the arbitrator(s) shall be final and binding on the parties and enforceable in any court of competent jurisdiction.
13. **ENTIRE AGREEMENT**: This Offer contains the entire agreement between Seller and Buyer, and no modification of this Offer shall be binding upon Seller unless evidenced by an agreement in writing signed by an executive officer of Seller after the date hereof. No oral or written statements by Seller's sales representatives, or other agents, made after the date hereof shall modify or vary the express terms hereof unless evidenced by an agreement in writing signed by an executive officer of Seller after the date hereof. To the extent any advertising or promotional material of Seller contradicts or disagrees with the terms hereof, Seller and Buyer agree that the terms hereof shall control and that such advertising and/or promotional materials are not part of the Agreement between Seller and Buyer.
14. **SECURITY INTEREST:.** To secure payment for goods, Buyer grants to Seller a security interest in the goods and agrees that Seller shall have the rights and remedies of a secured party under the Uniform Commercial Code. Buyer designates Seller as its attorneyinfact to execute any financing statements on behalf of Buyer necessary to perfect such security interest.
15. **TAXES:** Prices on the products sold buy Seller are exclusive of any city, state, federal or foreign taxes or duties, of any kind. Buyer is responsible for all such taxes and duties and agrees to indemnify Seller for all taxes and duties that may be assessed upon it due.

Dryer Capacity

Process Data	
% Slds In	15%
% Slds Out	90%
Temp In	70
Temp Out	240
Dryer Eff	96%
Therm Eff.	91%
Hp Utilize	70%
Cost Elec.	$0.08 Per kW/h
Cost N.G.	$3.75 Per MMBtu

High Effc

	wet	In lb/hr		Out lb/hr			Energy								
	Lbs per Hr	Solids	Water	Solids	Water	Vent	Elec $/h	NG $/h	N.G. Req	Dryer Ht	Electric	Slds Btu	H20 Btu	Evap Btu	HP
IC 800	960.0	144.0	816.0	144.0	16.0	800.0	$1.09	$3.96	1.1 MMBtu	1.0 MMBtu	13.6 kW	6854.4	138720	776000	26
IC 1800	2160.0	324.0	1836.0	324.0	36.0	1800.0	$1.76	$8.90	2.4 MMBtu	2.1 MMBtu	22.0 kW	15422.4	312120	1746000	42
IC 3600	4320.0	648.0	3672.0	648.0	72.0	3600.0	$2.39	$17.80	4.7 MMBtu	4.3 MMBtu	29.8 kW	30844.8	624240	3492000	57
IC 5400	6480.0	972.0	5508.0	972.0	108.0	5400.0	$3.77	$26.70	7.1 MMBtu	6.4 MMBtu	47.1 kW	46267.2	936360	5238000	90
IC 7000	8400.0	1260.0	7140.0	1260.0	140.0	7000.0	$4.94	$34.61	9.2 MMBtu	8.3 MMBtu	61.7 kW	59976	1213800	6790000	118
IC 10000	12000.0	1800.0	10200.0	1800.0	200.0	10000.0	$5.53	$49.45	13.2 MMBtu	11.9 MMBtu	69.1 kW	85680	1734000	9700000	132

= 88 kw.

%In		%Out			Process Data			
% Solids	% Water	% Solids	% Water	%Evap	Sludge ΔT	TF ΔP	TF ΔT	Btu/lb H20
15%	85%	15%	1.67%	83%	170	15	50	1319

This PRICE is based off using Bio Digester Gas half the time

		wet	In lb/hr		Out lb/hr			Energy								
Annual Dry Solid Ton	2,226	Lbs per Hr	Solids	Water	Solids	Water	Vent	Elec $/h	NG $/h	N.G. Req	Dryer Ht	Electric	Slds Btu	H20 Btu	Evap Btu	HP
Dryer Size Selection	IC 7000	8400.0	1260.0	7140.0	1260.0	140.0	7000.0	$4.94	$34.61	9.2 MMBtu	8.3 MMBtu	61.7 kW	59976	1213800	6790000	83
Annual Wet Solid Ton	14,840	Daily				Yearly										
Days per Week		Hrs/Day	Energy	$/W.T.	Startup	Hrs/Yr										
	4	17.0	$671.91	$9.42	$29.67	3533										
	5	13.6	$537.53	$9.42												
	6	11.3	$447.94	$9.42												
Optional Offsets	7	9.7	$383.95	$9.42												
	24/?	2.8days														
	10/?	6.8days														
	8/?	8.5days														

$39.55/hr.

9.2 MMBTU × 3.75 = 34.50

7000 lbs/hr × 1319 = 9.2 MMBtu

1000 ft³ NG ≈ 1 MMBTU ≈ 1 GJ

90% eff = 8.3 MBTU

7000 lbs water × 1315 BTU / lb water = 9.2 M BTU

1 BTU raises 1 lb water 1°F

Therm = 100,000 BTU

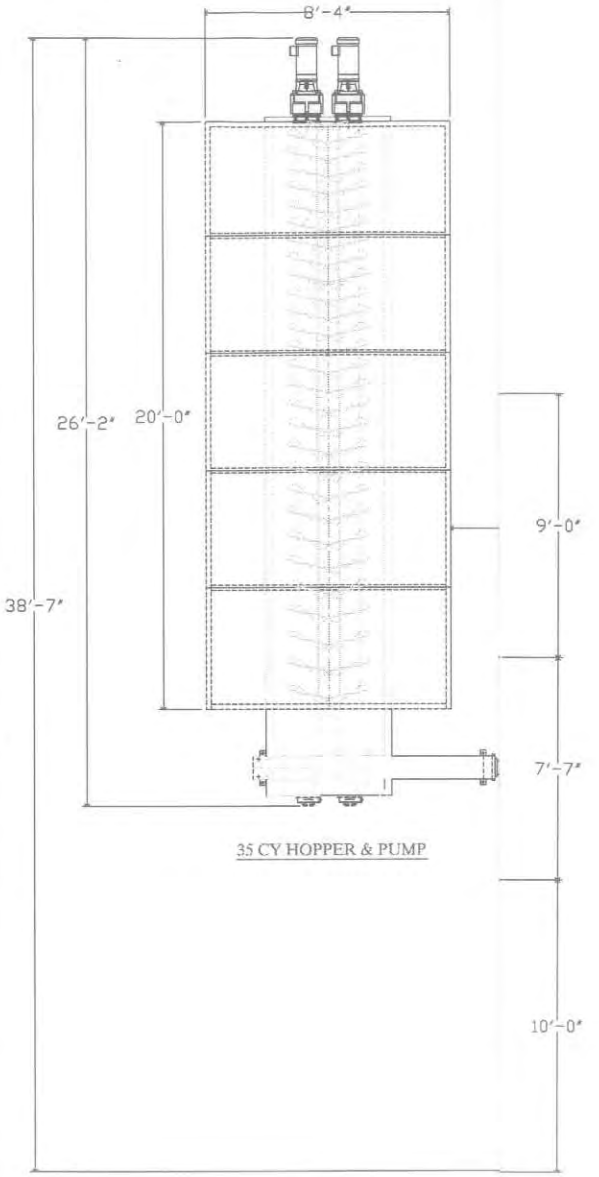
1 Kwhr = 3.6 E6 J

1 hp = .7457 KW.

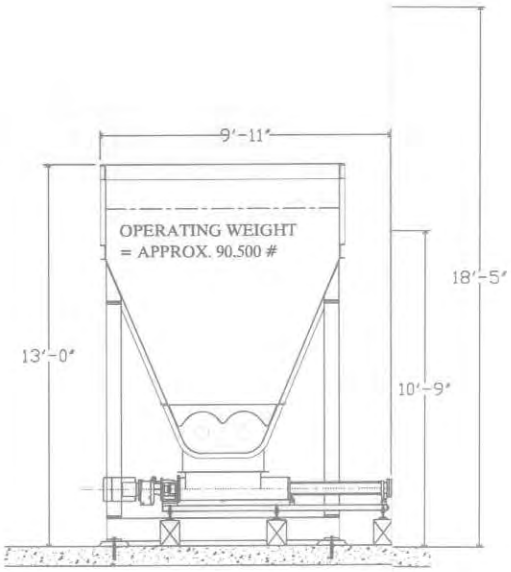
12

22/22

FOR PRELIMINARY USE ONLY
DRAWING SUBJECT TO CHANGE



35 CY HOPPER & PUMP



FOR PRELIMINARY USE ONLY
DRAWING SUBJECT TO CHANGE

CUSTOMER: ----

PROJECT No: ----

AYOUT: A
DF
D-SCRU SYSTEM

Therma-Flite
The Screw Heat Exchange Company
P.O.Box 847
849 Jackson Street
Benicia, CA 94510
Telephone: (707) 747-5949
Fax: (707) 747-5951

SCALE:	SHEET:	DWG. No:	
NTS	1 OF 1	IC7000 BID-SCRU BLOCK LAYOUT A	R1

The city of Post Falls, Id - Proposal #1360

FENTON ENVIRONMENTAL TECHNOLOGIES, INC.

NAME: CHARLES BIGHAM
TITLE: NATIONAL SALES
EMAIL: CBIGHAM@IFENTON.COM
4306 HWY 377 SOUTH BROWNWOOD, TX 76801
PHONE: (800) 521-1708 EXT. 226
FAX: (325) 646-7027
IFENTON.COM

2.5 dry tons/day × 31 d/Month = 78 dry tons/month

2.5 DTD / .13 = 19.2 WTD

FENTON ENVIRONMENTAL TECHNOLOGIES, INC.

FENTON

6-25-2010

Mike Neher
Environmental Coordinator
City of Post Falls, Id 83854

4306 HWY 377 SOUTH
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IFENTON.COM

Subject: Fenton Fenix™ CM 48/10 Series Dryers for city of Post Falls, Id
Project Proposal # 1360

Mr. Neher:

In accordance with your request, I am pleased to enclose budgetary proposal for your dryer project for the city of Post Falls. This proposal is for the Fenix™ CM 48/10 which runs 2 wet tons per hour of operation. Based on your numbers of 78 dry tons a month or 114 wet tons at 16% d.s. loading the CM 48/10 will handle all your needs with room for future growth. 78 / .16 = 488 wet tons

The CM 48/10's capacity gives you sufficient production capability to easily handle the production rate in either of two scenarios' one being 12 hours per day based on a 5 day per week, and the second being 2.5 days a week based off running the dryer for 24 hours per day.

Fenton also has other sizes and types of dryers for this application so once you move farther down the path and if things change, please keep this in mind. If the hours of operation or sludge volumes should change, we can reappraise the type and size of dryer to better suite your needs.

12,200 lbs/d = 6.1 dTD
41.5 WTD

Sludge Production Rates:

*These numbers are based on 16% d.s.

Dryer Model – CM 48/10	Present
Dry Solids – Tons per day	4
Dry Solids – Tons per week @ 5 days	3.6
Wet solids – W/T per day (run 5 days)	22.8
Wet Solids – Tons per week	114
Percentage D.S. of Wet Cake	16%
Hours of Operation per Day	12
Dryer Ran 24hrs/day per week	2.5 days
Finished Product/Day (tons)@90%	4
Wet Sludge Product vs. Dried Sludge	6 to 1

Note: If the City hauls 5 truck loads now, there will only be 1 truck load and this should be picked up for a minimum of FREE.

- **Type of Operation-Auto Batch**

  Buffer: 50 cu. yd. on the CM 48/10 wet sludge storage/feed hopper. This large hopper allows for over 18 hrs of machine run time for the dryers.

Note: *Your dewatering equipment or hauling may run at a different rate of production so the generously sized hopper allows for maximum operating flexibility.*

- **Major Benefits of Fenton Fenix™ CM series Automatic Batch Design**

  The Fenix™ CM Series is not only indirectly heated but it processes dewatered biosolids through the dehydration chamber in an automatic batch mode. The benefits of this are primarily:

  1. The dewatered cake is evenly exposed to a pre-selected heating regimen.
  2. The sludge cake is dried to a consistent level even when the incoming cake solids vary.
  3. The system requires a very low level of operator interface since it adjusts automatically to changes in conditions.
  4. The system can be easily turned off at the end of any batch allowing a seamless shut down at the end of an operating day.
  5. The ability to warrant Class A for each and every batch is unsurpassed.
  6. Even though called "automatic batch" the Fenton Fenix™ CM is designed to run around the clock and for as long an operating cycle as is desired. 24 hours a day and seven days a week is just fine, but not a requirement.

- **Operating Costs**

  Natural Gas = 1,000 Btu's/ cu. ft.

  Assume 16% d.s. in and + 90% d.s. out.

  2,383,800 Btu's/wet ton dehydrated actual average.

  Natural Gas = 23.84 Therms at $ 1.00 per therm = $23.84 per wet ton

- **Electricity**

Approximately 65% of full load based on field records. The motors on the Fenix™ CM series dryer do not run all of the time. Therefore, you can figure on using the 65% to find the total kW per hour.

CM 48/10

140 hp est. x 65% = 91 kW's per hour at 2 wet tons/ hour = 45.5 kW / wet ton

45.5 kW x .095 = $4.32 per wet ton

- **Maintenance**

We offer the extended warranty and maintenance agreement at a very reasonable cost. For this very reasonable fixed cost per year, we would provide full coverage on all non-consumable parts (that is virtually everything except bulbs, fuses and lubricants), respond to call-outs when the matter could not be resolved by phone, meet with operators on-site for check-ups and provide a written report to the manager of all visits.

Note: *If the extended maintenance (warranty) is not chosen most engineers use 1% of capital/yr. after the first year as the maintenance and operating cost.*

*The Fenton Fenix™ CM series dryers are shipped pre-piped/pre-wired from the factory on heavy-duty galvanized skids. One point utility connections are required for gas, electricity, water, drain, combustion gas exhaust duct and pipe the contact air to the bio-filter and carbon pack.

Labor is nominal for this system and while some oversight is needed at least at the start and end of a drying "day", it is hard to determine the actual hours needed. You could conservatively assume the dryer operator has some other duties such as that of belt press or centrifuge operator, etc.

At the end of the day all the operator has to do is hit the cool-down button and the dryer will shut it self off without the operator being around or monitoring the drying unit.

Once again, all of the Fenton Fenix™ CM Series dryers come pre-tested and ran at our plant. If all of the utilities are available when the dryer is installed, sludge could be drying within the first week because the equipment is skid mounted and installation time is kept to a minimum.

The various drawings are sent to you for use in developing a layout at your plant. We could compress these layouts some if needed just let me know.

We trust this information will be useful in your study.

Please call with any other questions that may arise.

Best regards,

Charles Bigham
National Sales
Fenton Environmental Technologies, Inc.
cbigham@ifenton.com

FENTON ENVIRONMENTAL TECHNOLOGIES, INC.

FENTON™

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CITY OF POST FALLS, ID WWTP

CM 48/10 BUDGETARY PROPOSAL #1360

One (1) Fenton Fenix™ CM 48/10 dehydration system:

Fifty (50) cu. yd. wet sludge storage/feed hopper
Wet sludge hopper leveling auger
Steam purge spray and controls
Eighty-Six (86) cu. ft. dried product mixing/cooling surge bin
Over temperature fusible link sprinkler heads
One – 3" diameter motorized condenser water feed valve
Bio-filter and Carbon Pack
Blower Damper Actuator
Panel View
Auto Lube Rotor Only

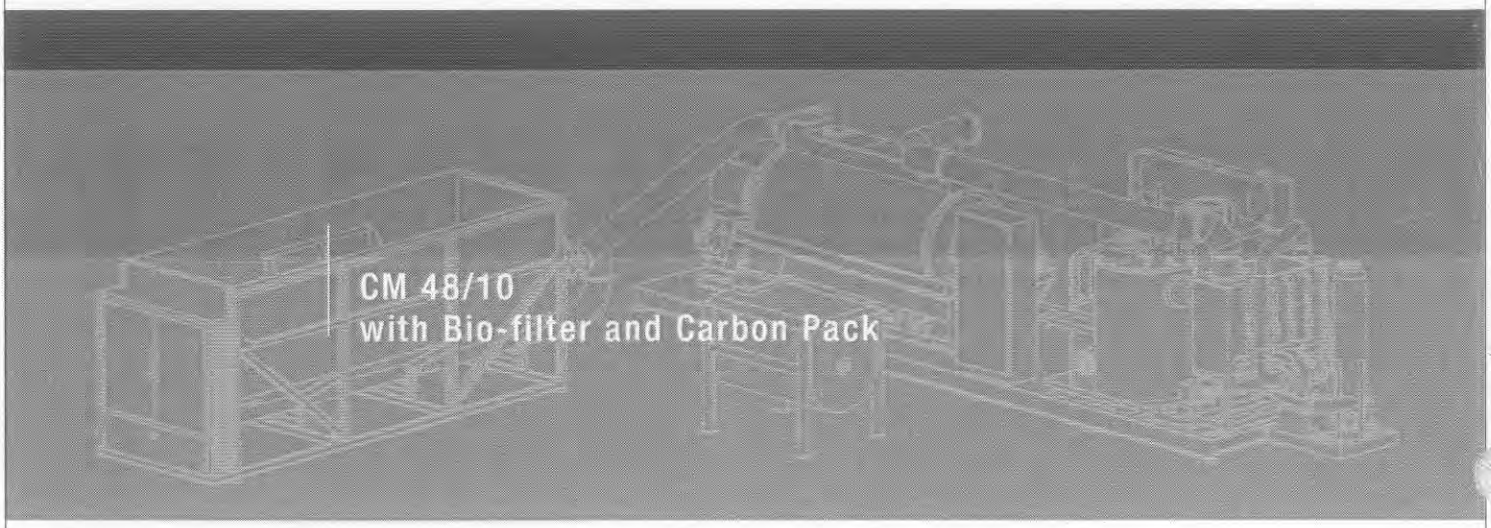
Price $ 1,400,000

Optional: Maintenance contract (extended warranty) Price $ 17,900
($24,000 - $6,100 first year rebate = $17,900)

Delivery: 20-22 weeks after submittal approvals est.

Terms: Milestone Payments (Included in proposal)
Price good for Forty-five (45) days

** Discounted price must be paid with Terms**



CM 48/10
with Bio-filter and Carbon Pack

FENTON ENVIRONMENTAL TECHNOLOGIES, INC.

FENTON FENIX™ CM 48/10

1.01 MANUFACTURER:

Fenton Environmental Technologies, Inc.

4306 Hwy. 377 South

Brownwood, Texas 76801

1.02 EQUIPMENT:

FENTON FENIX™ CM 48/10, automated batch, biosolids dehydration system.

1.03 PERFORMANCE:

A. Class A Biosolids

With respect to pathogen reduction and vector attraction, Fenton Environmental Technologies, Inc. (FET) shall guarantee the production of a Class A product when the Fenton Fenix™ is operated within the equipment operating parameters and is dehydrating a substantially digested sludge.

B. Operation Parameters

1. Method: Automated Batch.
2. Capacity: 9.5 cubic yards per batch, nominal.
   a) Hopper: 50 cubic yards.
   b) Process: 43 to 48 tons per 24-hour day.
   c) Input Solids: 14 to 24% solids of digested biosolids.
   d) Dry solids per batch: 60 to 75 cubic feet. Any additional conveyors must be capable of moving 75 cubic feet a minute.

1.04 BONDING (when required):

Fenton Environmental Technologies shall at its option, supply either a Surety Bond from a bonding company or an International Irrevocable Letter of Credit from Whitney National Bank, New Orleans, Louisiana.

1.05 DESCRIPTION:

A. Scope

This proposal covers the requirements to design and furnish a complete sludge dryer system. The sludge dryer system consists of one (1), automated batch style sludge dryer system. The sludge dryer system shall be a prefabricated unit consisting of a skid mounted dewatered sludge hopper, sludge dehydration chamber, thermal fluid heat exchanger fired by natural gas, control panel, scrubber/condenser and required integral conveying devices. This dryer shall be an automated batch, indirect heated Fenix™ sludge dehydration system.

B. General Requirements

Equipment furnished under this proposal shall be fabricated, pre-piped and factory tested and will meet the specifications of this section as follows:

1.06 QUALITY ASSURANCE:

A. Standardization

To ensure compatibility, the equipment specified in this section will be an integrated system that is the product of Fenton Environmental Technologies, who will provide a single source responsibility for all components of the system.

B. Quality

All components of the Fenix™ shall be engineered for long continuous and uninterrupted service. Provisions will be made for easy lubrication, adjustment or replacement of all parts.

C. Documentation

An engraved equipment reference plate will be fastened to the main skid of the dryer system with stainless steel pins or screws. The equipment reference plate will reference order, serial, and model numbers of the dryer system.

1.07 MANUFACTURING CODES AND SPECIFICATIONS:

A. Electrical

1. Control Enclosure: Stainless steel, NEMA 12.
2. Machine Wiring: Wired to National Electrical Codes.
3. Conduit: All conduit will be rigid except where Liquid-Tite is required.
4. Boxes: All junction boxes and terminal boxes will be rain tight.
5. Natural Gas Burners: Arranged and piped to NFPA.
6. Heating Oil: Arranged and piped to factory mutual standards.

B. Steel Fabrications

1. Welding shall be by the metal-arc method or gas-shielded arc method described in the American Welding Society's "Welding Handbook" as supplemented by other AWS standards. Qualifications of welders shall be with AWS Standard AWS B2.1-84.
2. Skip welds will be used, as approved by FET Engineering and Quality Control, for warp age control where structural integrity will not be compromised.
3. The system will be designed and manufactured for galvanizing and bolt up assembly under ASTM A143, A384 and A385.

C. Galvanizing

1. Steel fabrications will be hot dip galvanized in accordance with ASTM A123-97.
2. Any defects or damage caused in manufacturing will be thoroughly cleaned, wire brushed, wiped clean with a suitable solvent and dried. The prepared area will be coated with a zinc rich compound specifically formulated for touch-up of galvanizing. The zinc rich coating will be a minimum of 3.4 mills thick and will be in accordance with SSPC standards.

D. Seals

1. The thermal fluid pump is manufactured by Allweiler Pump or equal. The seal specifications are:
   a) Stationary member - Silicon Carbide.
   b) Rotary member – Carbon.
   c) O-ring – Viton.
   d) Spring – CrNi steel.
2. Thermal fluid rotary seals are of proprietary design.
   a) Seals are of stuffing box design, using two (2) high temperature double lip seals.
3. Dehydration chamber end seals are of proprietary design.
   a) One (1) reinforced silicone gasket.
   b) Multiple rings of graphite impregnated braided Teflon packing.

E. Bearings

1. Bearings will be oil or grease lubricated, with lubrication points piped to a central lubrication block for accessibility.
2. Bearings shall be a minimum of L-10 rated life of 50,000 hours.

F. Balance

1. Drive motors are manufactured by WEG Electric Motor Corporation or equal. The balancing specifications are:

a) To ISO 1940/73.

b) ISO procedure states the following equation: U=(e X m) /R.

c) Where e= maximum residual unbalance in function of speed, mass and balance.

Grade (G) [mm X g/kg]

M = mass of rigid rotating body [kg]

R = balancing radius (distance from the center of the shaft to the compensating position [mm]

2. The condenser blower is manufactured by New York Blower or equal. The balancing specifications are:

   a) To AMA 204, Section 6, quality grade G2.5 standards.

3. The thermal fluid heater gas burner is supplied by Fulton Thermal Corp. or equal. The blower specifications are:

   a) To ISO 1940-73, as stated at 1.05, 8, b & c.

G. Equipment Guards

1. Equipment guards are designed for OSHA regulations and are 14 gauge hot rolled steel with expanded metal insert, where applicable, to allow visual inspection. All guards are designed for easy removal.
2. Guards shall be sand blasted to near white and painted with safety orange.
3. Chemical and fad resistant decals shall be affixed to the equipment where equipment may start automatically, have rotating parts or heat zones. Decals will be displayed in areas that are visually obvious. Decals are black print with yellow background.

H. Hardware

1. Bolts shall be ASTM Class 449, Type 5 or greater.
2. Flanges, other than structural connections, shall be ANSI B16, class 150 type-raised face, slip on weld.
3. Pipe threads shall be ANSI 11.5 or 8V, depending on size.

I. Couplings

1. When couplings are used where the drive is greater than ½ hp, and where angular misalignment, parallel misalignment, end float and cushion shock or vibration dampening may need to be addressed, a flexible member with synthetic tension member bonded in rubber shall be provided. The flexible member shall be attached to the flanges by means of clamps, rings and cap screws. The flanges shall be attached to the shaft by key seat and setscrews.

J. Electrical

1. Contractors shall be Square D, Telemecanique, and Thermal Magnetic. Rated for 30-million operations or equal.
2. Contactors: UL, ASE and CSA approved.
3. Switches: 22 mm Square D, ZB4B.
4. 9300 Rades Ethernet Modem
5. Allen Bradley Panel View Plus 1000.

K. Gauges

1. Manufacturer to supply a water flow switch, natural gas test plugs, one magnehelic airflow gauge and one thermal fluid pressure switch.

1.08 GENERAL OPERATION: PLC CONTROLLED AUTOMATIC BATCH PROCESS

A. The Fenix™, under PLC control, is started in preheat mode to heat the thermal fluid to a system operating temperature.

B. The feed hopper receives waste material from others with a storage capacity as stated above.

C. The PLC calls for biosolids to be fed to the dryer chamber.

1. The feed airlock door opens.
2. The feed auger feeds biosolids to the dryer chamber per level control.
3. The internal thermal fluid heated rotor moves and breaks up the biosolids to create maximum exposure to the heated surface of the rotor and the thermal fluid heated dryer chamber.
4. The PLC senses the satisfaction of the time/temperature requirement of the dehydration process.
5. The discharge door opens, the discharge conveyor is activated, and the rotor is changed to a one-direction rotation to move the dried material to the discharge conveyor.
   a) The dried product surge bin is used for cooling up to 2 hours before starting the auxiliary dried product conveyor to empty the bin.
6. When the discharge time is satisfied, the discharge door is closed and the PLC resets to automatically feed a new batch and start the process over.
7. This automatic batch process continues to cycle until the operator stops the sequence and places the system into cool down mode.

1.09 QUALITY CONTROL:

A. The Fenix™ will be totally piped, wired, inspected and tested prior to shipment.

B. FET Quality Control will test and document all phases of manufacturing and testing.

1.10 STEAM PURGE:

A. Water header ½" stainless steel tubing.

B. ¼" solenoid valve.

C. Programming for water delivery of approximately 2 quarts per batch.

1.11 NITROGEN PURGE (Optional):

A. Header fabricated from 1" schedule 40 pipe.

B. Hi-Lo pressure regulator and flow switch.

C. Two ¾" dia. solenoid valves.

D. Programming for nitrogen delivery.

1.12 OVER TEMPERATURE WATER SPRAY (Discharge auger and/or surge bin):

A. One (1) fire rated 360° F, ½" fusible link sprinkler head.

B. Water manifold 1" dia. galvanized pipe.

2.00 CONSTRUCTION:

MATERIALS OF CONSTRUCTION		
Item	Material	Finish
Structural Steel Main Skid	10" X 22# Beam	Galvanized
Main Skid Floor	⅛" floor plate	Galvanized
Hopper walls & ends	⅜" hot rolled steel	Galvanized
Hopper structural support steel	4" – 9.5 # beams	Galvanized
Hopper chain guard housing	12-ga hot rolled steel	Orange paint
Motor bases	1" plate	Galvanized
Dehydrator frame	6" X 15# beams	Galvanized
Dehydration chamber end plates	½" plate	Blasted & hi temp black paint
Dehydration chamber	⅜" rolled steel	Insulated and wrapped 18ga 304 S.S. – Electro polish to #3 finish
D- chamber crown and lid	10 ga 304 S.S.	Hand polish
Steam exhaust duct	14 ga 304 S.S.	Hi temp black paint
Condenser	10 ga hot rolled steel	Galvanized
Hot oil combustion tank	18 ga 304 S.S.	N/A
Base	3" X 4.1# channel	Galvanized
Cover	10 ga hot rolled steel	Black paint
Combustion exhaust stack	14 ga 304 S.S.	Black paint
Hot oil expansion tank	3/16" thick hot rolled steel	Black paint
Support legs	4" X ¼" angle	Galvanized
Product discharge head box	¼" hot rolled steel	Black paint
Discharge screw conveyor body & cover	10 ga hot rolled steel	Galvanized
Condenser fan piping	6" dia. - .187" wall pipe	Galvanized
Hot oil piping	Sch 40 – SA106B seamless pipe	Insulated except valves and overflow/piping
Chain hopper	#140 roller chain w/ cotter pins	N/A

Item	Material	Finish
Dehydrator rotor	#180 roller chain w/ cotter pins	N/A/
Gear hopper	Forged steel to meet ANSI Type II	N/A
Dehydration rotor	Forged steel to meet ANSI Type II	N/A
Centralized lubrication blocks		
Dehydrator	¼" S.S. tubing	N/A
Hopper	¼" S.S. tubing	N/A
Control Panel	40" w X 18" d X 84" h – NEMA 12 polished 304 S.S.	N/A
Electrical conduit	Steel properly sized	Galvanized
J-Boxes	Steel properly sized	Galvanized
Condenser water piping	Steel pipe/Buna-N hose & S.S. noz.	Galvanized steel
Drain pipe	6" dia. - .187" wall pipe	Galvanized
Gas piping	2" dia. – sch 40 black pipe	N/A

Details:

N/A = not applicable

S.S. = stainless steel

Noz. = spray nozzles

Blast= sand blasting to near white metal

Hi temp black paint = sand blast and two coats hi temp "bbq" paint – 1000 deg. F

Orange paint = sand blast, primer and two finish coats of industrial polyurethane paint

Galvanizing = pickled and hot dipped – 5 to 7 mil coating thickness

3.00 MAJOR COMPONENTS:

3.01 WET SLUDGE FEED HOPPER:

A. One (1), FET custom sludge feed hopper, of proprietary design, fabricated from 3/8" thick mild steel with fifty (50) cubic yard holding capacity. Internals include two (2) mild steel rotary wiper mechanisms and two (2) 11" diameter mild steel augers. Externals include a chain and sprocket system to turn the rotary wiper and auger. Sprockets will be industrial quality to accept heavy-duty roller chains. Two (2) mild steel motor shelves will be properly designed and mounted to the hopper to support the drive motors and gearbox assembly. Chain guards are provided to comply with OSHA regulations. The hopper interior and exterior will be hot dip galvanized. One (1) custom 11" dia. auger system installed between the feed hopper discharge and the dehydrator wet feed inlet complete with properly sized motor and gearbox. One (1) linear screw operated door installed in the feed port to act as an airlock. One (1) 9" dia. auger coupled to a ½" hp drive is mounted on the hopper rim for automatic sludge leveling.

3.02 DEHYDRATION CHAMBER:

A. Each Fenix™ is designed, fabricated and supplied as follows:

One (1) structural steel frame designed and fabricated to support the dehydration chamber and motor drive package. All external steel surfaces will be finished per the Construction Materials and Finishes section. The cylindrical dehydration chamber is insulated with 2" high-density ceramic insulation and wrapped with an aluminum skin to prevent external heat loss. The inspection cover is left uninsulated. Dehydrator wet sludge feed port is equipped with an electrically operated shut off gate. Dehydrator top is furnished with two (2) 304 stainless steel inspection covers. Dehydrator crowned top is furnished with one (1) stainless steel exhaust duct, which is connected to the provided condenser system.

One dehydrator end is furnished with a linear screw actuated discharge gate. One (1) 3/8" steel dehydration chamber measuring approximately 72" dia. x 144" long. The chamber has a smooth inner surface. One (1) thermal fluid external jacket integrally welded to the dehydration chamber for heat transfer to the dehydration chamber wall. One (1) 72" dia. proprietary thermal fluid type hollow disk / blender fabricated from 5/16" steel, complete with wall wipers. Two (2), proprietary rotary joints to provide thermal fluid inlet and outlet to the rotating disks. Two (2) ½" thick steel plate ends enclose the dehydration chamber.

One (1) heavy-duty structural steel support base to support the dehydrator drive package. One (1) engineered dehydrator rotary disk drive package complete with reversible motor, gearbox, chain and bearings to drive the disks. One (1) dried sludge discharge system consisting of a linear screw operated door and an enclosed auger drive package to convey the dried sludge to a discharge point on one side of the dehydration chamber. Multiple thermocouple probes for temperature readings and control including thermal fluid, exhaust, dehydration vapor, thermal fluid expansion tank and thermal fluid return from shell and rotor disks.

3.03 THERMAL FLUID SYSTEM:

A. One (1) custom natural gas fired thermal fluid heater fabricated from stainless steel and A36 steel, with a maximum rating of 9 MMbtu's per hour. Internals of the air to thermal fluid heat exchanger are steel and designed for industrial use. The outer shell of the thermal fluid heater is 10-gauge stainless steel, with a chamber top constructed with A36 steel. The top section is painted with high temperature paint. The outer shell is insulated with 2" of high-density ceramic insulation. An industrial natural gas system will be supplied consisting of natural gas burners, control valves, temperature controls and piping. The natural gas system will conform to NFPA. The entire unit will be fabricated, assembled and tested in our facility before shipment. A thermal fluid expansion tank complete with a relief port is mounted in an elevated position. A special thermal fluid pump, filter, and valves will be furnished to circulate the thermal fluid through the Fenix dehydrator system. The combustion gasses will be collected in a 22" dia. duct, which will terminate above the unit.

3.04 NATURAL GAS BURNER:

A. One (1) industrial natural gas system consisting of one (1) natural gas burner with modulating controls configured to meet NFPA. The system will be pre-piped and pre-mounted. The programmable controller will run various time / temperature recipes for total control of the dehydration process. Times and temperature regimes will be established during machine start-up and entered into the programmable controller. All necessary thermocouples and instrumentation are furnished in this proposal.

The flue gasses are collected in a 22" dia. duct and terminated above the machine. Thermal fluid heater has a 9 MMbtus maximum firing rate. Actual natural gas usage will vary depending on the amount of actual water being evaporated however; since we must elevate the total load (solids and water) to 212° F, the solids differential between applications does not significantly change the estimated cost of dehydration.

OR

B. One (1) train as above except setup for #2 heating oil arranged and piped to factory mutual specifications (Customers choice).

3.05 CONVEYOR:

Materials of Construction

A. Though: Fabricated from a minimum 10ga A-36 plate. Hot dipped galvanized.

B. Cover: Fabricated from a minimum 14ga A-36 plate. Hot dipped galvanized.

C. Flights: ASTM A-36 coal tar epoxy coated.

D. Drive: The conveyor will be driven by a gear reducer ratio to be determined by the manufacturer.

3.06 STEAM & OPTIONAL NITROGEN PURGE SYSTEM:

A. Steam Purge Components

1. One (1) ¼" solenoid valve.
2. One (1)-spray nozzle.
3. One (1) contactor in control panel.
4. Piping from machine service line.
5. Programmed timer for operation before batch discharge.

B. Nitrogen Purge Components (Optional)

1. Pressure regulator.
2. Two (2) ¾" dia. solenoid valves.
3. One (1) flow switch.
4. One (1) I/O control point in the PLC.
5. Piping from customers' nitrogen supply tank to discharge conveyor and to the dehydration chamber by others.

3.07 DRIED PRODUCT SURGE BIN:

A. Fabricated from 3/16" steel plate with galvanized finish.

1. Capacity 86 cu. ft.
2. Cover with 2" FPT vent fitting. (Piped to dryer water-cooled condenser by others).
3. Discharge flanged outlet.
4. Two (2) ½" FPT fittings for addition of spray nozzles.
5. One (1) 12" dia. access cover.
6. One (1) 10 hp motor drive package with gearbox.

B. Dried Product Dust Suppression (Optional)

1. One (1)-¼ hp gear head pump to deliver 50 psi. (.25 – 1.5 gal./batch)
2. Manifold mounted from 1" dia. galvanized pipe.
3. Pump/motor self located per project. (Customer to place liquid suppressant drum within 6' of pump)
4. Programming from PLC.

3.08 CONTROL PANEL AND ELECTRICAL:

A. One (1) master control panel to conform to National Electrical Code, specifications. The cabinet will be a stainless steel NEMA 12 enclosure, with UL label for industrial control enclosures. An Allen Bradley SLC 5/05 programmable controller is provided, complete with internal timers to control the time/temperature regimes and all machine functions. The panel is supplied with Panel View Plus 1,000. Network communication is through Ethernet Port. Necessary I/O devices are furnished to operate the equipment safely and efficiently and to certify that the dried sludge meets the requirements for Class A sludge classification.

One (1) main disconnect is provided in the enclosed cabinet. The panel is equipped with an Allen Bradley 9300 RADES Ethernet modem for connection to a designated phone line. **The owner is required to supply a phone line (noted in equipment warranty).** Fenton will also supply ladder logic diagrams and initial cycle programming for one (1) time temperature dehydration cycle. All hard wiring schematics are furnished.

Outputs for additional recorders for record keeping or SCADA systems can be furnished at an additional cost.

B. Motor Sizes

1.	Dehydrator Disk Drive Motor	50 hp
2.	Hopper Drive Motor (1)	5 hp
3.	Hopper Drive Motor (2)	5 hp
4.	Hopper Leveling Auger Drive	.5 hp
5.	Hopper Cross Feed Conveyor	7.5 hp
6.	Combustion Fan Motor	7.5 hp
7.	Thermal Fluid Circulation Pump Motor	30 hp
8.	Condenser Fan Motor	20 hp
9.	Dried Sludge Exit Conveyor Motor	5 hp
10.	Dried Product Surge Bin	10 hp
	Full Load	140.5 hp

Note: Not all motors run continuously. Actual horsepower used averages 60-65% of full-connected horsepower.

C. Control Voltage

One 3 KVA step down transformer (120V/1ph/60HZ) is furnished and installed in the control panel.

3.09 DEHYDRATION EMISSIONS:

A. Condenser/Scrubber

Water supply with a minimum of 140 gpm at 40 psi not to exceed 45 psi of plant water is required. Pressure reducing valves or flow meters supplied by owner. Reuse water supplied to the Condenser/Scrubber unit must be filtered through 300-micron filtration prior to delivery to the Condenser/Scrubber system. Filtration shall be supplied by the Owner. The dehydration air stream will contain steam and a small percentage of particulate matter. We will provide a high efficiency enclosed Venturi type scrubber to remove air borne particulate, which will be piped to the supplied Biofilter and Carbon Pack. The water will be piped to a drain where it will return to the head of the plant.

B. Bio-Filter with Carbon Pack

One (1) 8'D x 9'8"H @ 500 CFM bio-filter package mounted on a 8' x 12' galvanized steel skid

The basic concept of biofiltration is to have odorous airflow through a media that supports biological active organisms. Organisms specific for the degradation of the specific odorous compounds accumulate on the media and multiply. Temperature, humidity, pH and nutrients are controlled to optimize the multiplication and effectiveness of these organisms.

The warm 90 - 100 deg. F moist air is pulled through the Fenix™ scrubber/condenser system and piped to the bio-filter through 8" dia. CPVC pipe. The correct moisture level is maintained through the manual adjustment of a valve and tubing arrangement from the condenser water system. The heat is controlled by manually adjusting the water flow through the scrubber system. Once field set upon startup these adjustments are infrequently reset if conditions change.

The bio-filter canister shall be manufactured of high quality, fiberglass. The segregated internal trays are made of fiberglass reinforced plastic grating, polypropylene media retention screen and tray supports. There will be a total of 300 cubic feet of organic, natural, fully biodegradable, non-synthetic composition. Malodorous compounds will be removed in the organic bio-filter media. The media will consist of three components, shredded wood (65%), nugget bark (25%), and compost (10%). The mixture shall have a pH between 6 and 8, an air-filled pore space of 25%-55% and moisture content of 40%.

The carbon pack is added after the bio-filter. The Carbon Pack will filter foul air as it flows into the bottom of the Linear PE canister. The foul air moves up through the inlet plenum, which diffuses the air and then up through the high capacity coconut shell carbon and potassium impregnated media bed where odorous compounds are removed by the active sties on the media.

Full technical support is included during the initial startup and is available as necessary throughout the equipment life cycle at a reasonable rate.

3.10 MODULARIZATION:

A. All equipment in this proposal will be factory mounted on four (4) heavy-duty structural steel bases.

1. The main skid will include the following:
   - a) The dehydration chamber.
   - b) Condenser/scrubber including ductwork.
   - c) Ductwork with precooling and duct cleaning spray. Precooling manifold will be piped for one point connection.
   - d) Electrical control panel with all motors and sensors wired to the panel.
2. The second skid includes the following:
   - a) Thermal fluid heat exchanger.
   - b) Gas burner and gas valve train.
3. The third skid includes the following:
   - a) Hopper.
   - b) Wet sludge feed conveyor.
4. The fourth skid includes the following:
   - a) Biofilter
   - b) Carbon Pack
   - c) Condenser Blower

4.00 DOCUMENTATION:

4.01 MANUALS DRAWINGS AND SUBMITTAL PACKAGES:

A. Manuals

1. Two (2) sets of operating manuals and spare parts lists will be furnished with the system.
2. Two (2) sets of "as built" drawings will be furnished with AutoCAD disk backup for your files.

   (Extra manuals and drawings will be provided at $250.00 per copy)

B. Submittals

1. Two (2) sets of submittal specifications, drawings, and spare parts lists will be furnished upon request upon response to a bid request.
2. Two (2) sets of application and electrical drawings will be furnished.

   (Extra submittal specifications and drawings will be provided at $250.00 per copy)

4.02 INSTALLATION REVIEW AND STARTUP ASSISTANCE:

A. Fenton Environmental Technologies will provide a trained technician for two (2) days to review the installation.

B. Fenton Environmental Technologies will provide a trained technician for five (5) days to startup, program the system and train the operators.

C. Extra days are available at $1,000.00 per person, per day plus living expenses.

Note: A minimum of 30 days notice is required to make arrangements for a Fenton Technician to start up the drying system.

4.03 PERFORMANCE AND ACCEPTANCE:

A. The performance test shall consist of a minimum of three (3) consecutive batches. Samples shall be collected at the beginning and the end of each batch. All tests shall be averaged to demonstrate compliance with specified performance criteria.

B. The performance tests will be conducted in accordance with the requirements of 40 CFR Part 503.

C. The owner will give acceptance after three (3) consecutive batches meet the performance guarantees in 4.03, A & B above. The owner will have a test laboratory available for analysis with no more than twenty-four hour turnaround on the test samples.

D. Sampling and related costs shall be the responsibility of the owner.

E. The owner does have the option of accepting the system per the time/temperature regime and the percent solids.

F. The performance testing must be arranged and completed during the five (5) day start-up period.

4.04 METERS AND INSTRUMENTATION:

It is recommended the following meters and instrumentation be supplied in the installation contractor's scope of work. If these items are not furnished on line, the owner will have adequate portable devices at the jobsite to take any measurements of readings required by the owner for performance testing.

A. Water flow meter in condenser feed line.

B. Separate electrical meter.

C. Separate gas meter, or in case of heating oil, a recording flow meter.

4.05 WARRANTY:

The Fenix™, manufactured by FET, is guaranteed to be free from material defects in workmanship for a period of one (1) year from the date of delivery. FET's obligation under this warranty shall be limited to the repair, or replacement, at Fenton's option, of any part deemed defective under this warranty and does not include labor.

Conditions of Warranty:

1. The equipment shall be used only by persons who are considered knowledgeable and properly trained by Fenton.
2. Any chemicals present in the sludge being introduced into the dehydrator shall be properly neutralized and rendered harmless.
3. No hydrocarbons or other volatile combustibles shall be placed in the equipment.
4. No corrosive compounds shall be introduced into the dehydrator.
5. The equipment shall be used in accordance with local, state and federal rules, regulations, laws, ordinances and guidelines.
6. Biosolids processed through the Fenix™ system shall be substantially digested using aerobic or anaerobic digestion.
7. Any inorganic or indigestible materials or solid objects within the biosolids may affect the performance of the overall Fenix™ system and could render the warranty void.
8. A modem line must be connected for communication with the PLC or performance specifications and warranties will be invalid.

FET MAKES NO OTHER WARRANTIES BY COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE EXPRESSED OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF OR THE WARRANTIES HEREIN. IT IS AGREED THAT SAID WARRANTIES ARE IN LIEU OF, AND PURCHASER HEREBY WAIVES ALL OTHER WARRANTIES, GUARANTEES, CONDITIONS OR LIABILITIES EXPRESSED OR IMPLIED, ARISING BY LAW OR OTHERWISE INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE UNDER THE UNIFORM COMMERCIAL CODE OR THE TEXAS BUSINESS AND COMMERCIAL CODE.

FET SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES AND ANY PROCESS RATE WARRANTY MUST BE IN WRITING AND SIGNED BY AUTHORIZED FENTON PERSONNEL.

All repairs and replacement parts furnished under this warranty shall be F.O.B. point of distribution (the purchaser shall pay all necessary freight and delivery charges involved). Applicable federal, state or local taxes will be added as required.

This warranty is effective for a period of one (1) year from delivery date.

This warranty does not cover damages resulting from accident, misuse, abuse, neglect, alteration or labor. Normal wear on bearings, sprockets, chains, and other moving parts, etc., is not covered under the warranty.

4.06 ***FENTON FENIX™* CM 48/10** SPECIFICATIONS:

A. Operation Parameters

1. Method: Automated batch
2. Capacity: 9.5 cubic yard per batch, nominal
3. Hopper Capacity: 50 cubic yards
4. Process Rate: 43 to 48 wet tons per 24-hour day
5. Input Solids: 14 to 24% solids of substantially digested biosolids

B. Feed Hopper

1. 50 cubic yard holding capacity
2. Rotary wiper
3. Wet sludge feed conveyor
4. Leveling auger

C. Dehydration Chamber

1. Thermal fluid circulation shell
2. Thermal fluid hollow disk rotor
3. Electrically actuated inlet and discharge doors

D. Gas or #2 Heating Oil Fired Thermal Fluid Heater

1. One (1) 9,000,000 BTU natural gas burner

   OR

   One (1) 9,000,000 BTU #2 heating oil burner
2. Gas train to meet NFPA Requirements
   a) Heating oil train to meet factory mutual specifications
3. Hot air/thermal fluid heat exchanger with ASME code I stamped
4. Requires 9,000 cfh of natural gas at five (5) psi

   OR

   Requires 55 gph of #2 oil at nil pressure
5. Duct diameter one (1) 22"

E. Electrical

1. Stainless steel, NEMA 12 control enclosure
2. Allen Bradley SLC 5/05 PLC
3. Main disconnect
4. UL stamp

5.	Modem: 9300 RADES Ethernet (designated phone line required)	
6.	Square D, Telemecanique, and thermal magnetic contractors	
7.	Dehydration drive	50 hp
8.	Hopper drive (1)	5 hp
9.	Hopper drive (2)	5 hp
10.	Hopper leveling auger drive	.5 hp
11.	Hopper wet feed conveyor	7.5 hp
12.	Combustion fan	7.5 hp
13.	Thermal fluid circulation pump	30 hp
14.	Condenser fan motor	20 hp
15.	Dried sludge conveyor	5 hp
16.	Dried product surge bin	10 hp
		140.5 Total hp

Note: Not all motors run continuously. Actual horsepower used averages 60-65% of full-connected horsepower.

F. Condenser/Scrubber

1. Galvanized Chamber
2. S/S Valves
3. Brass Nozzles
4. Flow Sensor
5. Requires 140 gpm at 40 psi not to exceed 45 psi of water flow. Reused water to be filtered through the 300-micron filtration, prior to delivery of the Condenser/Scrubber.
6. One (1) 3" diameter motorized valve is prewired for automatic operations.

Note: All specifications are subject to change without notice. Contact Fenton Environmental Technologies to verify final specifications.

5.00 Additional Information

5.01 Heat Energy Usage

Assume:
One ton = 2,000 lbs.
One lb. H2O evaporated = 1,400-1,600 Btu's
Natural gas = 1,000 BTU's/cu.ft.
MCF = 1,000,000 Btu's
Therm = 100,000 BTU's
Propane = 91,000 BTU/gal.
Number 2 fuel oil = 140,000 BTUs/gal, (37,037 BTUs / liter)
Class A biosolids = 90% d.s. minimum
d.s. = dry solids, t.d.s. = Total dry solids

Our first example will be a belt press dewatering the sludge cake to an average of 16% dry solids. If we work the calculation out for each wet ton the number can then be multiplied by the total wet tons. This is easier since the answer in BTUs will be too large for your standard calculation.

Calculation:
2,000 lbs. wet sludge X .16(%)=320 lbs. d.s. (each wet ton has 320 lbs. of solids at 16% d.s.)

320 lbs. d.s. divided by .90(%)=356 lbs. left after drying (we added 10% H20 to the total d.s.)

2,000 lbs. wet sludge – 356 lbs. after drying = 1,644 lbs. H20 to evaporate per wet ton

1,644 lbs. H20 evaporated/wet ton X 1,450 BTUs = 2,383,800 BTUs/wet ton @ 16% d.s.

2,383,800 BTUs div. by 1,000,000 BTUs/MCF = 2,38 MCF X $__?/MCF gas rate = $__/wet ton dehydrated

OR-Propane
2,383,800 BTUs divided by 91,000 BTUs per gallon = 26.2 gallons X $__/Gallon of propane = $__/wet ton dehydrated

OR-Number 2 Fuel Oil
2,383,800 BTUs divided by 140,000 BTUs/gallon = 17.03 gallons X $__/gallon #2 fuels oil = $__ wet ton dehydrated

Note: Process rates and BTU usage are nominal rates for typical, fully digested, municipal biosolids.

Dry Solids	BTU's	Dry Solids	BTU's
14% d.s.	2,449,050 btu's	19% d.s.	2,288,100 btu's
15% d.s.	2,417,150 btu's	20% d.s.	2,256,200 btu's
16% d.s	2,383,800 btu's	21% d.s.	2,222,850 btu's
17% d.s.	2,351,900 btu's	22% d.s.	2,190,950 btu's
18% d.s.	2,320,000 btu's	23% d.s.	2,159,050 btu's

5.02 Class A Compliance Under the 503 Rules

The Fenton Fenix™ series automatic batch style biosolids dehydrator is uniquely suited to insure compliance with the 40 CFR 503 regulations pertaining to achieving Class "A" biosolids.

The Fenix™ dehydration chamber is loaded automatically with a predetermined amount of dewatered biosolids, which starts the batch cycle.

The total sludge load is subjected to a minimum temperature of 212 degrees F for a minimum of two and one-half hours, which exceeds the time and temperature requirements of the 503 regulations pertaining to pathogen reduction. This compliance is shown as follows using Regime A under Alternative 1, which requires that solids be heated at 50 degrees C or higher for 20 minutes or longer.

Time (in days) = 131,700,000
10^ 0.14 (temperature) or, for the RK dehydrator at 212 degrees F (=100 C)

Time = 131,700,000 / 10^ 0.14(100) or Time = 131,700,000 / 10^14 or Time = less than 1.3/10^6 day.

The time required in the Fenix™ for pathogen reduction would be less than 1 minute. Therefore, the minimum time requirement of 20 minutes specified in the 503 Rules must be followed. Following the 20-minute requirement, the Fenix™ dehydrator exceeds the time requirement by about 700%.

Total cycle time is determined by achieving the desired sludge dryness. We normally recommend a minimum of 90 % dry solids for a finished product to qualify under 503.33 "Option-8" regarding vector attraction reduction. (Fully digested sludges need be dried to 75%- 503.33 "Option 7".)

The Fenton Fenix™ patented process automatically adjusts the time and temperature regime for the varying incoming wet sludge solids content.

This feature is very important since dewatering operations will vary from time to time in solids consistency yet we must maintain consistent Class A biosolids at all times. Conversely, automatic flow through systems cannot adjust to varying conditions without disrupting their normal operation and compromising the finished Product Class "A" parameters.

Please refer to 40 CFR 503.32 Pathogens - (a) (3) (ii) (9) for pathogen reduction requirements and to 40 CFR 503.33 (b) (7) and (8) for vector attraction reduction requirements.

Fenton Environmental Technologies, Inc. guarantees Class A compliance on a continued basis with each Fenton Fenix™.

In choosing Class A biosolids thermal dehydration utilizing Fenton Fenix™ technology, your utility will be assured of an environmentally correct sludge handling solution for many years into the future.

5.03 NFPA Code Sections

APPLICABLE TO USE OF FENTON FENIX™ TECHNOLOGY

The Fenton Fenix™ municipal wastewater sludge dryer was designed for municipal wastewater treatment plants. The sludge is indirectly heated. Hot flue air and the limited amount of sludge contact air are never co-mingled. Heat is applied to the sludge through a steel shell with thermal oil circulating inside of slow rotating disks and the chamber wall. This design allows for: 1) low dust generation due to slow rotation, 2) a compact sludge heating space due to low air flow with steel disks, not pre-dried sludge and hot air, as the turning mechanism, 3) fully enclosed operation, 4) precise temperature management and monitoring through a PLC control panel, and 5) a wet-then-dry cycling which precludes dust accumulation in the dehydration chamber.

NFPA guidelines for the design and construction of sludge dryer in a municipal wastewater treatment plant are provided in Section 820, Table 4-2(b) (the "Table"), a copy of which is attached. Regarding electrical classification, the authority having jurisdiction (AHJ) can determine following NFPA 499.

According to the Table, Sludge dryers in a municipal setting are to be classified within the envelope. The guidelines for classification are found in NFPA 499 and three levels of classification for explosion hazard of a combustible dust are provided. These are Division 1, Division 2 or unclassified, all according to the amount of dust that might be present in the device or area. The dust type for a municipal biosolid is Group G.

Under NFPA 499 guidelines, sludge dryers in a municipal setting could be classified Division 1 or 2 or unclassified depending on the level of dust, which might be present. In the case of the Fenton Fenix™, a Division 1 classification would be inappropriate. In considering a Division 2 classification, the area inside the dehydration chamber is the only area with potential dust.

This area would not require design or manufacturing changes if classified as Division 2 since the dehydration chamber (the "envelope") is fully enclosed, contains no electrical devices, is subject to fire suppression (see below), cannot physically contain a sufficient volume of dispersed or accumulated dust to support an explosion, and is under a slight vacuum at all times, thereby providing constant venting into a wet spray area.

In most circumstances, the Fenix™ would be located separately from dry product discharge into storage or transport. Dry product storage and transport areas would be separately considered as to deflagration risk, which is also addressed in NFPA 61, 68, 69 and 499. These considerations are site specific and are not covered here.

The Table would appear to require that all sludge dryers in municipal settings be "classified" for deflagration risk. This is clearly a pointer to Section 499 as to how that classification would be made. Should the AHJ choose to classify as Division 2 no changes are required in the design or manufacture of the Fenton Fenix™ since the "envelope" of the dryer would, when considered for deflagration risk, not merit added deflagration risk abatement. Fire suppression measures already incorporated in the design consist of automatic in-feed of wet sludge should pre-determined temperatures be exceeded.

External areas should be monitored periodically in connection with normal housekeeping for possible, though improbable, accumulations of dust. As noted in NFPA 499 3.3.1, housekeeping can obviate the need for classifying an area even as Division 2.

Fenton is pleased to meet with plant personnel, engineers and/or local authorities to discuss this important area. A more complete discussion memorandum is also available.

NFPA 654, A5 6.1 States clearly that indirectly heated dryers like the Fenton Fenix™ are much preferred.

5.04 Fire/Explosion Risk Measures

Fenton has incorporated several standard safety features and offers added protection options on the Fenton Fenix™ series indirectly heated dehydrators.

Our warranty expressly prohibits introducing undigested biosolids or sludge that hasn't met a minimum level of volatile reduction. In addition our warranty excludes petroleum hydrocarbons and other flammable materials from being processed in the equipment. However, realizing that there is a possibility of a treatment plant malfunction, operator error or an accidental introduction of flammable materials into the dryer we offer the following safety features to help minimize explosion and fire risks.

A. Standard

All Fenix™ series dryers are equipped with a steam purge at the end of the drying cycle. A small amount of water is vaporized instantly evacuating the dehydration chamber of any accumulated fumes. This feature helps minimize the effect caused by the introduction of oxygen into the dehydration chamber as the discharge door opens. This is the point in the process cycle when fumes or overheated solids could ignite.

High temperature shutdown and cycle exceed timer safeties are incorporated into the operating program

A water spray system will be furnished in the auger discharge conveyor consisting of one (1) commercial, 360 degree F, fire sprinkler heads complete with a piping manifold. This item is also furnished in the dried solids surge bin.

This feature will extinguish a solids fire in either the discharge conveyor or the surge bin.

B. Optional

An optional nitrogen purge system is available for the dehydration chamber, discharge auger conveyor and the surge bin. Treatment plants that receive other effluents or have other known risk factors should consider this option.

5.05 OSHA

All equipment will conform to OSHA specifications. Chain guards, access doors and emergency machine shut down devices will be positioned at the required locations.

Local approvals are the responsibility of the customer. Our personnel will assist whenever possible in providing pertinent information about common practices.

Our experience of over hundreds of machines should prove valuable in this endeavor.

5.06 Items not included in this proposal:

(Unless specifically quoted)

1. Permits
2. Concrete Work
3. Buildings or Other Structures
4. Bonding
5. Taxes
6. Wet Sludge Conveyor to the Fenix™ Storage/Hopper
7. Dehydrated Biosolids Conveyor
8. Deviations from Standard Manufacturing Specifications
9. Deviations from Standard Brand Name Components
10. Certified Engineered Drawings
11. Interest on Non Standard Payment Terms

Fenton Environmental Technologies, Inc. – Drying Systems Standard Conditions of Sale

ACCEPTANCE – Unless noted, all prices are F.O.B., FET factory and are firm for acceptance within sixty (60) days from the date of this quotation. All orders are subject to written acceptance by FET at its home office in Brownwood, Texas.

TAXES: All taxes, customs, dues, fees and other charges imposed by any governmental authority upon the manufacturing, sale, transportation, export or import, of the goods sold hereunder shall be paid by Purchaser, or if required to be paid by Seller shall be reimbursed to Seller by Purchaser, and any increases after acceptance of order will be added to Seller's price.

PAYMENT POLICY: All payments shall be in U.S. dollars and pro-rated payments shall become due as shipments are made. If shipment is delayed by Purchaser, date or readiness for shipment shall be deemed to be the date of shipment for payment purposes. If manufacturer is delayed by Purchaser, a payment shall be made based on purchase price and percentage of completion, balance payable in accordance with the terms as stated.

If payments are not made in conformance with the terms stated herein, the contract price shall, without prejudice to FET right to immediate payment, be increased by 1.5% per month on the unpaid balance to reflect a time price differential, but not to exceed the maximum amount permitted by law.

If at anytime in FET judgment Purchaser may be or may become unable or unwilling to meet the terms specified, FET may require satisfactory assurance or full or partial payments as condition to commencing or continuing manufacture, or in advance of shipment.

SHIPMENT: FET will use all reasonable care in shipping the equipment or parts, requiring crating (at FET determination) and will endeavor to make shipment within the time estimated in our quotation subject to confirmation by FET at the time of placing order.

The shipping date is to be considered as approximate only for the reason that FET ability to complete and ship equipment or parts ordered within this period may depend upon conditions beyond FET control.

Equipment or parts will be crated for domestic truck shipments at FET expense; however, FET assumes no responsibility for loss of, or damage to the equipment after delivery to the carrier, who shall be deemed to be acting for the Purchaser and the equipment shall thereafter be at the Purchaser's risk.

If shipment is not accepted within five (5) days after the Purchaser is notified that the order is ready for shipment, the equipment will be stored at the Purchaser's risk and expense.

TITLE SECURITY AND INTEREST: Title to the product (s) and risk of loss or damage shall pass to the purchaser upon shipment. Purchaser grants FET a security interest in all equipment purchased or here after purchased from FET and all other equipment of the Purchaser to secure payment of the purchase price. The Purchaser shall not sell the equipment without the written consent of FET. The security interest shall attach to all proceeds of the equipment. The Purchaser agrees to do all acts necessary to maintain the equipment subject to the security interest and to protect FET, interest from loss by adequately insuring the equipment against the loss or damage from any external cause with FET being named as an insured or co-insured.

DEFAULT: If the Purchaser fails to pay the purchase price or defaults on its obligations under the proceeding paragraph, FET may, immediately and without notice to the Purchaser, take possession of the collateral in such manner as is commercially reasonable. With respect to any accounts or contract rights which represent the proceeds from the sale of equipment, the Purchaser authorizes its accounts or contract rights which represent the proceeds from the sale of equipment, the Purchaser authorizes its account or contract debtors to pay amounts due directly to FET to be applied to the amounts due to FET. The Purchaser shall be liable to FET for all expenses incurred to take possession of collateral, to dispose of same, and any action necessary to protect FET interest in such collateral including any action in any bankruptcy proceedings. The term "expense" shall include reasonable attorney fees and reasonable costs of litigation.

POWER OF ATTORNEY: The Purchaser appoints FET as its attorney in fact to sign or execute any or all documents necessary to protect the security interest granted in this agreement.

ERECTION: Unless otherwise stated in writing, the equipment shall be assembled and erected by and at the expense of the Purchaser.

CANCELLATION BY PURCHASER: If Purchaser requests cancellation of any order, FET shall be entitled to recover from Purchaser, in addition to the purchase price of any portion of such order already shipped or delivered, the following:

a: The purchase price for all completed or in progress goods specifically manufactured or processed for buyer;
b: The cost of all parts, raw materials and supplies specifically purchased by FET in connection with Purchaser's order.
c: All costs and expenses incurred by FET as a result of the cancellation, including orders, subcontracts, or arrangements with suppliers made by Seller in connection with buyer's order; and
d: Seller's anticipated profit on the cancelled or uncompleted portion of buyer's order.

DRAWINGS AND SPECIFICATIONS: In the event that drawings are sent to the Purchaser for approval after the order is placed, the drawings must be returned marked "Approved as Noted" within ten (10) working days after receipt unless otherwise noted. In the event that Purchaser's written comments are not given within ten (10) day period, the items shall be deemed adequate by FET.

CONFIDENTIAL INFORMATION & IMPROVEMENTS: Purchaser will keep confidential and will not use or reproduce any information received from FET in connection with this quotation for the use, operation, or maintenance of the product (s), except with the written consent of FET Purchaser will not copy or otherwise reproduce any written or printed material or drawings furnished to Purchaser by FET in connection with the products (s) or this proposal. Purchaser will return all such material to FET if this quotation is not accepted, Purchaser will not copy the product (s) or make any design drawings of the product(s). FET shall have a royalty-free license to make, use and sell any changes or improvements in the product(s) invented or suggested by Purchaser or its employees.

LIMITED WARRANTY: The Fenton Fenix™, manufactured by Fenton Environmental Technologies, Inc., ("FET"), is guaranteed to be free from material defects in workmanship for a period of one (1) year from date of delivery. Fenton's obligation under this warranty shall be limited to the repair, or replacement, at Fenton's option, of any part deemed defective under this warranty.

Conditions of warranty: (1) The equipment shall be used only by persons who are considered knowledgeable and properly trained by Fenton; 2) Any chemicals present in the sludge being introduced into the dehydrator shall be properly neutralized and rendered harmless; 3) No hydrocarbons or, other volatile combustibles, shall be placed in the equipment; 4) No corrosive compounds shall be introduced into the dehydrator; 5) The equipment shall be used in accordance with Local, State and Federal rules, regulations, laws, ordinances and guidelines; 6) Biosolids processed through the Fenix™ system shall be substantially digested, using aerobic or anaerobic digestion; 7) Any inorganic or un-digestible materials, or solid objects within the biosolids may effect the performance of the overall Fenix™ system and could render the warranty void. 8) A modem line must be connected for communication with the PLC or performance specifications and warranties will be invalid.

FENTON MAKES NO OTHER WARRANTIES BY COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE, EXPRESSED OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF OR THE WARRANTIES HEREIN. IT IS AGREED THAT SAID WARRANTIES ARE IN LIEU OF, AND PURCHASER HEREBY WAIVES, ALL OTHER WARRANTIES, GUARANTEES, CONDITIONS OR LIABILITIES, EXPRESSED OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE UNDER THE UNIFORM COMMERCIAL CODE OR THE TEXAS BUSINESS AND COMMERCIAL CODE.

FENTON SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES AND ANY PROCESS RATE WARRANTY MUST BE IN WRITING AND SIGNED BY AUTHORIZED FENTON PERSONNEL.

Purchaser's attachment to or incorporation into Fenton's dryer system of any non-Fenton parts, components or other equipment without Fenton's prior written authorization shall void the warranty provided herein.

All repairs and replacement parts furnished under this warranty shall be F.O.B. point of distribution (the purchaser shall pay all necessary freight and delivery charges involved). Applicable Federal, State, or Local taxes will be added as required.

This warranty is effective for a period of one (1) year from delivery date.

This warranty does not cover damages resulting from accident, misuse, abuse, neglect or alteration. Normal wear or bearings, sprockets, chains, and other moving parts etc., is not covered under warranty.

Fenton reserves the right to prorate the warranty and defective parts shall be received by Fenton before any applicable credit is granted.

DAMAGES: FET's liability for any breach of this agreement or for any claim for products liability shall be limited to the amount of the sales price for the goods sold hereunder.

IN NO EVENT SHALL FET BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM FET:

A: FAILURE TO FULFILL THE TERMS OF PURCHASER'S ORDER;
B: BREACH OF THE WARRANTY;
C: NEGLIGENCE; OR
D: STRICT LIABILIY FOR DEFECTS IN GOODS SOLD HEREUNDER.

NOR SHALL FET BE LIABLE FOR SPECIAL, INDIRECT, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OR PROFITS OR REVENUE LOSS OF USE OF EQUIPMENT OR ANY ASSOCIATED EQUIPMENT.

GOVERNMENTAL LAWS AND REGULATIONS:

1. Environmental
   FET makes no representation or warranty regarding and may not be held liable for the failure of its equipment to perform in compliance with any federal, state, or local environmental laws or regulations regarding the treatment, disposal or transformation of the product(s), by-products, material and/or waste that the equipment is used to treat. These laws and regulations include but are not limited to:
   a: National Environmental Policy Act of 1969
   b: Solid Waste Disposal Act
   c: Clean Air Act (Federal and State)
   d: Comprehensive Environmental Response, Compensation and Liability Act of 1980
   e: Federal Land Policy and Management Act of 1976
   f: Federal Water Pollution Prevention and Control Act
   h: Transportation Safety Act of 1974 (48 US CA 91801, et sec)

2. OSHA Compliance
   a: FET will be held liable only for those OSHA standards that are effect as of this date and to the extent they are applicable to the performance by FET or its obligations under this contract.
   b: That FET can be held liable only for the physical characteristics of the product(s).
   c: That FET liability through any non compliance to OSHA shall be limited to the cost of modifying the product(s) or replacing the non-complying product(s) or component(s) after receipt of prompt written notice of the noncompliance.

3. Purchaser agrees to indemnify FET for any liability FET incurs due to analysis of Purchaser's material, by-product, waste or liability incurred by FET for actions taken by the Purchaser in connection with the use of the equipment.

4. Purchaser, at its own expense, agrees to indemnify, defend an save FET and its officers, directors, employees, and agents thereunder, harmless from and against any and all damages, demands, penalties, suits, causes of actions, and claims whatsoever brought by any governmental body, or any third person arising out of Purchaser's failure to comply with packaging or other specifications and requirements mandated by and federal, state or local environmental laws or regulation regarding the treatment, disposal or transportation of the products that the equipment is used to treat specifically including, but not limited to, the Transportation Safety Act of 1974 (49 US CA 91501, et sec) and any rules and regulations issued thereunder.

TEXAS CONTRACT: All sales by FET shall be deemed Texas sales and shall be governed by the laws of the state of Texas, excluding any conflicts of laws provisions. Any litigation between the parties shall be in the state and federal court for Brown County, Texas.

All claims for defective material, shortage; errors or other reasons must be made within five (5) days from the receipt of material. Defective material will be replaced by seller, but seller will not pay for labor, expense, or damage resulting from its use. Seller shall not be liable for delays occasioned by fire, strikes, differences of employees, accidents, or other causes beyond its control.

CONSENT TO JURISDICTION: The Purchaser consents to the jurisdiction of the state or federal court for Brown County, Texas, and irrevocably agrees that all actions or proceedings relating to this agreement or to the prod its purchased by Purchaser pursuant to the Agreement, shall be litigated in such courts an FET and Purchaser waive any objection which either may have, based upon improper venue or formum non convenians, to conducting any proceeding in any such court. The scope of this consent is intended to encompass any and all disputes that may be filed in any court an that relate to the subject matter of this agreement, including without limitation, contract claims tort claims, breach of duty claims, product performance claims, injury claims, and all other common law and statutory claims. FET and Purchaser each acknowledge that this consent is a material inducement to enter into the purchase arrangement, that each has relied on the consent of the other entering into this agreement, and that both will continue to rely on such consent in their future dealings. This consent is irrevocable, meaning that it may not be modified, either orally or in writing, and the consent shall apply to any subsequent amendments, renewals, supplements, or modifications to this agreement and shall apply to all businesses dealings between the Purchaser and FET.

Layout & Application

Fenton Environmental uses their considerable experience, which has been gained by the installation of more indirectly heated biosolids dryers than all the other manufacturers combined to assist our customers in developing the optimum layout for their application.

In addition to carefully analyzing the proper drying capacity of the dehydrator there are several other important factors to be considered which relate to material handling and maintenance accessibility.

1. **Wet Sludge**

   The wet sludge must be conveyed from the dewatering equipment to the Fenton Fenix™ wet sludge storage/feed hopper. Shaft less auger conveyors work well on dewatered biosolids and help contain odors. A Bindicator type fill switch mounted in the hopper is often used to control the dewatering operation or to alert the operator to take action.

2. **Wet Sludge Storage Buffer**

   The wet sludge storage /feed hopper sizing plays an important role in the optimum equipment design. Dewatering devices are normally purchased with excess capacity as the larger sizing "scale of economy" weighed against the reduced labor costs dictates specifying equipment that will comfortably operate within an eight-hour shift at the plant.

   Conversely, thermal dryers are economically sized for a minimum of 12 or more operating hours per day, which improves efficiency, and saves wear on the equipment. So when one compares the capacity of the dewatering equipment to the capacity and cost of the dryer it is easily determined that an n oversized wet sludge storage/feed hopper is mandatory. Fenton provides up to 18 hours of holding capacity with our standard Fenix™ dryers. Continuous dryer manufacturers often do not address this very important design consideration.

3. Layout Considerations

The Fenton Fenix™ oversized wet sludge feed hopper is on a separate skid and can be placed as necessary in a straight line, "L" or "U" shaped arrangement to accommodate the desired building shape.

The finished dried product from the Fenix™ continuous batch dehydrator is discharged rapidly into a surge bin that serves several desirable functions. The relatively small discreet amount of dried product that is derived from a single batch may be checked for class compliance before it is forwarded to the shipping/storage area. Conversely; continuous flow-through designs transfer the material on an ongoing basis risking contamination of the trailer or silo's contents.

The surge bin also acts as a cooling device as the hot dried product is commonly a known fire risk. We recommend that the product be cooled to a minimum of 120 deg. F. before being fed into storage or trailers.

Dust control materials can be sprayed on the dried class "A" product in the surge bin with virtually no waste as there is up to 2 hrs. retention time before the product must be evacuated to accommodate the next batch.

One should always leave ample access to the dehydration room through overhead doors large enough for the equipment installation and removal.

Access around the equipment is best planned if one considers using a forklift for easy maintenance access to elevated components. The maintenance personnel will show their appreciation through diligence in their duties.

Philosophy: "Projects run out of space, time and money!" This will handle the space item.

4. Dried Product Storage/Transportation

Once the decision has been made to pursue Class A biosolids using thermal dehydration, the first items to be planned are the end use of the product, the material handling equipment and transportation methods necessary for accomplishing the removal of the product. From these end product design considerations we then work backwards into the plant and the dehydration equipment layouts.

Therefore; the first design consideration is at the end of the Class A process.

4306 HWY 377 SOUTH
BROWNWOOD, TX 76801
PHONE: (800) 521-1708
FAX: (325) 646-7027
IFENTON.COM

PAYMENT TERMS

Schedule of Values, Milestone Payment Schedule.

10% of the total project value with the purchase order.
Submittals will be forwarded within 30 days of receipt of order.

The purchaser will be invoiced for the second milestone payment due.

15% of the total project value 4 weeks from the order date.
Second milestone payment must be returned by this date to insure the scheduled delivery.

The purchaser will be invoiced for the third milestone payment due.

20% of total project value 10 weeks from the order date.

The purchaser will be invoiced for the forth milestone payment.

25% of the total value 16 weeks from order date.

25% of total project value when the system is ready to ship.
The purchaser will be invoiced for the "ready to ship" milestone 45 days in advance of the scheduled ship date.

5% of the total project value after delivery, not to exceed 60 days.

NOTICE:
THE ENCLOSED BID PROPOSAL ADDRESSES AND ACCEPTS CERTAIN ITEMS CONTAINED IN THE SPECIFICATION BID PACKAGE THAT VARY FROM, ALTER, OR OTHERWISE CONFLICT WITH FENTON'S OVERALL STANDARD EQUIPMENT DESIGN. EVERY EFFORT HAS BEEN MADE TO NOTE THE EXCEPTIONS TO THE RELEVANT CONFLICTING ITEMS. HOWEVER, THERE MAY BE CONFLICTING ITEMS THAT WERE NOT CONSIDERED SIGNIFICANT, OR THAT WERE OTHERWISE NOT ACCEPTED TO. IN THE EVENT OF ANY SUCH CONFLICT IN THE TERMS OF THE SPECIFICATION BID PACKAGE AND FENTON'S STANDARD EQUIPMENT DESIGN, FENTON'S STANDARD DESIGN, SPECIFICATIONS AND PAYMENT TERMS WILL PREVAIL.

ANY DELAYS IN PAYMENTS BASED UPON THE AGREED TO TERMS CAN AFFECT THE MANUFACTURING AND DELIVERY OF THE EQUIPMENT. FAILURE TO MEET THE TERMS WILL NEGATE ANY LIQUIDATED DAMAGES THAT MAY BE PLACED ON THE DELIVERY DATE OF THE SYSTEM. IN THE EVENT OF LATE PAYMENT, AND BASED UPON OUR PLANT MANUFACTURING SCHEDULES, FENTON WILL HAVE THE SOLE DISCRETION IN DETERMINING A NEW DELIVERY DATE. THE PENALTY FOR LATE PAYMENTS WILL BE CHARGED MONTHLY AT THE MAXIMUM THAT IS PERMITTED BY LAW.

Rigging & Setup

Fenton Environmental Technologies, Inc (F.E.T.) will receive and unload all provided equipment except any small items, if any, that were drop shipped.

All equipment will be inspected for damage and our personnel will fill out the proper forms if a damage claim is needed.

F.E.T. will have the necessary crane and /or material handling equipment present at the site to unload the trucks.

The equipment will be rigged and put in place on the owners prepared floor.

The equipment will be shimmed on 2" blocks that are placed between the dryer and floor wash down.

All shipping splits will be reconnected including the hopper fill auger, dried product discharge auger and the hot oil expansion tank removed for shipping height will be remounted.

All electrical wiring to the hopper skid, augers and other accessories that was disconnected and rolled back for shipment will be wired back to the proper "J" box.

All conveyors will be installed and properly braced from the floor. If the conveyors are to be supported from the ceiling, this will be done by others.

The installation contractor could take advantage of our personnel being at the site by immediately supplying the required utilities to the skids so that the equipment could be checked for leaks, proper water and gas pressures and other pre-startup details.

F.E.T. will cleanup their work area and leave the work site until called for startup and testing.

A written report will be furnished to the Owner and Engineer within 7-days of completion of this phase of our contract.

1/12

Composting

Scott Krallman

From: Steve Diddy <Steve@compostsystems.com>
Sent: Friday, November 18, 2011 3:10 PM
To: Scott Krallman
Subject: ECS/Post Falls ID
Attachments: ECS Pro Forma Design Services - 2011-01-20.pdf; ECS Products and Services - 2011-01-20.pdf

Hi Scott,
Thank you for contacting me.
I've done some quick math on the Post Falls project below.
I'll use this for the basis of my design unless you see some obvious faults.
Please note unless stated otherwise these values are daily (365 d/y)
For example, at 14% solids the mix will require ~104 yd3/day of wood waste.
For comparison, if the solids were increased to 18% the daily wood waste requirement drops to ~65 yds/day. Increasing the solids may be worth considering because of the cost of bulking agents and the nearly 30% decrease in the size of the compost system requirements.

Total Annual Wet Tons	tons	8000
% Solids - wt basis	%	14.0%
Total Solids (dry tons)	DT/y	1,120
Total Solids (dry tons)	DT/day	3.1

Compost Volume Generated From Dewatered Biosolids & Wood Chips

Inputs Required	Units	**Input**
Total Solids (dry tons)	DT/day	3.1
% Solids - wt basis	%	14.0%
Density of DW Biosolids	lb/yd3	1,650
Density of wood waste	lb/yd3	550
Desired Mix % solids	%	40.0%
% solids wood waste	%	60.0%
volume reduction of mix	%	12.0%
Result	Units	**Output**
Wet weight of biosolids	tons	22
Volume of biosolids	yd3	27
Weight Ratio: Wood/Biosolids		1.3
Volume Ratio: Wood/Biosolids		3.9
Volume of wood waste	yd3	104
Wet weight of wood	tons	28
Total daily mix weight	tons	50
Bulk Density of Mix	lb/yd3	880
Total daily mix volume	yd3/day	115
Annual Tonnage	tons	18,400
Annual Volume	yd3	41,813
Approx Compost Production	yd3/year	25,088

ratio of compost to initial wet sludge

$\frac{18,400}{8000 \text{ tons}} = 2.3$

Please contact me if you have comments and questions. And I'll be back with process suggestions and equipment estimates after Thanksgiving.

Sincerely,

Steve Diddy
director of business development
c 360.280.8985

Engineered Compost Systems - ECS
4211 24th Ave West
Seattle, WA 98199
t 206.634.2625 - f 206.634.1309

www.compostsystems.com

Scott Krallman

From: Steve Diddy <Steve@compostsystems.com>
Sent: Friday, December 09, 2011 12:31 PM
To: Scott Krallman
Subject: Engineered Compost Systems - ECS
Attachments: ECS 2011-12-07 Post Falls ID - ASP with In-floor Aeration in Bunker-combined.pdf

Hi Scott
It is always difficult to know what the best composting solution is for any application—and jump right to it. I don't believe I have the final technology solution for Post Falls, however I have provided a starting point for discussion. As the project moves along, and I know more about it, I'm happy to revise this proposal with other solutions and to better match the project's revised budget.

For this estimate I choose an ASP system with in-floor aeration and a bunker wall configuration. There is an image of this arrangement found in the 3rd & 4th image here: http://www.compostsystems.com/systems/standard-asp

Here are some thoughts that I considered to get to this point:

- Single direction aeration will work well for this application, reversing aeration is available and I didn't think the increased cost added that much benefit.
- In-floor aeration offers the best air distribution, least labor and maintenance and at a higher cost. The floor also collects Leachate/Condensate and takes it to a sump located before the fan. Since this is a municipal facility, and municipalities often have access to low interest loans and are labor adverse, I included the in-floor aeration option. Going to an above grade aeration system will increase labor costs, maintenance costs, the potential for odor, and reduce the estimate by ~$100,000 plus associate construction/installation costs.
- Bunker wall configurations have a very small facility footprint when compared to an ASP with discrete piles. The total process area for this configuration is ~11,000 ft2 including area for the biofilter and aeration system. The bunker walls also are more efficient at composting because they lack the "toe" of the piles, an area that is difficult in which to retain heat for pathogen kill. I'd recommend a solid poured-in-place back pushwall, and the bunker side walls can be "ecology" blocks.
- This is an uncovered ASP system. We recommend that one foot of clean cover (wood chips or finished compost top-cover) is added to the top for insulation and odor control. The AC Composter™ cover (http://www.compostsystems.com/systems/ac-composter) can be added however I'm not certain the benefit equals the cost. Covers, fabric or top-cover will retard drying and drying out the piles in the Post Falls arid conditions will be an operational issue to monitor.
- You mentioned wind and snow at the site—and the bunker wall configuration lends itself to adding a roof (without side walls) if warranted (not essential).
- The dewatered solids at 14% are wet and require a fair amount of bulking agent which in turn demands a greater installed capacity for composting (more cost). At 14% solids I estimated the mix would require ~103 yd3 of wood waste per day...This is reduced to ~68 yd3/day if the solids content is increased to 18%. You may want to consider this option during your analysis.

Thank you for your interest in ECS products and services...your project is a good fit with our systems and capabilities and we look forward to continuing the dialogue as your project moves forward.

Please contact me when you have comments and questions.

Sincerely,

4

Steve Diddy
director of business development
c 360.280.8985

Engineered Compost Systems - ECS
4211 24th Ave West
Seattle, WA 98199
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www.compostsystems.com

Products and Services

engineeredCOMPOSTsystems

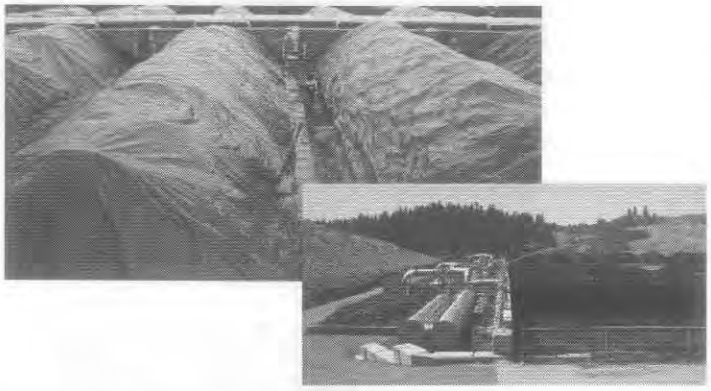
The ECS Process

No compost facilities have the same requirements, characteristics, or feedstocks. That is why ECS is committed to providing each of our clients with a solution that is tailored to meet their economic, environmental and technological needs.

We begin by listening...and using a rigorous design approach we've developed over the past decade...combined with our unparalleled range of system and component offerings, we provide ECS clients with several appropriate Pro-Forma Options. Our clients are better able to make an informed decision on whether or not to proceed with a new potential project or facility upgrade; and which, among many process options, best suits their unique application and needs.

When a new project or facility upgrade proves feasible, ECS develops the detailed process design in concert with the client's other team members (engineers, environmental consultants, and contractors). ECS' typical project scope of work includes:

- Providing drawings and calculations for permitting support
- Providing the manufactured process components for facility construction
- Conducting facility start-up and acceptance testing
- Training facility staff to use ECS equipment and on the fundamentals of composting
- Providing product service, on-going technical support, and annual site inspections



ECS Solutions for Sustainability

AC Composter™ Covered and negative aeration ASP technology offers excellent AND cost-effective process control. The AC Composter™ can be used with In-slab or CompDog™ aeration floors, and in a variety of site configurations. Patents are issued and pending.

SV Composter™ Stationary in-vessel technology with concrete site-built vessels; reversing aeration; in-slab floor aeration (that collects condensate/leachate); and enclosed aeration hallway provides processing certainty for all climates and feedstocks. It offers the best capture and reduction of odors, VOC and GHG air emissions; and smallest footprint of all ECS systems.

CV Composter™ Containerized (modular) in-vessel technology with stainless steel vessels built onto roll-off system chassis; reversing aeration; condensate/leachate collection; and excellent capture and reduction of odors, VOC and GHG air emissions. It requires minimal infrastructure and the modular approach easily adds additional capacity for growth.

ECS Standard ASP Proven and reliable designs for both primary composting and curing. They are available with single and/or reversing aeration systems; various configurations (discrete piles, mass-bed, bunker-walls); and with in-slab or above-grade aeration floors.

CompDog™ Unique and affordable pipe-less & above-grade aeration floor that adapts easily to new facilities, and provides a logical upgrade path for existing windrow facilities looking to transition to ASP technology. Patents are issued and pending.

RF TeleProbe™ The compost industry's leading wireless compost temperature monitoring technology. The RF TeleProbe™ has been continuously in service since 1999; offers single or dual sensors; and is compatible with ECS aeration control and monitoring software, PLC systems, or data monitoring and recording only.

CompTroller™ ECS' automated aeration control and monitoring system is operating at all ECS compost installations. It is designed for regulatory compliance and provides operators with a broad range of process options.

- Facility Design
- In-Vessel
- ASP
- Automated Controls
- Client Support

(206) 634-2625 • Seattle, WA www.compostsystems.com

ECS PATENTS *The AC Composter™ covered aerated pile system and CompDog™ aeration floor system are covered by US Patents 7,642,090, 7,713,731, and other US and foreign patents pending.*

Pro Forma Design Services

engineeredCOMPOSTsystems

The operating realities of each composting facility are unique; a site-specific study is the best way to anticipate the implications of developing a new facility, or installing a different processing technology in an existing facility. This study should overlay the proposed technologies to the operational, commercial, and regulatory conditions at the target facility. At ECS, the outcome of this study is "pro forma" analysis and a design review report that provides the client with solid data. From this report, they can base a business decision on the viability of the proposed facility, or facility upgrade.

ECS is very efficient at developing Pro Forma Design Reports. We have well-developed analytic and cost models; a broad range of existing designs; updated equipment prices; and excellent working relationships with compost analysis laboratories and product vendors. Our Pro Forma Design clients who decide to continue with the development or modification of their compost facility, do so with better planning and greater confidence. The clients who find out that owning and operating a compost facility would not have met their goals, are happy to figure this out during the early planning stage.

When clients decide that the project will meet their goals, and decide to move ahead, the next step is permitting and construction design. The role of ECS in this phase is to develop the detailed process design in conjunction with their civil engineer who develops the construction package required for construction permitting. In addition, ECS frequently works in support of consultants who are charged with environmental permitting.

Once a construction begins, ECS coordinates the delivery of equipment to the site and works closely with the contractor to ensure the installation is efficient. Once the facility begins operations, ECS provides start-up, training, and long-term technical and maintenance support.

ECS Pro Forma Design and Analysis Outline

ECS regularly provides Pro Forma Design Services for compost facility planning and business forecasting. We work with clients and their consultants to identify their primary areas of concern and opportunity, and to help them analyze an approach to best match their goals.

The actual analysis and design tasks vary considerably from one facility to the next. These tasks range from a simple facility sizing and construction cost estimation (~20 hours); to much more in-depth facility planning and cost analysis (up to 160 hours). The pro forma tasks carried out are selected, in consultation with the client, from the following list:

1. **Facility Operation Goal Definition**
2. **Feedstock Analysis** (laboratory assays, theoretical mix, and mass-balance calculations)
3. **Initial Process Design**
   a. Processing alternatives
   b. Operational description
   c. Material flow diagram (feedstock requirements, water use, air handling volumes)
   d. Process & instrumentation diagram
   e. Preliminary facility layout – land requirement
   f. Equipment list and specifications (material handling & time-motion models)
   g. Staff skill requirements and labor estimations
4. **Environmental Compliance Assessment**
   a. Odors
   b. Air emissions
   c. Surface water
5. **Facility Cost Analysis**
   a. Budgetary capital and financing costs (land, design and permitting, equipment budget, construction cost)
   b. Operation & maintenance costs (labor, power, fuel, water and sewer, G&A costs, bulking agent requirements, equipment O&M costs)
6. **Revenue and Profit Models**
   a. Tip fees (Tip fee market analysis)
   b. Product sales (market analysis, quality requirements, product options)
   c. Carbon and pollution credits
   d. Sensitivity analysis

- **Facility Design**
- **In-Vessel**
- **ASP**
- **Automated Controls**
- **Client Support**

(206) 634-2625 • Seattle, WA www.compostsystems.com

Aerated Static Pile (ASP) Systems

engineeredcompostsystems

The ECS ASP Systems offer great versatility and reliability. They are appropriate for primary and secondary composting; small to large-sized facilities; and for any feedstocks including food waste and biosolids. They have a smaller footprint, faster process time, and better odor control when compared with windrow or static pile compost systems.

ECS has an innovative array of specialized ASP components, such as the CompTroller™ (automated aeration control and monitoring system); RF Teleprobe™ (wireless temperature transmitting technology); In-Slab and CompDog™ aeration floors; and the AC Composter™ (Covered ASP System) that features an impermeable cover combined with a negatively aerated compost process.

ASP System capabilities include:

- Excellent VOC, GHG and odor control using site-built biofilters
- Condensate management and collection
- Batch or continuous-flow processes
- Ability to process feedstocks at irregular loading rates
- Reversing or single direction aeration
- Discrete piles, mass-bed or bunker wall configurations
- Accommodates growth and expansion easily

Aeration

The aeration system distributes air through the biomass to enhance composting conditions. All process air exhausts through an ECS designed biofilter. All aeration components in contact with the compost's corrosive exhaust air-stream are made from stainless steel or polymeric materials. The aeration system is designed to conserve energy with variable speed fans, and adaptive control strategies. Motorized dampers control airflow and direction to each pile. Damper position is automatically set by the control system.

Aeration Floors

ECS offers several different below and above grade aeration floors that distribute air through the biomass and are compatible with loading and unloading using front-end loaders. Our In-Slab channel aeration floor collects condensate/leachate, is plug-resistant, and is easily maintained. The CompDog™ floor system uses an inflatable form to create aeration vaults under an ASP pile. In-floor sparger and pipe-on-grade options are also available.

Control

ECS' CompTroller™ is an automated aeration control and monitoring system that is operating at all ECS compost installations. It is designed to achieve regulatory compliance; offers operators a broad range of process options; and provides each pile/zone with independent and automatic control for achieving process goals. It allows the operator to set aeration rates very low (anoxic conditions) if conserving moisture and fan power is the highest process-setting priority; or higher to reduce temperature and increase drying rates. The CompTroller™ is remotely accessible via the web and is flexible, robust, and keeps your data safe.

- Facility Design
- In-Vessel
- ASP
- Automated Controls
- Client Support

(206) 634-2625 • Seattle, WA www.compostsystems.com

ECS PATENTS *The AC Composter™ covered aerated pile system and CompDog™ aeration floor system are covered by US Patents 7,642,090, 7,713,731, and other US and foreign patents pending.*

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Compost Facility Size & Cost Estimation

For Scott Krallman - JUB Engineers
Quote Bugetary - Post Falls, ID
By Steve Diddy/Chris Anderson
Date 12/7/2011

Design Basis: Aerated Static Pile with Bunker Walls, Single Direction Aeration, In-floor Aeration

Volume & Retention Assumptions

Total Annual Wet Tons	tons	8,000
Total Mix Weight - Annual Amount	tpy	18,400
Mix Density	lb/yd3	880
Average Daily Mix Volume (7 day week)	yd3/day	115
Retention Time in Zones	days	25

AC Composter Design Data

Number of Fan Groups	#	1
Total Number of Zones	#	5
Zone (Bunker) Width	ft	30
Zone (Bunker) Length	ft	62
Days to fill a Zone (9' pile height plus 1' cover material)	days	5.0
Biofilter Area	ft2	2,700
Average Continuous Fan Power	Hp	19
Installed Fan Power	Hp	30

Budgetary Quotation for Staged ECS Deliverables

ASP with In-floor Aeration in Bunkers	$510,000

Includes: Process, mechanical, and electrical engineering (drawings will not be stamped); Pre-Assembled skids for controls; Automated controls; Aeration system; In-floor Aeration Components; Biofilter mechanical components (SS ducting, HDPE sparger pipes with couplers, irrigation components); Leachate and Condensate collection system design; Leachate and Condensate Collection components; Start-up and Operator Training; one year of technical support (primarily via remote web access); and Allowances for freight & travel

Does not include: Permits; civil engineering; ECS equipment installation; construction; surface water & leachate storage and processing; biofilter media; process water system; access roads and storage pads; lights; utilities; buildings; pre-processing design or equipment; taxes

Scott Krallman

From: Steve Diddy <Steve@compostsystems.com>
Sent: Friday, December 09, 2011 1:00 PM
To: Scott Krallman
Subject: ECS Mixers

Hi Scott,
I meant to include a heavy duty biosolids mixer in my last email.
We recommend and provide Helm Welding mixers, for Post Falls I'd say a 525 ft3 four horizontal auger mixer with:

- Electric motor
- Scales
- Discharge conveyor and
- RF controls.

It will cost ~$150,000 delivered.

http://www.compostsystems.com/components/compost-mixers

Sincerely,

Steve Diddy
director of business development
c 360.280.8985

Engineered Compost Systems - ECS
4211 24th Ave West
Seattle, WA 98199
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www.compostsystems.com

10

Scott Krallman

From: Steve Diddy <Steve@compostsystems.com>
Sent: Friday, December 09, 2011 1:00 PM
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Sincerely,

Steve Diddy
director of business development
c 360.280.8985

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Seattle, WA 98199
t 206.634.2625 - f 206.634.1309

www.compostsystems.com

Compost Bunker

Walls

$$\frac{[150+70(6)](1')(12')}{27}$$

= 255 cy

× 1000 cy

$254,000

Slab $\frac{92 \times 150 \times .67}{27}$

= 342 cy

× $800

$274,000

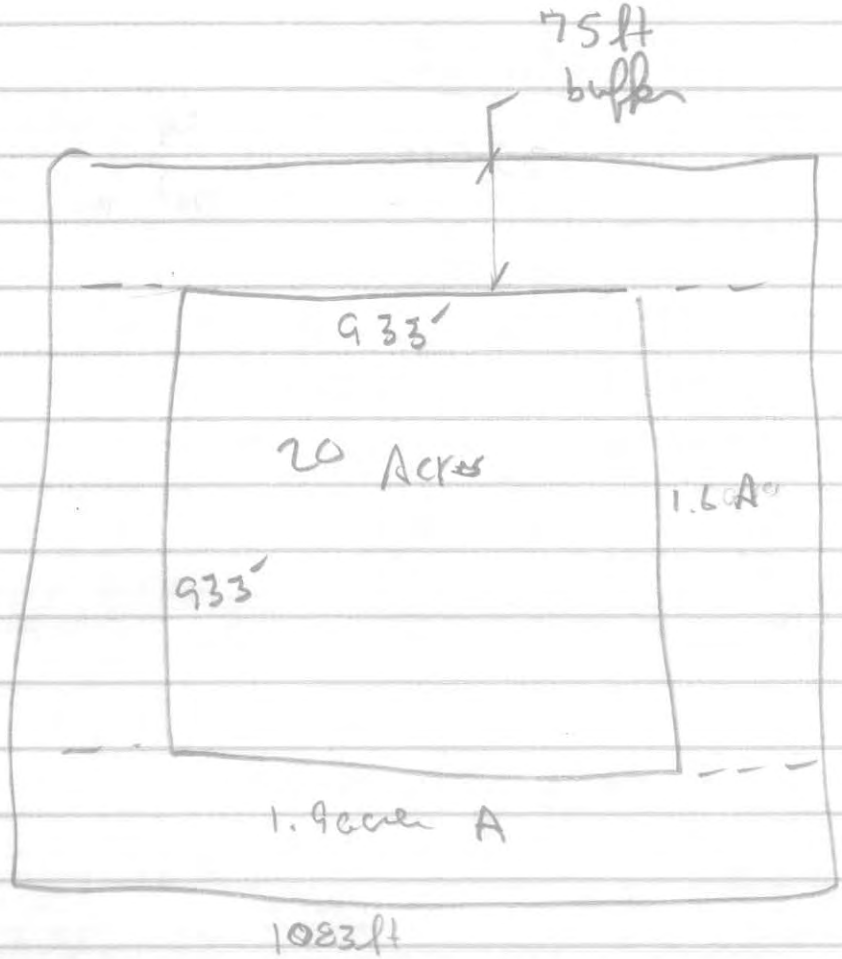
Bio filter 2700 sf, w/ 6' walls

walls (4×52) (1) (6') / 27 × 1000 = $47,000

slab (2700) (.67) / 27 × 800 = 54,000

total Concrete = $629,000

Land



total Land 27 acres

42 E6

135, 261

135

Wet tu

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Post Falls WRF Facility Plan

DATE: November 1, 2011

PROJECT DESCRIPTION: Utility Water Pump Station

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Demo Existing Structure	1	LS	$7,500.00	$ 7,500
2	**Pumps**				$ -
3	3 each at 150 gpm at 40-60 psi	3	EA	$ 25,000	$ 75,000
4	Screening Eqpt	2	EA	$ 18,000	$ 36,000
5	Piping and Mechanical	3	EA	$ 20,000	$ 60,000
6	**Pump Building**				
7	Excavation and Site Work	225	CY	$ 5	$ 1,125
8	Pump Station (20 x20 Building/Tank)	600	SF	$ 300	$ 180,000

Construction Subtotal	**$ 352,100**
Mobilization, Bonding, Administration (12%)	$ 42,300
Site Electrical, Controls and Testing (30%)	$ 118,300
Construction Total	**$ 512,700**
Engineering and Administration (25%)	$ 128,200
Construction Reserve Contingency (20%)	$ 102,500
Total Capital	**$ 743,400**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Post Falls WRF

DATE: October 1, 2011

PROJECT DESCRIPTION: Operations Building

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Backfill	1000	CY	$ 5	$ 5,000
2	Modify Existing Building (60 x 60)	3,600	SF	$ 85	$ 306,000
3	Site Work	1	LS	5%	$ 15,300

Construction Subtotal	$	**326,300**
Mobilization, Bonding, Administration (12%)	$	39,200
Site Electrical, Controls and Testing (25%)	$	91,400
Construction Total	$	**456,900**
Engineering and Administration (25%)	$	114,200
Construction Reserve Contingency (20%)	$	91,400
Total Capital	$	**662,500**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Post Falls WRF

DATE: October 1, 2011

PROJECT DESCRIPTION: Maintenance Shop

CLIENT: City of Post Falls

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Excavation and Backfill	1100	CY	$ 5	$ 5,500
2	New Building w/ moderate heating	5,000	SF	$ 70	$ 350,000
3	Site Work	1	LS	5%	$ 17,500

Construction Subtotal	**$**	**373,000**
Mobilization, Bonding, Administration (12%)	$	44,800
Site Electrical, Controls and Testing (25%)	$	104,500
Construction Total	**$**	**522,300**
Engineering and Administration (25%)	$	130,600
Construction Reserve Contingency (20%)	$	104,500
Total Capital	**$**	**757,400**

J-U-B ENGINEERS, INC.

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J-U-B ENGINEERS, INC.

City of Post Falls and Hayden Area Regional Sewer Board

Evaluation of Joint Anaerobic Digestion Facility

PROFESSIONAL ENGINEER
REGISTERED
12491
STATE OF IDAHO
RUEL MICHAEL CONN
10/5/2012

October 2012

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TM – Evaluation of a Joint Anaerobic Digestion Facility for the City of Post Falls and the Hayden Area Regional Sewer Board (HARSB)

Introduction and Purpose of the Evaluation

In the spring of 2012 during the development of the HARSB and City of Post Falls Facility Planning efforts, both the City of Post Falls and HARSB representatives began discussion of the potential option of developing a regional anaerobic treatment and biosolids handling facility. The initial discussion was based on the realization that the capital cost for either facility may potentially be reduced if they were to combine the biosolids treatment to one location. As both entities face similar long-term biosolids treatment and disposal issues, and both are facing significant modifications to solids handling processes, they felt it would be beneficial to evaluate the opportunity for an anaerobic digestion system that would be jointly used by both parties. The evaluation considers the capital costs for a facility located at either the Post Falls WRF or the HARSB WWTP and the associated operation cost over a 20-year period.

Design Criteria

The solids loading design criteria were taken from the facilities plan of each facility. The planning year used in this evaluation is 2031. The design condition for sizing the anaerobic digesters is the projected maximum week solids production. The projected solids production for each facility includes the addition of 150 mg Alum/l for phosphorus removal beginning in the year 2018. The maximum week solids production is 2.4 times the average day value.

Max Week Total Solids Production	
Post Falls	29,980 lbs/day
HARSB	12,250 lbs/day
Total	42,230 lbs/day
Volatile solids	78%
Digester System	Mesophilic, single stage, high rate
Feed solids concentration	7%
Hydraulic residence time	10 days at max week loading
Total volume	734,000 gallons (98,000 cubic feet)
Number of tanks	2
Tank diameter	50 ft
Liquid depth	25 ft
Volatile solids destruction	50%
Digested Solids	10,660 lbs/d

Joint Facility – General Description

Both the HARSB and the Post Falls treatment plants operate and extended aeration activated sludge process without primary clarification. The Post Falls process also includes biological phosphorus removal and denitrification for one-half its flow. The treatment capacity for Post Falls is 4.0 mgd. The treatment capacity of HARSB is 2.4 mgd. The waste activated sludge from each facility should be very similar which will simplify the operation of the digestion facility.

Both treatment facilities have sufficient land and space to site a joint anaerobic digestion facility. HARSB is more rurally located with the Kootenai County Airport on its north border and an industrial park along on its eastern border. Agricultural fields are to the south and west. Post Falls has a housing development immediately along its western border and is buffered by Interstate 90, Seltice Road and the City property on the other sides.

The scenarios evaluated for the joint digestion facility assumes that it will be located at either the HARSB WWTP or the Post Falls WRF and that the remote facility will truck sludge to the joint facility. The other possibility is that the joint facility would be located somewhere between each treatment plant. This option was not evaluated. It did not seem practical since the existing treatment plants have all of the supporting processes that would be required (i.e., electrical service, pump stations, effluent discharge, etc.)

The additional equipment and facilities needed to locate the joint digestion facility at either HARSB or Post Falls would be very similar and are discussed in this section. The requirements that would be specific to each location are discussed separately following this section.

To reduce the trucking costs, the sludge from the remote site would be dewatered to approximately 14 percent total solids. At the joint facility the dewatered sludge would be dumped into a live bottom hopper to be automatically fed into a process to re-wet the sludge. The re-wetting process can be performed with a continuous mixer. Continuous mixers are used by industrial applications to mix wet and dry components. An example is the mixing of dry concrete with water on a continuous assembly line producing concrete blocks. The re-wetted sludge would be mixed with the waste activated sludge from the local treatment plant (joint digestion facility site).

Sludge fed to the anaerobic digesters should be in the range of 5 percent to 7 percent total solids (TS) and it should be as consistent and continuous as possible. Blending of the dewatered sludge from one treatment plant with the waste activated sludge from the other treatment plant could be controlled so that it resulted in a mixture of 5 percent to 7 percent TS, but this would like hard to control with consistent results. Also, because of the quantity differences it would only work if Post Falls was the dewatered sludge and not vise-versa. The best method to create a consistent feed and be able to feed continuously is to use a sludge holding tank. Such a tank must be aerated in order to prevent odors; however; it is generally not practical to aerate sludge greater than 3 percent total solids. Therefore, the recommended operating scenario is to

dewater sludge at the remote treatment plant and haul it to the joint digestion facility where it will be re-wetted and combined with the waste activated sludge of the local treatment plant. The combined sludge will be held in an aerated storage tank at 3 percent TS less and then thickened to 5 to 7 percent in a separate process as it is fed to the digesters.

Either of two sludge thickening technologies is appropriate to thicken the waste activated sludge; a gravity belt thickener (GBT) or a rotary drum thickener (RDT). Both GBTs and RDTs are considered relatively simple to operate, require minimal operator attention, and have a proven track record for WAS thickening.

A mesophilic, high rate anaerobic digestion process is recommended with the total volume divided between two tanks. Two tanks will provide system redundancy and early in the design life they could be operated as a 2-stage process if so desired. Anaerobic digesters are sized based upon a solids retention time (SRT) and a hydraulic retention time (HRT). The high rate system is completely mixed so there is no supernatant decant and the solids residence time is equal to the hydraulic residence time. The digester volume is based on a minimum SRT of 10 days at the maximum week solids load and a minimum SRT of 20 days at the average day solids load in the design year. The required total digester volume is approximately 734,000 gallons (98,000 cubic feet). Two 50-foot-diameter x 25-foot-water-depth tanks are proposed with an additional 10 feet of side wall height for scum, storage, etc. Mixing systems, tank cover types, gas storage methods, etc. are design specifics, so are not discussed here although they are included in the cost estimate for the system.

When the digesters are fed continuously, it is necessary to provide digested sludge storage volume for when the dewatering system is not in operation. Digested sludge may be stored in the digester itself, but it is typically more cost effective and easier to manage operations by having a separate digested sludge storage tank. Therefore, a digested sludge storage tank is recommended. This tank will be mixed but not aerated. The sludge dewatering system will be drawn from this tank. The digested sludge holding tank may produce potential odors. Odor control costs for the facility have not been included.

Digested sludge will be dewatered at the joint digestion site and then disposed by a Contractor. Anaerobically digested sludge can be expected to dewater to better than the aerobic sludge currently produced by each treatment plant. For cost estimating a dewatered sludge cake of 20 percent was used. For contracted sludge disposal an initial cost of $65 per wet ton was used.

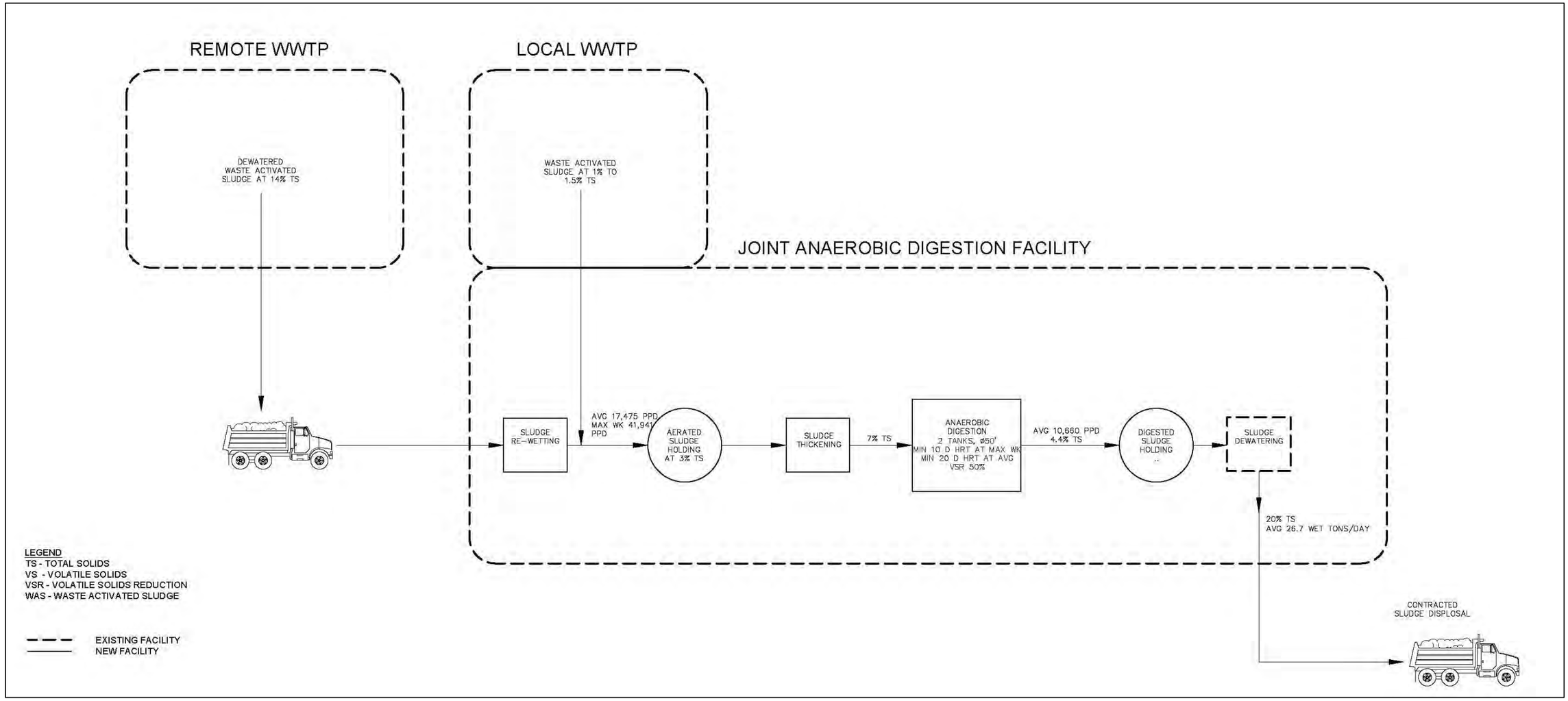
The filtrate from the dewatered sludge will have significant amounts of ammonia and BOD. The assumed concentrations were 921 mg NH3-N/l and 8,527mg BOD5/l from Table 27-VI, WPCF Manual of Practice No. 8, which results in an additional oxygen demand of approximately 3,227 lbs/day (in the design year of 2031). This additional oxygen demand is approximately equal to 0.5 mg of wastewater influent flow. To minimize the impact on the mainstream treatment process, a side stream treatment is recommended.

To develop the life cycle operating costs, the following assumptions were made:

Methane gas generated would be used for heating, excess gas would be flared. No supplemental gas has been assumed, nor value of methane gas for power generation.
Annual cost escalation = 3%
Interest rate = 3%
Electricity = $ 0.08/kWhr

A general schematic of the joint digestion facility is shown on Figure 1.

Figure 1 – General Schematic of the Joint Anaerobic Digestion Facility



Joint Facility Located at the HARSB WWTP

Considerations that are specific to locating the joint digestion facility at HARSB are discussed in this section. In this scenario, dewatered sludge from the Post Falls WRF will be hauled to the HARSB Facility.

Aerated sludge storage - HARSB has an existing 220,000-gallon aerated sludge storage tank. A second 220,000-gallon aerated storage tank is recommended to provide redundancy.

Sludge thickening – The cost for sludge thickening does not include a building. It was assumed that sludge thickening would be located with the sludge dewatering and additional cost was included to account for the building in the dewatering improvements.

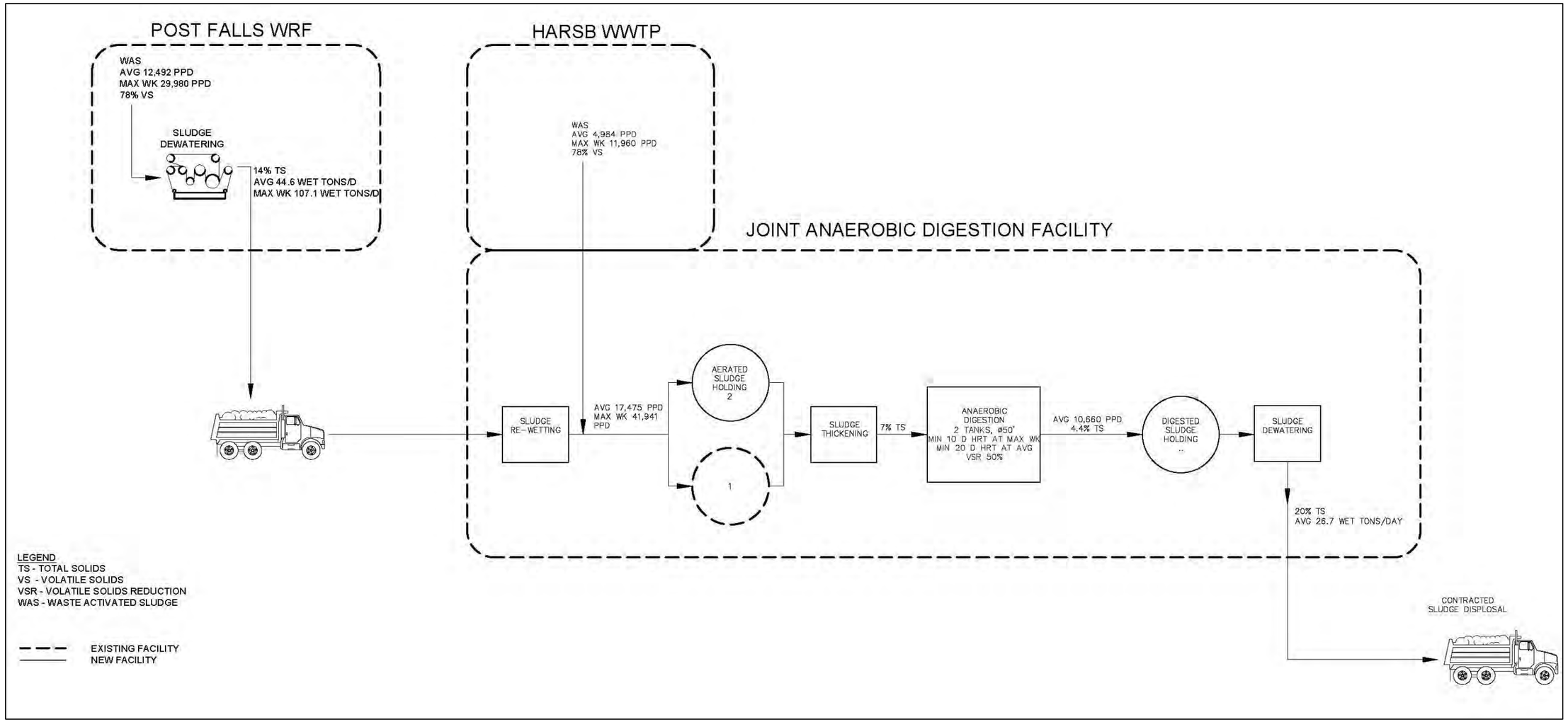
Digested sludge storage – A new 150,000 gallon tank has been assumed for the cost analysis. However, there are two existing 50-foot-diameter clarifiers that may potentially be re-purposed, and one of them could be used as the digested sludge storage tank. This may present additional potential cost savings.

The existing sludge dewatering equipment at HARSB has been in use for nearly 20 years and is approaching the end of it service period. New dewatering equipment will be needed to provide additional capacity and redundancy.

Calculations and detailed capital, operating and disposal cost evaluations are included in **Appendix A**. A summary of the opinion of probable cost follows:

	Capital Cost	Operating Cost	Total
Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB		$ 7,440,000	$ 7,440,000
Sludge Re-wetting at the Joint Digestion Facility	$ 1,292,000	$ 137,000	$ 1,429,000
Aerobic Holding Tank	$ 1,730,000	$ 439,000	$ 2,169,000
Sludge Thickening	$ 474,000		$ 474,000
Anerobic digesters	$ 8,577,000	$ 403,000	$ 8,980,000
Dewatering Facility	$ 3,731,000		$ 3,731,000
Side Stream Treatment	$ 1,012,000	$ 568,000	$ 1,580,000
Cost of sludge disposal		$ 9,320,000	$ 9,320,000
Total	$ 16,816,000	$ 18,307,000	$ 35,123,000

Figure 2 – Process Schematic (Anaerobic Digestion Facility Located at HARSB WWTP)



Facility Located at the Post Falls WRF

Considerations that are specific to locating the joint digestion facility at the Post Falls WRF are discussed in this section. In this scenario, dewatered sludge from HARSB will be hauled to the Post Falls WRF Facility.

Aerated sludge storage - Post Falls has two existing aerated sludge holding tanks of 89,000 gallons and 220,000 gallons. The smaller tank is too small to provide a significant amount of redundancy, so it is recommended that an additional 220,000-gallon aerated sludge storage tank be constructed.

Sludge thickening – It would be possible to modify the installation of the existing BDP belt filter press to provide dual functionality as a gravity belt thickener but it is not recommended. A separate dedicated thickener is recommended so that thickening and dewatering can occur simultaneously. There is an open bay in the existing sludge dewatering building that can be used for the sludge thickening equipment.

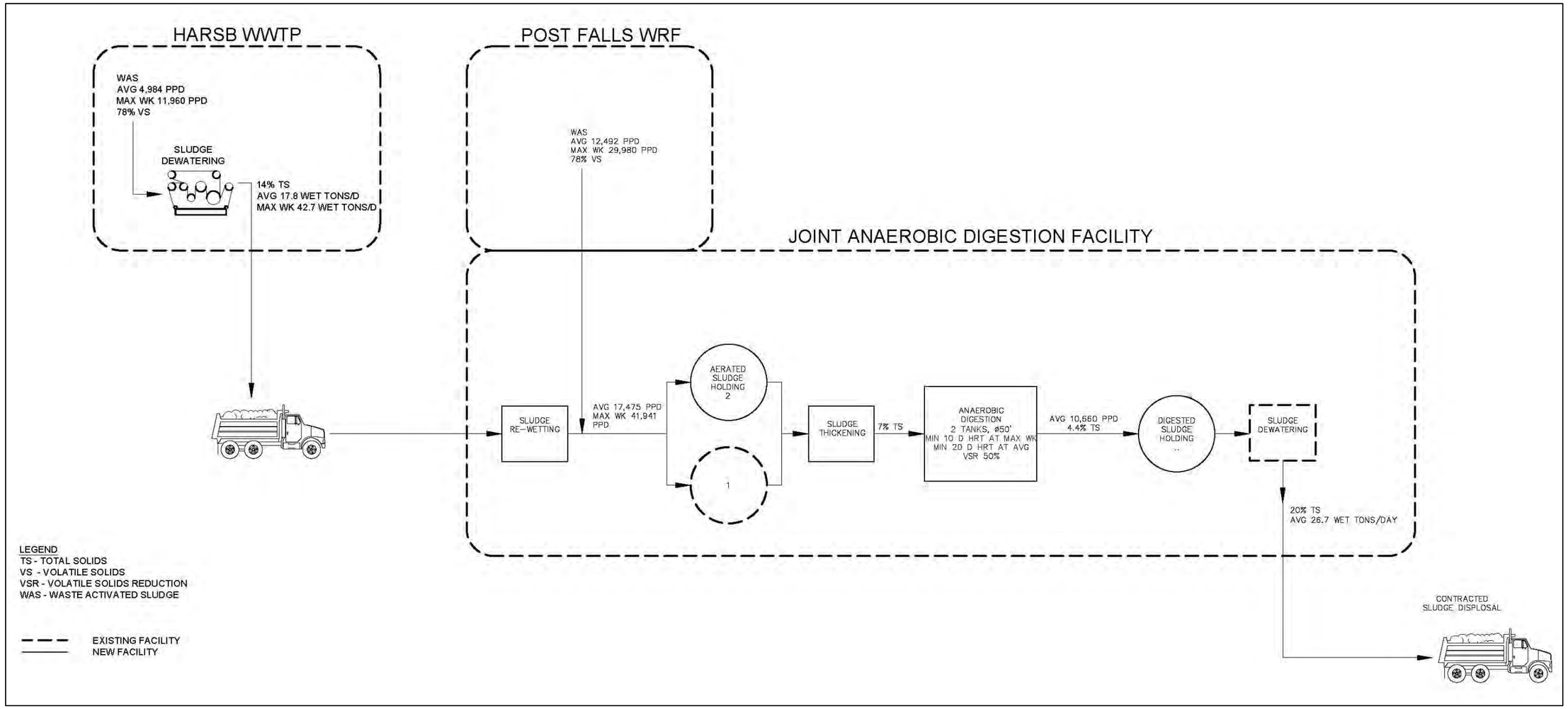
Digested sludge storage – At the design conditions the estimated maximum week volume of digested sludge is 69,880 gpd. It is recommended that storage be provided for a minimum of two days; therefore the tank size should be approximately 150,000 gallons. The existing small aerated storage tank has a volume of 89,000 gallons. It would be sufficient for the first 6 to 7 years, but would be too small thereafter. The cost of a 150,000-gallon tank is included with the dewatering facility improvements.

Sludge dewatering - Post Falls has sufficient dewatering capacity with the two existing belt filter presses, but the polymer system, sludge feed pumps and plant drain systems would require increased capacity.

Calculations and detailed capital, operating and disposal cost evaluations are included in **Appendix B**. A summary of the opinion of probable cost follows:

	Capital Cost	Operating Cost	Total
Cost to haul sludge from HARSB to the Joint Digestion Facility at the PFWRF		$ 3,049,000	$ 3,049,000
Sludge Re-wetting at the Joint Digestion Facility	$ 1,292,000	$ 137,000	$ 1,429,000
Aerobic Holding Tank	$ 1,730,000	$ 439,000	$ 2,169,000
Sludge Thickening	$ 474,000		$ 474,000
Anerobic digesters	$ 8,577,000	$ 403,000	$ 8,980,000
Dewatering Facility	$ 782,000		$ 782,000
Side Stream Treatment	$ 1,012,000	$ 568,000	$ 1,580,000
Cost of sludge disposal		$ 9,320,000	$ 9,320,000
Total	$ 13,867,000	$ 13,916,000	$ 27,783,000

Figure 3 – Process Schematic (Anaerobic Digestion Facility Located at HARSB WWTP)



Discussion

In Facility Planning work for the City of Post Falls, the cost for capital and operation of an anaerobic digestion facility with capacity for 5.2 MGD average daily flow for the City of Post Falls (alone) was developed.

During separate facility planning work for HARSB, the costs for capital and operation were developed for a similar facility to treat solids generated from a 2.4 MGD average daily flow facility (HARSB alone). The costs for each independent anaerobic digestion facility are shown in **Table 1**.

Table 1 – Summary of Individual Anaerobic Digestion System Costs

Facility	Capital Cost	Operating Cost (including contracted disposal)	Total
Post Falls WRF (5.2 mgd)	$10,269,000	$7,340,000	$17,609,000
HARSB (2.4 mgd)	$12,878,000	$3,459,000	$16,337,000
TOTAL	$23,147,000	$10,799,000	$33,946,000

This memorandum developed the capital and operating cost for a joint anaerobic digestion facility. Costs were developed for locating the joint facility at Post Falls and at HARSB. Those costs are compared in **Table 2**. The improvements needed to locate the facilities at either treatment plant are very similar. The difference in cost is primarily because 1) Post Falls produces more than twice as much sludge, so there are significant savings from not having to haul it and 2) Post Falls has sufficient existing dewatering capacity.

Table 2 – Summary of Joint Digestion Facility Costs

Facility Location	Capital Cost	Operating Cost (including contracted disposal)	Total
Post Falls WRF	$13,867,000	$13,916,000	$27,783,000
HARSB	$16,816,000	$18,307,000	$35,123,000

Based on the analysis presented there is potential for lifecycle (20 years) cost savings of $6.16 million by developing a combined digestion facility at the Post Falls WRF. Because of the significant improvements (including side stream treatment and dewatering) that would be necessary to construct and operate a joint facility at the HARSB WWTP, the joint facility at this location is actually a higher lifecycle cost than each entity treating at their own site.

Recommendations

As each entity continues to update and modify their biosolids management strategies, the joint digestion alternative (located at the Post Falls WRF) should be considered as a viable option with potential capital and lifecycle cost savings. The HARSB site joint digestion facility also has a lower capital cost than the individual options, but increased operating costs make the overall lifecycle cost less advantageous.

Additional considerations that should be considered in future discussions and review of these alternatives include:

- Updated costs for end-disposal of biosolids (current assumed disposal costs and escalation factors have a considerable impact on the viability of either option)
- Public acceptability of an anaerobic treatment facility located at the Post Falls or HARSB WWTPs
- Legal and fiscal agreements for handling of land costs (for the facility), trucking to the facility, operation, record keeping and maintenance of the joint facility.
- Level of testing of biosolids at each facility including metals, PCBs and other trace constituents.
- Additional odor control required.
- Regional opportunity for septage and/or Fats/Oils/Grease (FOG) disposal facility.

Appendices

Appendix A – HARSB Facility Calculations and Costs
Appendix B – Post Falls Facility Calculations and Costs

Appendix A

HARSB Facility
Calculations and Costs

Summary Costs- Joint Digestion Facility Located at HARSB

	Capital Cost	Operating Cost	Total
Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB		$ 7,440,000	$ 7,440,000
Sludge Re-wetting at the Joint Digestion Facility	$ 1,292,000	$ 137,000	$ 1,429,000
Aerobic Holding Tank	$ 1,730,000	$ 439,000	$ 2,169,000
Sludge Thickening	$ 474,000		$ 474,000
Anerobic digesters	$ 8,577,000	$ 403,000	$ 8,980,000
Dewatering Facility	$ 3,731,000		$ 3,731,000
Side Stream Treatment	$ 1,012,000	$ 568,000	$ 1,580,000
Cost of sludge disposal		$ 9,320,000	$ 9,320,000
Total	$ 16,816,000	$ 18,307,000	$ 35,123,000

Common Assumptions

Note: There are other assumption in each individual tab

Yellow cells are user inputs.
Only change numbers in yellow cells.

Blue cells mean the value is copied from another place.
Don't change blue cells.

Orange cells are results.
Don't change orange cells

Annual cost escalation	3.0%	
Interest rate	3.0%	
Elec cost per kWhr	$ 0.08	
Concentration of digester feed solids	70,000	mg/l
	7.0%	
Volatile Solids of digester feed	78%	

Sludge Production Estimates

This data was copied in from the PF and HARSB Facilities Plan Biosolids alternative spreadsheets
It must be manually updated if the sludge production estimates are changed

Period	Year	Post Falls Flow [mgd]	Post Falls Dry Solids Wasted [dry lbs/day]	Post Falls	Year	HARSB Flow [mgd]	HARSB Dry Solids Wasted [dry lbs/day]	HARSB	Year	Total Dry Solids Wasted [dry lbs/day]	
0	2011	2.40	4,664			2011	1.21	2,008	0	2011	6,672	
1	2012	2.54	4,936		0	2012	1.27	2,102	1	2012	7,038	
2	2013	2.68	5,208		1	2013	1.32	2,196	2	2013	7,404	
3	2014	2.82	5,480		2	2014	1.38	2,290	3	2014	7,770	
4	2015	2.96	5,752		3	2015	1.44	2,384	4	2015	8,136	
5	2016	3.10	6,024		4	2016	1.49	2,478	5	2016	8,502	
6	2017	3.24	6,296		5	2017	1.55	2,572	6	2017	8,869	
7	2018	3.38	8,120	begin alum additon	6	2018	1.61	3,417	begin alum additon	7	2018	11,537	
8	2019	3.52	8,456		7	2019	1.66	3,537		8	2019	11,993	
9	2020	3.66	8,792		8	2020	1.72	3,658		9	2020	12,450	
10	2021	3.80	9,129		9	2021	1.78	3,778		10	2021	12,907	
11	2022	3.94	9,465		10	2022	1.83	3,899		11	2022	13,364	
12	2023	4.08	9,801		11	2023	1.89	4,019		12	2023	13,821	
13	2024	4.22	10,138		12	2024	1.95	4,140		13	2024	14,277	
14	2025	4.36	10,474		13	2025	2.00	4,260		14	2025	14,734	
15	2026	4.50	10,810		14	2026	2.06	4,381		15	2026	15,191	
16	2027	4.64	11,146		15	2027	2.12	4,501		16	2027	15,648	
17	2028	4.78	11,483		16	2028	2.17	4,622		17	2028	16,105	
18	2029	4.92	11,819		17	2029	2.23	4,743		18	2029	16,562	
19	2030	5.06	12,155		18	2030	2.29	4,863		19	2030	17,018	
20	2031	5.20	12,492		19	2031	2.34	4,984		20	2031	17,475	<<<<Design Year
					20	2032	2.40	5,104					
Sum			182,639					74,835				257,474	

% from HARSB	29%
% from PF	71%

Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB

This evaluation assumes that the solids are dewatered at Post Falls and re-wetted at HARSB

Annual cost escalation	3.0%	
Interest rate	3.0%	
%TS of dewatered sludge	14.0%	
Unit weight of dewaterd sludge	1,600	lbs/cy
Round trip truck time to Joint Digestion Site	3.00	/hr
Tuck capacity	12.00	cy
Trucking cost	$ 100.00	/hr

Year	Period	Avg Dry Solids Wasted at PFWRF [ppd]	Dewatered Sludge [Wtons/day]	Sludge vol @ 1600 lbs/cy [cy/day]	Escalating Trucking Cost [$/hr]	Trucking Cost [$/year]	Present worth Cost of Trucking [$/year]
2011	0	4664	16.7	20.82	$ 100.00	$ 189,984	$ 189,984.46
2012	1	4936	17.6	22.03	$ 103.00	$ 207,099	$ 201,066.88
2013	2	5208	18.6	23.25	$ 106.09	$ 225,069	$ 212,149.31
2014	3	5480	19.6	24.46	$ 109.27	$ 243,925	$ 223,226.22
2015	4	5752	20.5	25.68	$ 112.55	$ 263,721	$ 234,312.33
2016	5	6024	21.5	26.89	$ 115.93	$ 284,488	$ 245,402.08
2017	6	6296	22.5	28.11	$ 119.41	$ 306,262	$ 256,489.26
2018	7	8120	29.0	36.25	$ 122.99	$ 406,809	$ 330,773.22
2019	8	8456	30.2	37.75	$ 126.68	$ 436,370	$ 344,474.70
2020	9	8792	31.4	39.25	$ 130.48	$ 467,336	$ 358,174.30
2021	10	9129	32.6	40.75	$ 134.39	$ 499,752	$ 371,862.78
2022	11	9465	33.8	42.25	$ 138.42	$ 533,703	$ 385,558.25
2023	12	9801	35.0	43.76	$ 142.57	$ 569,236	$ 399,251.01
2024	13	10138	36.2	45.26	$ 146.85	$ 606,444	$ 412,958.95
2025	14	10474	37.4	46.76	$ 151.26	$ 645,379	$ 426,671.71
2026	15	10810	38.6	48.26	$ 155.80	$ 686,095	$ 440,378.39
2027	16	11146	39.8	49.76	$ 160.47	$ 728,645	$ 454,067.74
2028	17	11483	41.0	51.26	$ 165.28	$ 773,130	$ 467,756.45
2029	18	11819	42.2	52.76	$ 170.24	$ 819,655	$ 481,460.96
2030	19	12155	43.4	54.27	$ 175.35	$ 868,282	$ 495,168.97
2031	20	12492	44.6	55.77	$ 180.61	$ 919,072	$ 508,867.89
					present value		$ 7,440,055.84

Total Life Cycle cost (present value)

Operating cost $ 7,440,000

Sludge Re-wetting at the Joint Digestion Facility

This is the estimated costs to re-wet the PFWRF dewatered sludge at the Joint digestion Facility

Initial Equipment Cost	$	500,000.00	
Equipment installation (15%)	$	75,000.00	15%
Support equipment (20%)	$	100,000.00	20%
Subtotal	$	675,000.00	
Electrical, Controls (20%)	$	135,000.00	20%
Mobilization, Bonding, Administration (12%)	$	81,000.00	12%
Construction costs	$	891,000.00	
Engineering and Administration	$	222,750.00	25%
Contingency	$	178,200.00	20%
Total capital costs	$	1,291,950.00	(present worth)

Annual cost escalation	$	0.03	
Interest rate	$	0.03	
Elec cost per kWhr	$	0.08	
Hp		50	
Run time per day		6	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ 6,532.44	$ 6,532.44
2012	1	$ 0.082	$ 6,728.41	$ 6,532.44
2013	2	$ 0.085	$ 6,930.26	$ 6,532.44
2014	3	$ 0.087	$ 7,138.17	$ 6,532.44
2015	4	$ 0.090	$ 7,352.32	$ 6,532.44
2016	5	$ 0.093	$ 7,572.89	$ 6,532.44
2017	6	$ 0.096	$ 7,800.07	$ 6,532.44
2018	7	$ 0.098	$ 8,034.08	$ 6,532.44
2019	8	$ 0.101	$ 8,275.10	$ 6,532.44
2020	9	$ 0.104	$ 8,523.35	$ 6,532.44
2021	10	$ 0.108	$ 8,779.05	$ 6,532.44
2022	11	$ 0.111	$ 9,042.42	$ 6,532.44
2023	12	$ 0.114	$ 9,313.70	$ 6,532.44
2024	13	$ 0.117	$ 9,593.11	$ 6,532.44
2025	14	$ 0.121	$ 9,880.90	$ 6,532.44
2026	15	$ 0.125	$ 10,177.33	$ 6,532.44
2027	16	$ 0.128	$ 10,482.65	$ 6,532.44
2028	17	$ 0.132	$ 10,797.13	$ 6,532.44
2029	18	$ 0.136	$ 11,121.04	$ 6,532.44
2030	19	$ 0.140	$ 11,454.67	$ 6,532.44
2031	20	$ 0.144	$ 11,798.31	$ 6,532.44
			present value	$ 137,181.21

Total Life Cycle cost (present value)

Capital cost	$	1,292,000
Operating cost	$	137,000
Total	$	1,429,000

Sludge Thickening

The WAS will need to be thickened prior to being fed to the AN digesters.
A GBT can be installed into the existing dewatering building

Initial Equipment Cost, 2 meter with appurtenances	$	200,000			
Equipment installation (15%)	$	30,000			15%
Support equipment (20%)	$	40,000			20%
Subtotal			$	270,000	
Electrical, Controls (20%)	$	54,000			20%
Site work and piping (20%)	$	54,000			20%
Mobilization, Bonding, Administration (12%)	$	32,400			12%
Subtotal			$	140,400	
Engineering and Administration	$	35,100			25%
Contingency	$	28,080			20%
Subtotal			$	63,180	
Total capital costs			**$**	**474,000**	(present worth)

Aerobic Holding Tank

This is an new sludge holding tank that will hold WAS.
HARSB has only one tanks. A second tank is needed for redundancy.
PFWRF and HARSB sludge will be blended here prior to being fed to the anaerobic digester.

	Qty	Unit	Unit cost		Cost	
Tank, complete	300,000	gal	$	1.50	$	450,000
Blower bldg	750	sf	$	220	$	165,000
Blowers/pumps	3	ea	$	50,000	$	150,000
Diffuser system/mixing system	1	ls	$	75,000	$	75,000
Subtotal					$	840,000
Site work	10%				$	84,000
Electrical, controls and instrumentation	20%				$	168,000
Mobilization, Bonding, Administration	12%				$	100,800
Subtotal					$	352,800
Total Construction					$	1,192,800
Engineering and Administration	25%				$	298,200
Contingency	20%				$	238,560
Total capital costs			(present worth)		$	1,729,560

Annual cost escalation	$ 0.03	
Interest rate	$ 0.03	
Elec cost per kWhr	$ 0.08	
Hp	40	
Run time per day	24	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ 20,903.80	$20,903.80
2012	1	$ 0.082	$ 21,530.92	$20,903.80
2013	2	$ 0.085	$ 22,176.84	$20,903.80
2014	3	$ 0.087	$ 22,842.15	$20,903.80
2015	4	$ 0.090	$ 23,527.41	$20,903.80
2016	5	$ 0.093	$ 24,233.24	$20,903.80
2017	6	$ 0.096	$ 24,960.23	$20,903.80
2018	7	$ 0.098	$ 25,709.04	$20,903.80
2019	8	$ 0.101	$ 26,480.31	$20,903.80
2020	9	$ 0.104	$ 27,274.72	$20,903.80
2021	10	$ 0.108	$ 28,092.96	$20,903.80
2022	11	$ 0.111	$ 28,935.75	$20,903.80
2023	12	$ 0.114	$ 29,803.82	$20,903.80
2024	13	$ 0.117	$ 30,697.94	$20,903.80
2025	14	$ 0.121	$ 31,618.88	$20,903.80
2026	15	$ 0.125	$ 32,567.44	$20,903.80
2027	16	$ 0.128	$ 33,544.47	$20,903.80
2028	17	$ 0.132	$ 34,550.80	$20,903.80
2029	18	$ 0.136	$ 35,587.33	$20,903.80
2030	19	$ 0.140	$ 36,654.95	$20,903.80
2031	20	$ 0.144	$ 37,754.59	$20,903.80
			present value	$ 438,979.87

Total Life Cycle cost (present value)

Capital cost	$	1,730,000
Operating cost	$	439,000
Total	$	2,169,000

Anaerobic digester sizing (complete mix, high-rate)

Based on peak week solids production from PFWRF and HARSB

Assume complete mix, high-rate digester, 95F operating temperature

Post Falls max week WAS load	29,980	lbs dry solids/day	[max week = 2.4 x Avg]
HARSB max week WAS load	11,960	lbs dry solids/day	[max week = 2.4 x Avg]
Total WAS load =	41,941	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	41,941	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	71,841	gpd	
	9,604	cf/day	

The HRT = SRT for a complete mix tank.
Use the minimum recommended SRT for the peak week loading condition.

Design HRT =	10	days	1991 MOP-8 Table 27-V
Digester liquid volume =	96,044	cf	
	718,408	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Tank Area	1,921	sq ft	
Tank diameter	49.5	ft	
Roundup dia to nearest 5 ft increment	50	ft	<<<<<
Actiual Tank Volume	49,086	cf	
	367,163	gal	
Total liquid digester liquid vol neglecting cone	98,172	cf	
	734,326	gal	
Actual volumetric loading	0.43	lbs VSS/cf-day	
	427	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	157	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	814	cy	<<<<<
concrete volume of floors (all tanks)	218	cy	<<<<<

Anaerobic digester sizing (complete mix, high-rate)

This is a check to see how the sizing based on peak week loading comapares to sizing based on avg day loading

Post Falls avg day WAS load	12,492	lbs dry solids/day	
HARSB avg day WAS load	4,984	lbs dry solids/day	
Total WAS load =	17,475	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	17,476	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	29,934	gpd	
	4,002	cf/day	
The HRT = SRT for a complete mix tank.			
Use the recommended SRT for the avgerage day loading condition.			
Design HRT =	20	days	1991 MOP-8 Table 27-V
Digester liquid volume =	80,037	cf	
	598,673	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Minimum Tank Area	1,601	sq ft	
Minimum Tank diameter	45.1	ft	
Roundup dia to nearest 5 ft increment	50	ft	<<<<<
Actiual Tank Volume	49,086	cf	
	367,163	gal	
Total liquid digester liquid vol neglecting cone	98,172	cf	
	734,326	gal	
Actual volumetric loading	0.18	lbs VSS/cf-day	
	178	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	157	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	814	cy	<<<<<

concrete volume of floors (all tanks)	218	cy	<<<<<

Anerobic digester capital costs						
		Qty	Unit	Unit cost	Cost	
Excavation at 3 times the tank volume		10,908	cy	$ 4	$ 43,632	
Tank 1						
Walls		814	cy	$ 1,000	$ 814,463	
Bottom		218	cy	$ 800	$ 174,528	
Tank 2						
Walls		814	cy	$ 1,000	$ 814,463	
Bottom		218	cy	$ 800	$ 174,528	
Equipment building		3000	sf	$ 220	$ 660,000	
Steel covers		2	ea	$ 90,000	$ 180,000	
Paint covers		1	ls	$ 100,000	$ 100,000	
Piping		1	ls	$ 105,000	$ 105,000	
Heat exchangers		2	ea	$ 25,000	$ 50,000	
Boilers and piping		2	ea	$ 100,000	$ 200,000	
Mixing system and gas equipment		1	ls	$ 500,000	$ 500,000	
Sludge pumping		1	ls	$ 75,000	$ 75,000	
Subtotal					$ 3,891,613	
Site work		20%			$ 778,323	
Electrical, controls and instrumentation		20%			$ 778,323	
Mobilization, Bonding, Administration		12%			$ 466,994	
Subtotal					$ 2,023,639	
Construction subtotal					$ 5,915,252	
Engineering and Administration (25%)		25%			$ 1,478,813.10	
Contingency (20%)		20%			$ 1,183,050.48	
Subtotal					$ 2,661,864	
Total capital costs				(present worth)	$ 8,577,116	
Total Life Cycle cost (present value)						
Operating cost	$ 8,577,000					

Anaerobic Digester Operating Costs

Mixing electrical cost					
Annual cost escalation	$ 0.03				
Interest rate	$ 0.03				
Elec cost per kWhr	$ 0.08				
Total Dig liquid volume	734,326	gallons			
Mixing energy input	0.05	hp/1000 gal			
Total mixing hp	36.72	hp/1000 gal			
Year	Period		Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
2011	0	239,939	$ 0.080	$ 19,195	$ 19,195
2012	1	239,939	$ 0.082	$ 19,771	$ 19,195
2013	2	239,939	$ 0.085	$ 20,364	$ 19,195
2014	3	239,939	$ 0.087	$ 20,975	$ 19,195
2015	4	239,939	$ 0.090	$ 21,604	$ 19,195
2016	5	239,939	$ 0.093	$ 22,252	$ 19,195
2017	6	239,939	$ 0.096	$ 22,920	$ 19,195
2018	7	239,939	$ 0.098	$ 23,608	$ 19,195
2019	8	239,939	$ 0.101	$ 24,316	$ 19,195
2020	9	239,939	$ 0.104	$ 25,045	$ 19,195
2021	10	239,939	$ 0.108	$ 25,797	$ 19,195
2022	11	239,939	$ 0.111	$ 26,571	$ 19,195
2023	12	239,939	$ 0.114	$ 27,368	$ 19,195
2024	13	239,939	$ 0.117	$ 28,189	$ 19,195
2025	14	239,939	$ 0.121	$ 29,034	$ 19,195
2026	15	239,939	$ 0.125	$ 29,905	$ 19,195
2027	16	239,939	$ 0.128	$ 30,803	$ 19,195
2028	17	239,939	$ 0.132	$ 31,727	$ 19,195
2029	18	239,939	$ 0.136	$ 32,678	$ 19,195
2030	19	239,939	$ 0.140	$ 33,659	$ 19,195
2031	20	239,939	$ 0.144	$ 34,669	$ 19,195
				present value	$ 403,098
Total Life Cycle cost (present value)					
Operating cost		$ 403,000			

Additional Treatment Cost

The filtrate from dewaterd anaerobic sludge is high in BOD and NH3-N.
It is assumed that the filtrate will be treated in a side stream, or that the sizes/capacities calculated here would be an incramental addition to existing facilities
Tank volume and aeration requirements are calculated and costs for each are estimated

VSS	78%
%TS of digester feed	7%
Average VSS destruction	50%

Year	Period	Dry Solids Wasted to digester	Fixed solids in DG Feed	Volatile solids in DG Feed	Wet weight of DG Feed	Water
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]
2011	0	6,672	1,468	5,204	95,313	88,641
2012	1	7,038	1,548	5,490	100,543	93,505
2013	2	7,404	1,629	5,775	105,773	98,369
2014	3	7,770	1,709	6,061	111,003	103,233
2015	4	8,136	1,790	6,346	116,233	108,097
2016	5	8,502	1,871	6,632	121,463	112,961
2017	6	8,869	1,951	6,917	126,693	117,824
2018	7	11,537	2,538	8,998	164,807	153,271
2019	8	11,993	2,639	9,355	171,333	159,340
2020	9	12,450	2,739	9,711	177,860	165,409
2021	10	12,907	2,840	10,067	184,386	171,479
2022	11	13,364	2,940	10,424	190,912	177,548
2023	12	13,821	3,041	10,780	197,438	183,617
2024	13	14,277	3,141	11,136	203,964	189,687
2025	14	14,734	3,242	11,493	210,490	195,756
2026	15	15,191	3,342	11,849	217,016	201,825
2027	16	15,648	3,443	12,205	223,542	207,894
2028	17	16,105	3,543	12,562	230,068	213,964
2029	18	16,562	3,644	12,918	236,595	220,033
2030	19	17,018	3,744	13,274	243,121	226,102
2031	20	17,475	3,845	13,631	249,647	232,172

	Period	Fixed Solids after Digestion (unchanged)	Volatile Solids after Digestion	Total Solids after digestion	Water after digestion (unchanged)	Wet weight of sludge after digestion	%TS of digested sludge
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]	
2011	0	1,468	2,602	4,070	88,641	92,711	4.4%
2012	1	1,548	2,745	4,293	93,505	97,798	4.4%
2013	2	1,629	2,888	4,517	98,369	102,885	4.4%
2014	3	1,709	3,030	4,740	103,233	107,973	4.4%
2015	4	1,790	3,173	4,963	108,097	113,060	4.4%
2016	5	1,871	3,316	5,186	112,961	118,147	4.4%
2017	6	1,951	3,459	5,410	117,824	123,234	4.4%
2018	7	2,538	4,499	7,037	153,271	160,308	4.4%
2019	8	2,639	4,677	7,316	159,340	166,656	4.4%
2020	9	2,739	4,856	7,595	165,409	173,004	4.4%
2021	10	2,840	5,034	7,873	171,479	179,352	4.4%
2022	11	2,940	5,212	8,152	177,548	185,700	4.4%
2023	12	3,041	5,390	8,431	183,617	192,048	4.4%
2024	13	3,141	5,568	8,709	189,687	198,396	4.4%
2025	14	3,242	5,746	8,988	195,756	204,744	4.4%
2026	15	3,342	5,925	9,267	201,825	211,092	4.4%
2027	16	3,443	6,103	9,545	207,894	217,440	4.4%
2028	17	3,543	6,281	9,824	213,964	223,788	4.4%
2029	18	3,644	6,459	10,103	220,033	230,136	4.4%
2030	19	3,744	6,637	10,381	226,102	236,484	4.4%
2031	20	3,845	6,815	10,660	232,172	242,831	4.4%

%TS of dewatered sludge cake		20%						
NH3-N in filtrate		921	mg/l	1997 MOP8 table 27-VI				
BOD in filtrate		8,527	mg/l	1997 MOP8 table 27-VI				
	Period	Wet weight of dewatered sludge cake	Water removed by dewatering	Water removed by dewatering	NH3-N load	BOD load	AOR Load	AOR Load
		[ppd]	[ppd]	[gpd]	[ppd]	[ppd]	[ppd]	[lbs/hr]
	0	20,349	72,362	8,676	67	617	1,232	51
	1	21,466	76,332	9,153	70	651	1,300	54
	2	22,583	80,303	9,629	74	685	1,367	57
	3	23,699	84,273	10,105	78	719	1,435	60
	4	24,816	88,244	10,581	81	752	1,503	63
	5	25,932	92,215	11,057	85	786	1,570	65
	6	27,049	96,185	11,533	89	820	1,638	68
	7	35,186	125,122	15,003	115	1,067	2,130	89
	8	36,580	130,076	15,597	120	1,109	2,215	92
	9	37,973	135,031	16,191	124	1,151	2,299	96
	10	39,366	139,986	16,785	129	1,194	2,384	99
	11	40,760	144,940	17,379	133	1,236	2,468	103
	12	42,153	149,895	17,973	138	1,278	2,552	106
	13	43,546	154,849	18,567	143	1,320	2,637	110
	14	44,940	159,804	19,161	147	1,363	2,721	113
	15	46,333	164,759	19,755	152	1,405	2,805	117
	16	47,726	169,713	20,349	156	1,447	2,890	120
	17	49,120	174,668	20,943	161	1,489	2,974	124
	18	50,513	179,623	21,537	165	1,532	3,058	127
	19	51,906	184,577	22,132	170	1,574	3,143	131
	20	53,300	189,532	22,726	175	1,616	3,227	134

Annual cost escalation	$ 0.03							
Interest rate	$ 0.03							
Elec cost per kWhr	$ 0.08							
Cs	9.17	mg/l	*O2 saturation constant under standard conditions*					
ACF	0.915	n/a	*Altitude Correction Factor*					
alpha	0.8	n/a	*O2 transfer correction factor*					
beta	0.95	n/a	*Salinity-surface tension correction factor*					
C1	2	mg/l	*Desired O2 in basin*					
T	20	degrees C	*Basin temperature*					
Cw	9.17	mg/l	*O2 saturation concentration at actual temperature*					
SOTR	3.5	lbs / HP-hr						
	Period	SOR	Hp Req'd	KiloWatts	KW-hrs/yr	Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[lbs/hr]				[$/kWhr]	[$/year]	[$/year]
	0	99	28	21	183,940	$ 0.080	$ 14,715	$ 14,715
	1	104	30	22	194,033	$ 0.082	$ 15,988	$ 15,523
	2	109	31	23	204,126	$ 0.085	$ 17,325	$ 16,330
	3	115	33	24	214,219	$ 0.087	$ 18,727	$ 17,138
	4	120	34	26	224,312	$ 0.090	$ 20,197	$ 17,945
	5	126	36	27	234,405	$ 0.093	$ 21,739	$ 18,752
	6	131	37	28	244,498	$ 0.096	$ 23,356	$ 19,560
	7	170	49	36	318,053	$ 0.098	$ 31,293	$ 25,444
	8	177	51	38	330,648	$ 0.101	$ 33,508	$ 26,452
	9	184	53	39	343,242	$ 0.104	$ 35,828	$ 27,459
	10	191	54	41	355,837	$ 0.108	$ 38,257	$ 28,467
	11	197	56	42	368,431	$ 0.111	$ 40,800	$ 29,474
	12	204	58	43	381,025	$ 0.114	$ 43,460	$ 30,482
	13	211	60	45	393,620	$ 0.117	$ 46,244	$ 31,490
	14	218	62	46	406,214	$ 0.121	$ 49,155	$ 32,497
	15	224	64	48	418,809	$ 0.125	$ 52,199	$ 33,505
	16	231	66	49	431,403	$ 0.128	$ 55,382	$ 34,512
	17	238	68	51	443,998	$ 0.132	$ 58,709	$ 35,520
	18	245	70	52	456,592	$ 0.136	$ 62,185	$ 36,527
	19	251	72	54	469,186	$ 0.140	$ 65,818	$ 37,535
	20	258	74	55	481,781	$ 0.144	$ 69,612	$ 38,542
							present value	$ 567,870

Design flow rate	22,726	gpd, based on the 20th year		
Design HRT =	2	days		
Tank volume	45,451	gallons		
	Qty	Unit	Unit cost	Cost
Side-stream treatment, tank	46,000	gallons	$ 2.00	$ 92,000
Mixing/aeration system	1	ls	$ 75,000	$ 75,000
Treatment equipment	1	ls	$ 150,000	$ 150,000
pumping	1	ls	$ 150,000	$ 150,000
Subtotal				$ 467,000
Equipment Installation	$ 375,000	%	10%	$ 37,500.00
Site work and piping	$ 467,000	%	10%	$ 46,700.00
Electrical and instrumentation	$ 467,000	%	20%	$ 93,400.00
Construction total				$ 644,600
Bonding, Administration	$ 644,600	%	12%	$ 77,352
Engineering and Administration (25%)	$ 644,600	%	25%	$ 161,150
Contingency (20%)	$ 644,600	%	20%	$ 128,920
Admin Total				$ 367,422
Total capital costs	(present worth)			$ 1,012,022
Total Life Cycle cost (present value)				
Capital cost		$ 1,012,000		
Operating cost		$ 568,000		
total		$ 1,580,000		

Cost of Dewatering Facility

Determine the number of Screw Presses needed;
Screw press loading rates from Huber
Approximate throughput at 1% feed: RoS3.2: 54 gpm
Approximate throughput at 2% feed: RoS3.2: 45 gpm
Approximate throughput at 3% feed: RoS3.2: 36 gpm
polymer: 20lbs/dt

Throughput of Huber RoS3.2 at 3-4% feed	36	gpm
Operating days per week	7	days/week
Operating hours per day	12	hours/day

Year	Period	Total Solids after digestion at max week max wk = 2.4xAvg [ppd]	%TS of digested sludge	Vol of Digested Sludge [gpd]	Number of screw presses needed	Roundup
2011	0	9,768	4.4%	26,679	1.0	2.0
2012	1	10,304	4.4%	28,143	1.1	2.0
2013	2	10,840	4.4%	29,607	1.1	2.0
2014	3	11,376	4.4%	31,071	1.2	2.0
2015	4	11,912	4.4%	32,535	1.3	2.0
2016	5	12,448	4.4%	33,999	1.3	2.0
2017	6	12,983	4.4%	35,463	1.4	2.0
2018	7	16,889	4.4%	46,132	1.8	2.0
2019	8	17,558	4.4%	47,959	1.9	2.0
2020	9	18,227	4.4%	49,785	1.9	2.0
2021	10	18,896	4.4%	51,612	2.0	2.0
2022	11	19,565	4.4%	53,439	2.1	3.0
2023	12	20,233	4.4%	55,266	2.1	3.0
2024	13	20,902	4.4%	57,092	2.2	3.0
2025	14	21,571	4.4%	58,919	2.3	3.0
2026	15	22,240	4.4%	60,746	2.3	3.0
2027	16	22,909	4.4%	62,573	2.4	3.0
2028	17	23,577	4.4%	64,399	2.5	3.0
2029	18	24,246	4.4%	66,226	2.6	3.0
2030	19	24,915	4.4%	68,053	2.6	3.0
2031	20	25,584	4.4%	69,880	2.7	3.0

Dewatering redundancy will be provided by operating one unit 6 days/week at 16 hrs/day

	Qty	Unit	Unit cost	Cost
Dewatering feed tank	150,000	gallons	$ 1.50	$ 225,000
Dewatering building	3,000	sq	$ 225	$ 675,000
Subtotal				$ 900,000
Mixing system for dewatering feed tank	1	ls	$ 50,000	$ 50,000
feed pumps	3	ls	$ 30,000	$ 90,000
Huber RoS3	3.0	ls	$ 225,000	$ 675,000
Huber dewatered sludge screw conveyor	1.0	ls	$ 70,000	$ 70,000
Conveyor shuttle for loading trucks	1	ls	$ 25,000	$ 25,000
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 928,000
Equipment Installation	$ 928,000	%	10%	$ 92,800
Site work and piping	$ 900,000	%	10%	$ 90,000
Electrical and instrumentation	$ 1,828,000	%	20%	$ 365,600
Construction total				$ 2,376,400
Bonding, Administration	$ 2,376,400	%	12%	$ 285,168
Engineering and Administration (25%)	$ 2,376,400	%	25%	$ 594,100
Contingency (20%)	$ 2,376,400	%	20%	$ 475,280
Admin Total				$ 1,354,548
Total capital costs	(present worth)			$ 3,731,000

Cost of sludge disposal by a third party

Annual cost escalation	$ 0.03		3.0%
Interest rate	$ 0.03		3.0%
Elec cost per kWhr	$ 0.08		
Initial disposal cost	$ 65.00	per wet ton	
%TS of dewatered sludge	20%		

Year	Period	Wet weight of dewatered sludge cake [ppd]	>>>>> [Wtons/yr]	Escalating Disposal cost [$/wet ton]	Disposal cost [$/year]	Present worth of disposal cost [$/year]
2011	0	20,349	3,714	$ 65.00	$ 241,394	$241,394
2012	1	21,466	3,918	$ 66.95	$ 262,279	$254,640
2013	2	22,583	4,121	$ 68.96	$ 284,200	$267,885
2014	3	23,699	4,325	$ 71.03	$ 307,200	$281,131
2015	4	24,816	4,529	$ 73.16	$ 331,324	$294,377
2016	5	25,932	4,733	$ 75.35	$ 356,619	$307,622
2017	6	27,049	4,936	$ 77.61	$ 383,133	$320,868
2018	7	35,186	6,422	$ 79.94	$ 513,347	$417,398
2019	8	36,580	6,676	$ 82.34	$ 549,685	$433,926
2020	9	37,973	6,930	$ 84.81	$ 587,741	$450,455
2021	10	39,366	7,184	$ 87.35	$ 627,586	$466,983
2022	11	40,760	7,439	$ 89.98	$ 669,293	$483,511
2023	12	42,153	7,693	$ 92.67	$ 712,937	$500,040
2024	13	43,546	7,947	$ 95.45	$ 758,598	$516,568
2025	14	44,940	8,201	$ 98.32	$ 806,356	$533,096
2026	15	46,333	8,456	$ 101.27	$ 856,297	$549,625
2027	16	47,726	8,710	$ 104.31	$ 908,510	$566,153
2028	17	49,120	8,964	$ 107.44	$ 963,084	$582,681
2029	18	50,513	9,219	$ 110.66	$ 1,020,115	$599,210
2030	19	51,906	9,473	$ 113.98	$ 1,079,701	$615,738
2031	20	53,300	9,727	$ 117.40	$ 1,141,944	$632,266
					Present Worth Cost	$ 9,320,000

Total Life Cycle cost (present value)

Operating cost $ 9,320,000

Summary Costs- Anaerobic Digestion Facility for HARSB

	Capital Cost	Operating Cost	Total
Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB		$ -	$ -
Sludge Re-wetting at the Joint Digestion Facility	$ -	$ -	$ -
Aerobic Holding Tank	$ 1,730,000	$ 439,000	$ 2,169,000
Sludge Thickening	$ 474,000		$ 474,000
Anerobic digesters	$ 6,587,000	$ 145,000	$ 6,732,000
Dewatering Facility	$ 3,210,000		$ 3,210,000
Side Stream Treatment	$ 877,000	$ 165,000	$ 1,042,000
Cost of sludge disposal		$ 2,710,000	$ 2,710,000
Total	$ 12,878,000	$ 3,459,000	$ 16,337,000

Common Assumptions

Note: There are other assumption in each individual tab

Yellow cells are user inputs.
Only change numbers in yellow cells.

Blue cells mean the value is copied from another place.
Don't change blue cells.

Orange cells are results.
Don't change orange cells

Annual cost escalation	3.0%	
Interest rate	3.0%	
Elec cost per kWhr	$ 0.08	
Concentration of digester feed solids	70,000	mg/l
	7.0%	
Volatile Solids of digester feed	78%	

Sludge Production Estimates

This data was copied in from the PF and HARSB Facilities Plan Biosolids alternative spreadsheets
It must be manually updated if the sludge production estimates are changed

Period	Year	Post Falls Flow [mgd]	Post Falls Dry Solids Wasted [dry lbs/day]	Post Falls	Year	HARSB Flow [mgd]	HARSB Dry Solids Wasted [dry lbs/day]	HARSB	Year	Total Dry Solids Wasted [dry lbs/day]	
0	2011	2.40	-			2011	1.21	2,008	0	2011	2,008	
1	2012	2.54	-		0	2012	1.27	2,102	1	2012	2,102	
2	2013	2.68	-		1	2013	1.32	2,196	2	2013	2,196	
3	2014	2.82	-		2	2014	1.38	2,290	3	2014	2,290	
4	2015	2.96	-		3	2015	1.44	2,384	4	2015	2,384	
5	2016	3.10	-		4	2016	1.49	2,478	5	2016	2,478	
6	2017	3.24	-		5	2017	1.55	2,572	6	2017	2,572	
7	2018	3.38	-	begin alum additon	6	2018	1.61	3,417	begin alum additon	7	2018	3,417	
8	2019	3.52	-		7	2019	1.66	3,537	8	2019	3,537	
9	2020	3.66	-		8	2020	1.72	3,658	9	2020	3,658	
10	2021	3.80	-		9	2021	1.78	3,778	10	2021	3,778	
11	2022	3.94	-		10	2022	1.83	3,899	11	2022	3,899	
12	2023	4.08	-		11	2023	1.89	4,019	12	2023	4,019	
13	2024	4.22	-		12	2024	1.95	4,140	13	2024	4,140	
14	2025	4.36	-		13	2025	2.00	4,260	14	2025	4,260	
15	2026	4.50	-		14	2026	2.06	4,381	15	2026	4,381	
16	2027	4.64	-		15	2027	2.12	4,501	16	2027	4,501	
17	2028	4.78	-		16	2028	2.17	4,622	17	2028	4,622	
18	2029	4.92	-		17	2029	2.23	4,743	18	2029	4,743	
19	2030	5.06	-		18	2030	2.29	4,863	19	2030	4,863	
20	2031	5.20	-		19	2031	2.34	4,984	20	2031	4,984	<<<<Design Year
					20	2032	2.40	5,104				
Sum			-					74,835			74,835	

% from HARSB	100%
% from PF	0%

Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB

This evaluation assumes that the solids are dewatered at Post Falls and re-wetted at HARSB

Annual cost escalation	3.0%	
Interest rate	3.0%	
%TS of dewatered sludge	14.0%	
Unit weight of dewaterd sludge	1,600	lbs/cy
Round trip truck time to Joint Digestion Site	3.00	/hr
Tuck capacity	12.00	cy
Trucking cost	$ 100.00	/hr

Year	Period	Avg Dry Solids Wasted at PFWRF [ppd]	Dewatered Sludge [Wtons/day]	Sludge vol @ 1600 lbs/cy [cy/day]	Escalating Trucking Cost [$/hr]	Trucking Cost [$/year]	Present worth Cost of Trucking [$/year]
2011	0	0	0.0	-	$ 100.00	$ -	$ -
2012	1	0	0.0	-	$ 103.00	$ -	$ -
2013	2	0	0.0	-	$ 106.09	$ -	$ -
2014	3	0	0.0	-	$ 109.27	$ -	$ -
2015	4	0	0.0	-	$ 112.55	$ -	$ -
2016	5	0	0.0	-	$ 115.93	$ -	$ -
2017	6	0	0.0	-	$ 119.41	$ -	$ -
2018	7	0	0.0	-	$ 122.99	$ -	$ -
2019	8	0	0.0	-	$ 126.68	$ -	$ -
2020	9	0	0.0	-	$ 130.48	$ -	$ -
2021	10	0	0.0	-	$ 134.39	$ -	$ -
2022	11	0	0.0	-	$ 138.42	$ -	$ -
2023	12	0	0.0	-	$ 142.57	$ -	$ -
2024	13	0	0.0	-	$ 146.85	$ -	$ -
2025	14	0	0.0	-	$ 151.26	$ -	$ -
2026	15	0	0.0	-	$ 155.80	$ -	$ -
2027	16	0	0.0	-	$ 160.47	$ -	$ -
2028	17	0	0.0	-	$ 165.28	$ -	$ -
2029	18	0	0.0	-	$ 170.24	$ -	$ -
2030	19	0	0.0	-	$ 175.35	$ -	$ -
2031	20	0	0.0	-	$ 180.61	$ -	$ -
					present value		$ -

Total Life Cycle cost (present value)

Operating cost $ -

Sludge Re-wetting at the Joint Digestion Facility

This is the estimated costs to re-wet the PFWRF dewatered sludge at the Joint digestion Facility

Initial Equipment Cost	$	-	
Equipment installation (15%)	$	-	15%
Support equipment (20%)	$	-	20%
Subtotal	$	-	
Electrical, Controls (20%)	$	-	20%
Mobilization, Bonding, Administration (12%)	$	-	12%
Construction costs	$	-	
Engineering and Administration	$	-	25%
Contingency	$	-	20%
Total capital costs	$	-	(present worth)

Annual cost escalation	$	0.03	
Interest rate	$	0.03	
Elec cost per kWhr	$	0.08	
Hp		50	
Run time per day		0	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ -	$ -
2012	1	$ 0.082	$ -	$ -
2013	2	$ 0.085	$ -	$ -
2014	3	$ 0.087	$ -	$ -
2015	4	$ 0.090	$ -	$ -
2016	5	$ 0.093	$ -	$ -
2017	6	$ 0.096	$ -	$ -
2018	7	$ 0.098	$ -	$ -
2019	8	$ 0.101	$ -	$ -
2020	9	$ 0.104	$ -	$ -
2021	10	$ 0.108	$ -	$ -
2022	11	$ 0.111	$ -	$ -
2023	12	$ 0.114	$ -	$ -
2024	13	$ 0.117	$ -	$ -
2025	14	$ 0.121	$ -	$ -
2026	15	$ 0.125	$ -	$ -
2027	16	$ 0.128	$ -	$ -
2028	17	$ 0.132	$ -	$ -
2029	18	$ 0.136	$ -	$ -
2030	19	$ 0.140	$ -	$ -
2031	20	$ 0.144	$ -	$ -
			present value	$ -

Total Life Cycle cost (present value)		
Capital cost	$	-
Operating cost	$	-
Total	$	-

Sludge Thickening

The WAS will need to be thickened prior to being fed to the AN digesters.
A GBT can be installed into the existing dewatering building

Initial Equipment Cost, 2 meter with appurtenances	$	200,000			
Equipment installation (15%)	$	30,000			15%
Support equipment (20%)	$	40,000			20%
Subtotal			$	270,000	
Electrical, Controls (20%)	$	54,000			20%
Site work and piping (20%)	$	54,000			20%
Mobilization, Bonding, Administration (12%)	$	32,400			12%
Subtotal			$	140,400	
Engineering and Administration	$	35,100			25%
Contingency	$	28,080			20%
Subtotal			$	63,180	
Total capital costs			**$**	**474,000**	(present worth)

Aerobic Holding Tank

This is an new sludge holding tank that will hold WAS.
HARSB has only one tanks. A second tank is needed for redundancy.

	Qty	Unit	Unit cost		Cost	
Tank, complete	300,000	gal	$	1.50	$	450,000
Blower bldg	750	sf	$	220	$	165,000
Blowers/pumps	3	ea	$	50,000	$	150,000
Diffuser system/mixing system	1	ls	$	75,000	$	75,000
Subtotal					$	840,000
Site work	10%				$	84,000
Electrical, controls and instrumentation	20%				$	168,000
Mobilization, Bonding, Administration	12%				$	100,800
Subtotal					$	352,800
Total Construction					$	1,192,800
Engineering and Administration	25%				$	298,200
Contingency	20%				$	238,560
Total capital costs			(present worth)		$	1,729,560

Annual cost escalation	$ 0.03	
Interest rate	$ 0.03	
Elec cost per kWhr	$ 0.08	
Hp	40	
Run time per day	24	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ 20,903.80	$20,903.80
2012	1	$ 0.082	$ 21,530.92	$20,903.80
2013	2	$ 0.085	$ 22,176.84	$20,903.80
2014	3	$ 0.087	$ 22,842.15	$20,903.80
2015	4	$ 0.090	$ 23,527.41	$20,903.80
2016	5	$ 0.093	$ 24,233.24	$20,903.80
2017	6	$ 0.096	$ 24,960.23	$20,903.80
2018	7	$ 0.098	$ 25,709.04	$20,903.80
2019	8	$ 0.101	$ 26,480.31	$20,903.80
2020	9	$ 0.104	$ 27,274.72	$20,903.80
2021	10	$ 0.108	$ 28,092.96	$20,903.80
2022	11	$ 0.111	$ 28,935.75	$20,903.80
2023	12	$ 0.114	$ 29,803.82	$20,903.80
2024	13	$ 0.117	$ 30,697.94	$20,903.80
2025	14	$ 0.121	$ 31,618.88	$20,903.80
2026	15	$ 0.125	$ 32,567.44	$20,903.80
2027	16	$ 0.128	$ 33,544.47	$20,903.80
2028	17	$ 0.132	$ 34,550.80	$20,903.80
2029	18	$ 0.136	$ 35,587.33	$20,903.80
2030	19	$ 0.140	$ 36,654.95	$20,903.80
2031	20	$ 0.144	$ 37,754.59	$20,903.80
			present value	$ 438,979.87

Total Life Cycle cost (present value)

Capital cost	$	1,730,000
Operating cost	$	439,000
Total	$	2,169,000

Anaerobic digester sizing (complete mix, high-rate)

Based on peak week solids production from PFWRF and HARSB

Assume complete mix, high-rate digester, 95F operating temperature

Post Falls max week WAS load	-	lbs dry solids/day	[max week = 2.4 x Avg]
HARSB max week WAS load	11,960	lbs dry solids/day	[max week = 2.4 x Avg]
Total WAS load =	11,960	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	11,961	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	20,487	gpd	
	2,739	cf/day	
The HRT = SRT for a complete mix tank.			
Use the minimum recommended SRT for the peak week loading condition.			
Design HRT =	10	days	1991 MOP-8 Table 27-V
Digester liquid volume =	27,389	cf	
	204,873	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Tank Area	548	sq ft	
Tank diameter	26.4	ft	
Roundup dia to nearest 5 ft increment	30	ft	<<<<<
Actiual Tank Volume	17,671	cf	
	132,179	gal	
Total liquid digester liquid vol neglecting cone	35,342	cf	
	264,357	gal	
Actual volumetric loading	0.34	lbs VSS/cf-day	
	338	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	94	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	489	cy	<<<<<
concrete volume of floors (all tanks)	79	cy	<<<<<

Anaerobic digester sizing (complete mix, high-rate)

This is a check to see how the sizing based on peak week loading comapares to sizing based on avg day loading

Post Falls avg day WAS load	-	lbs dry solids/day	
HARSB avg day WAS load	4,984	lbs dry solids/day	
Total WAS load =	4,984	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	4,984	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	8,536	gpd	
	1,141	cf/day	
The HRT = SRT for a complete mix tank.			
Use the recommended SRT for the avgerage day loading condition.			
Design HRT =	20	days	1991 MOP-8 Table 27-V
Digester liquid volume =	22,825	cf	
	170,728	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Minimum Tank Area	456	sq ft	
Minimum Tank diameter	24.1	ft	
Roundup dia to nearest 5 ft increment	25	ft	<<<<<
Actiual Tank Volume	12,271	cf	
	91,791	gal	
Total liquid digester liquid vol neglecting cone	24,543	cf	
	183,581	gal	
Actual volumetric loading	0.20	lbs VSS/cf-day	
	203	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	79	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	407	cy	<<<<<
concrete volume of floors (all tanks)	55	cy	<<<<<

Anerobic digester capital costs						
		Qty	Unit	Unit cost	Cost	
Excavation (3 times the tank volume)		3927	cy	$ 4	$ 15,708	
Tank 1						
Walls		489	cy	$ 1,000	$ 488,678	
Bottom		79	cy	$ 800	$ 62,830	
Tank 2						
Walls		489	cy	$ 1,000	$ 488,678	
Bottom		79	cy	$ 800	$ 62,830	
Equipment building		3000	sf	$ 220	$ 660,000	
Steel covers		2	ea	$ 90,000	$ 180,000	
Paint covers		1	ls	$ 100,000	$ 100,000	
Piping		1	ls	$ 105,000	$ 105,000	
Heat exchangers		2	ea	$ 25,000	$ 50,000	
Boilers and piping		2	ea	$ 100,000	$ 200,000	
Mixing system and gas equipment		1	ls	$ 500,000	$ 500,000	
Sludge pumping		1	ls	$ 75,000	$ 75,000	
Subtotal					$ 2,988,723	
Site work		20%			$ 597,745	
Electrical, controls and instrumentation		20%			$ 597,745	
Mobilization, Bonding, Administration		12%			$ 358,647	
Subtotal					$ 1,554,136	
Construction subtotal					$ 4,542,859	
Engineering and Administration (25%)		25%			$ 1,135,714.76	
Contingency (20%)		20%			$ 908,571.81	
Subtotal					$ 2,044,287	
Total capital costs				(present worth)	$ 6,587,146	
Total Life Cycle cost (present value)						
Operating cost	$ 6,587,000					

Anaerobic Digester Operating Costs

Mixing electrical cost					
Annual cost escalation	$ 0.03				
Interest rate	$ 0.03				
Elec cost per kWhr	$ 0.08				
Total Dig liquid volume	264,357	gallons			
Mixing energy input	0.05	hp/1000 gal			
Total mixing hp	13.22	hp/1000 gal			
Year	Period		Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
2011	0	86,378	$ 0.080	$ 6,910	$ 6,910
2012	1	86,378	$ 0.082	$ 7,118	$ 6,910
2013	2	86,378	$ 0.085	$ 7,331	$ 6,910
2014	3	86,378	$ 0.087	$ 7,551	$ 6,910
2015	4	86,378	$ 0.090	$ 7,778	$ 6,910
2016	5	86,378	$ 0.093	$ 8,011	$ 6,910
2017	6	86,378	$ 0.096	$ 8,251	$ 6,910
2018	7	86,378	$ 0.098	$ 8,499	$ 6,910
2019	8	86,378	$ 0.101	$ 8,754	$ 6,910
2020	9	86,378	$ 0.104	$ 9,016	$ 6,910
2021	10	86,378	$ 0.108	$ 9,287	$ 6,910
2022	11	86,378	$ 0.111	$ 9,565	$ 6,910
2023	12	86,378	$ 0.114	$ 9,852	$ 6,910
2024	13	86,378	$ 0.117	$ 10,148	$ 6,910
2025	14	86,378	$ 0.121	$ 10,452	$ 6,910
2026	15	86,378	$ 0.125	$ 10,766	$ 6,910
2027	16	86,378	$ 0.128	$ 11,089	$ 6,910
2028	17	86,378	$ 0.132	$ 11,422	$ 6,910
2029	18	86,378	$ 0.136	$ 11,764	$ 6,910
2030	19	86,378	$ 0.140	$ 12,117	$ 6,910
2031	20	86,378	$ 0.144	$ 12,481	$ 6,910
				present value	$ 145,115
Total Life Cycle cost (present value)					
Operating cost		$ 145,000			

Additional Treatment Cost

The filtrate from dewaterd anaerobic sludge is high in BOD and NH3-N.
It is assumed that the filtrate will be treated in a side stream, or that the sizes/capacities calculated here would be an incramental addition to existing facilities
Tank volume and aeration requirements are calculated and costs for each are estimated

VSS	78%
%TS of digester feed	7%
Average VSS destruction	50%

Year	Period	Dry Solids Wasted to digester	Fixed solids in DG Feed	Volatile solids in DG Feed	Wet weight of DG Feed	Water
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]
2011	0	2,008	442	1,566	28,688	26,680
2012	1	2,102	462	1,640	30,032	27,930
2013	2	2,196	483	1,713	31,375	29,179
2014	3	2,290	504	1,786	32,719	30,429
2015	4	2,384	525	1,860	34,063	31,678
2016	5	2,478	545	1,933	35,406	32,928
2017	6	2,572	566	2,007	36,750	34,177
2018	7	3,417	752	2,665	48,813	45,396
2019	8	3,537	778	2,759	50,534	46,997
2020	9	3,658	805	2,853	52,256	48,598
2021	10	3,778	831	2,947	53,977	50,199
2022	11	3,899	858	3,041	55,699	51,800
2023	12	4,019	884	3,135	57,421	53,401
2024	13	4,140	911	3,229	59,142	55,002
2025	14	4,260	937	3,323	60,864	56,603
2026	15	4,381	964	3,417	62,585	58,204
2027	16	4,501	990	3,511	64,307	59,805
2028	17	4,622	1,017	3,605	66,029	61,407
2029	18	4,743	1,043	3,699	67,750	63,008
2030	19	4,863	1,070	3,793	69,472	64,609
2031	20	4,984	1,096	3,887	71,193	66,210

	Period	Fixed Solids after Digestion (unchanged)	Volatile Solids after Digestion	Total Solids after digestion	Water after digestion (unchanged)	Wet weight of sludge after digestion	%TS of digested sludge
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]	
2011	0	442	783	1,225	26,680	27,905	4.4%
2012	1	462	820	1,282	27,930	29,212	4.4%
2013	2	483	857	1,340	29,179	30,519	4.4%
2014	3	504	893	1,397	30,429	31,826	4.4%
2015	4	525	930	1,454	31,678	33,133	4.4%
2016	5	545	967	1,512	32,928	34,439	4.4%
2017	6	566	1,003	1,569	34,177	35,746	4.4%
2018	7	752	1,333	2,084	45,396	47,480	4.4%
2019	8	778	1,380	2,158	46,997	49,155	4.4%
2020	9	805	1,427	2,231	48,598	50,829	4.4%
2021	10	831	1,474	2,305	50,199	52,504	4.4%
2022	11	858	1,521	2,378	51,800	54,178	4.4%
2023	12	884	1,568	2,452	53,401	55,853	4.4%
2024	13	911	1,615	2,525	55,002	57,528	4.4%
2025	14	937	1,662	2,599	56,603	59,202	4.4%
2026	15	964	1,709	2,672	58,204	60,877	4.4%
2027	16	990	1,756	2,746	59,805	62,551	4.4%
2028	17	1,017	1,803	2,819	61,407	64,226	4.4%
2029	18	1,043	1,850	2,893	63,008	65,901	4.4%
2030	19	1,070	1,897	2,966	64,609	67,575	4.4%
2031	20	1,096	1,944	3,040	66,210	69,250	4.4%

%TS of dewatered sludge cake		20%						
NH3-N in filtrate		921	mg/l	1997 MOP8 table 27-VI				
BOD in filtrate		8,527	mg/l	1997 MOP8 table 27-VI				
	Period	Wet weight of dewatered sludge cake	Water removed by dewatering	Water removed by dewatering	NH3-N load	BOD load	AOR Load	AOR Load
		[ppd]	[ppd]	[gpd]	[ppd]	[ppd]	[ppd]	[lbs/hr]
	0	6,125	21,780	2,612	20	186	371	15
	1	6,412	22,800	2,734	21	194	388	16
	2	6,699	23,820	2,856	22	203	406	17
	3	6,986	24,840	2,978	23	212	423	18
	4	7,272	25,860	3,101	24	221	440	18
	5	7,559	26,880	3,223	25	229	458	19
	6	7,846	27,900	3,345	26	238	475	20
	7	10,421	37,058	4,443	34	316	631	26
	8	10,789	38,366	4,600	35	327	653	27
	9	11,157	39,673	4,757	37	338	676	28
	10	11,524	40,980	4,914	38	349	698	29
	11	11,892	42,287	5,070	39	361	720	30
	12	12,259	43,594	5,227	40	372	742	31
	13	12,627	44,901	5,384	41	383	765	32
	14	12,994	46,208	5,541	43	394	787	33
	15	13,362	47,515	5,697	44	405	809	34
	16	13,730	48,822	5,854	45	416	831	35
	17	14,097	50,129	6,011	46	427	854	36
	18	14,465	51,436	6,167	47	439	876	36
	19	14,832	52,743	6,324	49	450	898	37
	20	15,200	54,050	6,481	50	461	920	38

Annual cost escalation	$ 0.03							
Interest rate	$ 0.03							
Elec cost per kWhr	$ 0.08							
Cs	9.17	mg/l	*O2 saturation constant under standard conditions*					
ACF	0.915	n/a	*Altitude Correction Factor*					
alpha	0.8	n/a	*O2 transfer correction factor*					
beta	0.95	n/a	*Salinity-surface tension correction factor*					
C1	2	mg/l	*Desired O2 in basin*					
T	20	degrees C	*Basin temperature*					
Cw	9.17	mg/l	*O2 saturation concentration at actual temperature*					
SOTR	3.5	lbs / HP-hr						
	Period	SOR	Hp Req'd	KiloWatts	KW-hrs/yr	Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[lbs/hr]				[$/kWhr]	[$/year]	[$/year]
	0	30	8	6	55,364	$ 0.080	$ 4,429	$ 4,429
	1	31	9	7	57,957	$ 0.082	$ 4,776	$ 4,637
	2	32	9	7	60,550	$ 0.085	$ 5,139	$ 4,844
	3	34	10	7	63,143	$ 0.087	$ 5,520	$ 5,051
	4	35	10	8	65,736	$ 0.090	$ 5,919	$ 5,259
	5	37	10	8	68,328	$ 0.093	$ 6,337	$ 5,466
	6	38	11	8	70,921	$ 0.096	$ 6,775	$ 5,674
	7	50	14	11	94,201	$ 0.098	$ 9,268	$ 7,536
	8	52	15	11	97,523	$ 0.101	$ 9,883	$ 7,802
	9	54	15	12	100,846	$ 0.104	$ 10,526	$ 8,068
	10	56	16	12	104,168	$ 0.108	$ 11,199	$ 8,333
	11	58	16	12	107,491	$ 0.111	$ 11,903	$ 8,599
	12	59	17	13	110,813	$ 0.114	$ 12,639	$ 8,865
	13	61	17	13	114,136	$ 0.117	$ 13,409	$ 9,131
	14	63	18	13	117,458	$ 0.121	$ 14,213	$ 9,397
	15	65	18	14	120,780	$ 0.125	$ 15,054	$ 9,662
	16	66	19	14	124,103	$ 0.128	$ 15,932	$ 9,928
	17	68	20	15	127,425	$ 0.132	$ 16,849	$ 10,194
	18	70	20	15	130,748	$ 0.136	$ 17,807	$ 10,460
	19	72	21	15	134,070	$ 0.140	$ 18,807	$ 10,726
	20	74	21	16	137,393	$ 0.144	$ 19,852	$ 10,991
							present value	$ 165,052

Design flow rate	6,481	gpd, based on the 20th year		
Design HRT =	2	days		
Tank volume	12,962	gallons		
	Qty	Unit	Unit cost	Cost
Side-stream treatment, tank	13,000	gallons	$ 2.00	$ 26,000
Mixing/aeration system	1	ls	$ 75,000	$ 75,000
Treatment equipment	1	ls	$ 150,000	$ 150,000
pumping	1	ls	$ 150,000	$ 150,000
Subtotal				$ 401,000
Equipment Installation	$ 375,000	%	10%	$ 37,500.00
Site work and piping	$ 401,000	%	10%	$ 40,100.00
Electrical and instrumentation	$ 401,000	%	20%	$ 80,200.00
Construction total				$ 558,800
Bonding, Administration	$ 558,800	%	12%	$ 67,056
Engineering and Administration (25%)	$ 558,800	%	25%	$ 139,700
Contingency (20%)	$ 558,800	%	20%	$ 111,760
Admin Total				$ 318,516
Total capital costs	(present worth)			$ 877,316
Total Life Cycle cost (present value)				
Capital cost		$ 877,000		
Operating cost		$ 165,000		
total		$ 1,042,000		

Cost of Dewatering Facility

Screw press loading rates from Huber
Approximate throughput at 1% feed: RoS3.2: 54 gpm
Approximate throughput at 2% feed: RoS3.2: 45 gpm
Approximate throughput at 3% feed: RoS3.2: 36 gpm
polymer: 20lbs/dt

Throughput of Huber RoS3.2 at 3-4% feed	36	gpm
Operating days per week	5	days/week
Operating hours per day	10	hours/day

Year	Period	Total Solids after digestion [ppd]	%TS of digested sludge	Vol of Digested Sludge [gpd]	Number of screw presses needed	Roundup
2011	0	1,225	4.4%	3,346	0.2	1.0
2012	1	1,282	4.4%	3,503	0.2	1.0
2013	2	1,340	4.4%	3,659	0.2	1.0
2014	3	1,397	4.4%	3,816	0.2	1.0
2015	4	1,454	4.4%	3,973	0.3	1.0
2016	5	1,512	4.4%	4,129	0.3	1.0
2017	6	1,569	4.4%	4,286	0.3	1.0
2018	7	2,084	4.4%	5,693	0.4	1.0
2019	8	2,158	4.4%	5,894	0.4	1.0
2020	9	2,231	4.4%	6,095	0.4	1.0
2021	10	2,305	4.4%	6,295	0.4	1.0
2022	11	2,378	4.4%	6,496	0.4	1.0
2023	12	2,452	4.4%	6,697	0.4	1.0
2024	13	2,525	4.4%	6,898	0.4	1.0
2025	14	2,599	4.4%	7,099	0.5	1.0
2026	15	2,672	4.4%	7,299	0.5	1.0
2027	16	2,746	4.4%	7,500	0.5	1.0
2028	17	2,819	4.4%	7,701	0.5	1.0
2029	18	2,893	4.4%	7,902	0.5	1.0
2030	19	2,966	4.4%	8,103	0.5	1.0
2031	20	3,040	4.4%	8,303	0.5	1.0

Dewatering redundancy will be provided by operating one unit 6 days/week at 16 hrs/day.

	Qty	Unit	Unit cost	Cost
Dewatering feed tank	150,000	gallons	$ 1.50	$ 225,000
Dewatering building	3,000	sq	$ 225	$ 675,000
Subtotal				$ 900,000
Mixing system for dewatering feed tank	1	ls	$ 50,000	$ 50,000
feed pumps	2	ls	$ 30,000	$ 60,000
Huber RoS3 (1 + 1 Redundant)	2.0	ls	$ 225,000	$ 450,000
Huber dewatered sludge screw conveyor	1.0	ls	$ 70,000	$ 70,000
Conveyor shuttle for loading trucks	1	ls	$ 25,000	$ 25,000
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 673,000
Equipment Installation	$ 673,000	%	10%	$ 67,300
Site work and piping	$ 900,000	%	10%	$ 90,000
Electrical and instrumentation	$ 1,573,000	%	20%	$ 314,600
Construction total				$ 2,044,900
Bonding, Administration	$ 2,044,900	%	12%	$ 245,388
Engineering and Administration (25%)	$ 2,044,900	%	25%	$ 511,225
Contingency (20%)	$ 2,044,900	%	20%	$ 408,980
Admin Total				$ 1,165,593
Total capital costs	(present worth)			$ 3,210,000

Cost of sludge disposal by a third party

Annual cost escalation	$	0.03
Interest rate	$	0.03
Elec cost per kWhr	$	0.08
Initial disposal cost	$	65.00 per wet ton
%TS of dewatered sludge		20%

Year	Period	Wet weight of dewatered sludge cake	>>>>>	Escalating Disposal cost	Disposal cost	Present worth of disposal cost
		[ppd]	[Wtons/yr]	[$/wet ton]	[$/year]	[$/year]
2011	0	6,125	1,118	$ 65.00	$ 72,658	$72,658
2012	1	6,412	1,170	$ 66.95	$ 78,342	$76,060
2013	2	6,699	1,223	$ 68.96	$ 84,302	$79,463
2014	3	6,986	1,275	$ 71.03	$ 90,549	$82,866
2015	4	7,272	1,327	$ 73.16	$ 97,096	$86,268
2016	5	7,559	1,380	$ 75.35	$ 103,953	$89,671
2017	6	7,846	1,432	$ 77.61	$ 111,135	$93,074
2018	7	10,421	1,902	$ 79.94	$ 152,043	$123,625
2019	8	10,789	1,969	$ 82.34	$ 162,128	$127,985
2020	9	11,157	2,036	$ 84.81	$ 172,680	$132,345
2021	10	11,524	2,103	$ 87.35	$ 183,721	$136,705
2022	11	11,892	2,170	$ 89.98	$ 195,268	$141,066
2023	12	12,259	2,237	$ 92.67	$ 207,342	$145,426
2024	13	12,627	2,304	$ 95.45	$ 219,966	$149,786
2025	14	12,994	2,371	$ 98.32	$ 233,160	$154,146
2026	15	13,362	2,439	$ 101.27	$ 246,948	$158,506
2027	16	13,730	2,506	$ 104.31	$ 261,353	$162,867
2028	17	14,097	2,573	$ 107.44	$ 276,401	$167,227
2029	18	14,465	2,640	$ 110.66	$ 292,116	$171,587
2030	19	14,832	2,707	$ 113.98	$ 308,525	$175,947
2031	20	15,200	2,774	$ 117.40	$ 325,655	$180,308

Present Worth Cost $ 2,710,000

Total Life Cycle cost (present value)

Operating cost $ 2,710,000

Appendix B

Post Falls Facility
Calculations and Costs

Summary Costs - Joint Digestion Facility Located at PFWRF

	Capital Cost	Operating Cost	Total
Cost to haul sludge from HARSB to the Joint Digestion Facility at the PFWRF		$ 3,049,000	$ 3,049,000
Sludge Re-wetting at the Joint Digestion Facility	$ 1,292,000	$ 137,000	$ 1,429,000
Aerobic Holding Tank	$ 1,730,000	$ 439,000	$ 2,169,000
Sludge Thickening	$ 474,000		$ 474,000
Anerobic digesters	$ 8,577,000	$ 403,000	$ 8,980,000
Dewatering Facility	$ 782,000		$ 782,000
Side Stream Treatment	$ 1,012,000	$ 568,000	$ 1,580,000
Cost of sludge disposal		$ 9,320,000	$ 9,320,000
Total	$ 13,867,000	$ 13,916,000	$ 27,783,000

Common Assumptions

Note: There are other assumption in each individual tab

Yellow cells are user inputs.
Only change numbers in yellow cells.

Blue cells mean the value is copied from another place.
Don't change blue cells.

Orange cells are results.
Don't change orange cells

Annual cost escalation	3.0%	
Interest rate	3.0%	
Elec cost per kWhr	$ 0.08	
Concentration of digester feed solids	70,000	mg/l
	7.0%	
Volatile Solids of digester feed	78%	

Sludge Production Estimates

This data was copied in from the PF and HARSB Facilities Plan Biosolids alternative spreadsheets
It must be manually updated if the sludge production estimates are changed

Period	Year	Post Falls Flow [mgd]	Post Falls Avg Dry Solids Wasted at PFWRF [ppd]	Post Falls	HARSB Flow [mgd]	HARSB Avg Dry Solids Wasted at HARSB [ppd]	HARSB	Total Dry Solids Wasted [dry lbs/day]	
0	2011	2.40	4,664		1.21	2,008		6,672	
1	2012	2.54	4,936		1.27	2,102		7,038	
2	2013	2.68	5,208		1.32	2,196		7,404	
3	2014	2.82	5,480		1.38	2,290		7,770	
4	2015	2.96	5,752		1.44	2,384		8,136	
5	2016	3.10	6,024		1.49	2,478		8,502	
6	2017	3.24	6,296		1.55	2,572		8,869	
7	2018	3.38	8,120	begin alum additon	1.61	3,417	begin alum additon	11,537	
8	2019	3.52	8,456		1.66	3,537		11,993	
9	2020	3.66	8,792		1.72	3,658		12,450	
10	2021	3.80	9,129		1.78	3,778		12,907	
11	2022	3.94	9,465		1.83	3,899		13,364	
12	2023	4.08	9,801		1.89	4,019		13,821	
13	2024	4.22	10,138		1.95	4,140		14,277	
14	2025	4.36	10,474		2.00	4,260		14,734	
15	2026	4.50	10,810		2.06	4,381		15,191	
16	2027	4.64	11,146		2.12	4,501		15,648	
17	2028	4.78	11,483		2.17	4,622		16,105	
18	2029	4.92	11,819		2.23	4,743		16,562	
19	2030	5.06	12,155		2.29	4,863		17,018	
20	2031	5.20	12,492		2.34	4,984		17,475	<<<<Design Year
					2.40	5,104			
Sum			182,639			74,835		257,474	
								29%	
								71%	

Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB

This evaluation assumes that the solids are dewatered at Post Falls and re-wetted at HARSB

Annual cost escalation	3.0%	
Interest rate	3.0%	
%TS of dewatered sludge	14.0%	
Unit weight of dewaterd sludge	1,600	lbs/cy
Round trip truck time to Joint Digestion Site	3.00	/hr
Tuck capacity	12.00	cy
Trucking cost	$ 100.00	/hr

Year	Period	Avg Dry Solids Wasted at HARSB [ppd]	Dewatered Sludge [Wtons/day]	Sludge vol @ 1600 lbs/cy [cy/day]	Escalating Trucking Cost [$/hr]	Trucking Cost [$/year]	Present worth Cost of Trucking [$/year]
2011	0	2,008	7.2	8.97	$ 100.00	$ 81,807	$ 81,806.79
2012	1	2,102	7.5	9.38	$ 103.00	$ 88,207	$ 85,637.96
2013	2	2,196	7.8	9.80	$ 106.09	$ 94,918	$ 89,469.13
2014	3	2,290	8.2	10.22	$ 109.27	$ 101,949	$ 93,298.00
2015	4	2,384	8.5	10.64	$ 112.55	$ 109,321	$ 97,130.72
2016	5	2,478	8.9	11.06	$ 115.93	$ 117,046	$ 100,964.91
2017	6	2,572	9.2	11.48	$ 119.41	$ 125,134	$ 104,798.01
2018	7	3,417	12.2	15.25	$ 122.99	$ 171,192	$ 139,194.99
2019	8	3,537	12.6	15.79	$ 126.68	$ 182,548	$ 144,104.69
2020	9	3,658	13.1	16.33	$ 130.48	$ 194,429	$ 149,013.62
2021	10	3,778	13.5	16.87	$ 134.39	$ 206,853	$ 153,917.94
2022	11	3,899	13.9	17.41	$ 138.42	$ 219,851	$ 158,825.19
2023	12	4,019	14.4	17.94	$ 142.57	$ 233,442	$ 163,731.35
2024	13	4,140	14.8	18.48	$ 146.85	$ 247,659	$ 168,643.73
2025	14	4,260	15.2	19.02	$ 151.26	$ 262,522	$ 173,558.04
2026	15	4,381	15.6	19.56	$ 155.80	$ 278,050	$ 178,469.86
2027	16	4,501	16.1	20.10	$ 160.47	$ 294,262	$ 183,374.65
2028	17	4,622	16.5	20.63	$ 165.28	$ 311,197	$ 188,279.23
2029	18	4,743	16.9	21.17	$ 170.24	$ 328,893	$ 193,190.16
2030	19	4,863	17.4	21.71	$ 175.35	$ 347,374	$ 198,102.49
2031	20	4,984	17.8	22.25	$ 180.61	$ 366,661	$ 203,011.18
					present value		$ 3,048,522.64

Total Life Cycle cost (present value)

Operating cost $ 3,049,000

Sludge Re-wetting at the Joint Digestion Facility

This is the estimated costs to re-wet the PFWRF dewatered sludge at the Joint digestion Facility

Initial Equipment Cost	$	500,000.00	
Equipment installation (15%)	$	75,000.00	15%
Support equipment (20%)	$	100,000.00	20%
Subtotal	$	675,000.00	
Electrical, Controls (20%)	$	135,000.00	20%
Mobilization, Bonding, Administration (12%)	$	81,000.00	12%
Construction costs	$	891,000.00	
Engineering and Administration	$	222,750.00	25%
Contingency	$	178,200.00	20%
Total capital costs	$	1,291,950.00	(present worth)

Annual cost escalation	$	0.03	
Interest rate	$	0.03	
Elec cost per kWhr	$	0.08	
Hp		50	
Run time per day		6	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ 6,532.44	$ 6,532.44
2012	1	$ 0.082	$ 6,728.41	$ 6,532.44
2013	2	$ 0.085	$ 6,930.26	$ 6,532.44
2014	3	$ 0.087	$ 7,138.17	$ 6,532.44
2015	4	$ 0.090	$ 7,352.32	$ 6,532.44
2016	5	$ 0.093	$ 7,572.89	$ 6,532.44
2017	6	$ 0.096	$ 7,800.07	$ 6,532.44
2018	7	$ 0.098	$ 8,034.08	$ 6,532.44
2019	8	$ 0.101	$ 8,275.10	$ 6,532.44
2020	9	$ 0.104	$ 8,523.35	$ 6,532.44
2021	10	$ 0.108	$ 8,779.05	$ 6,532.44
2022	11	$ 0.111	$ 9,042.42	$ 6,532.44
2023	12	$ 0.114	$ 9,313.70	$ 6,532.44
2024	13	$ 0.117	$ 9,593.11	$ 6,532.44
2025	14	$ 0.121	$ 9,880.90	$ 6,532.44
2026	15	$ 0.125	$ 10,177.33	$ 6,532.44
2027	16	$ 0.128	$ 10,482.65	$ 6,532.44
2028	17	$ 0.132	$ 10,797.13	$ 6,532.44
2029	18	$ 0.136	$ 11,121.04	$ 6,532.44
2030	19	$ 0.140	$ 11,454.67	$ 6,532.44
2031	20	$ 0.144	$ 11,798.31	$ 6,532.44
			present value	$ 137,181.21

Total Life Cycle cost (present value)

Capital cost	$	1,292,000
Operating cost	$	137,000
Total	$	1,429,000

Aerobic Holding Tank

The existing small tank is too small. Recommend building another large tank

	Qty		Unit	Unit cost		Cost	
Tank, complete		300,000	gal	$	1.50	$	450,000
Blower bldg		750	sf	$	220	$	165,000
Blowers/pumps		3	ea	$	50,000	$	150,000
Diffuser system/mixing system		1	ls	$	75,000	$	75,000
Subtotal						$	840,000
Site work	$	840,000			10%	$	84,000
Electrical, controls and instrumentation	$	840,000			20%	$	168,000
Mobilization, Bonding, Administration	$	840,000			12%	$	100,800
Subtotal						$	352,800
Total Construction						$	1,192,800
Engineering and Administration	$	1,192,800			25%	$	298,200
Contingency	$	1,192,800			20%	$	238,560
Total capital costs				(present worth)		$	1,729,560

Annual cost escalation	$ 0.03	
Interest rate	$ 0.03	
Elec cost per kWhr	$ 0.08	
Hp	40	
Run time per day	24	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ 20,904	$ 20,904
2012	1	$ 0.082	$ 21,531	$ 20,904
2013	2	$ 0.085	$ 22,177	$ 20,904
2014	3	$ 0.087	$ 22,842	$ 20,904
2015	4	$ 0.090	$ 23,527	$ 20,904
2016	5	$ 0.093	$ 24,233	$ 20,904
2017	6	$ 0.096	$ 24,960	$ 20,904
2018	7	$ 0.098	$ 25,709	$ 20,904
2019	8	$ 0.101	$ 26,480	$ 20,904
2020	9	$ 0.104	$ 27,275	$ 20,904
2021	10	$ 0.108	$ 28,093	$ 20,904
2022	11	$ 0.111	$ 28,936	$ 20,904
2023	12	$ 0.114	$ 29,804	$ 20,904
2024	13	$ 0.117	$ 30,698	$ 20,904
2025	14	$ 0.121	$ 31,619	$ 20,904
2026	15	$ 0.125	$ 32,567	$ 20,904
2027	16	$ 0.128	$ 33,544	$ 20,904
2028	17	$ 0.132	$ 34,551	$ 20,904
2029	18	$ 0.136	$ 35,587	$ 20,904
2030	19	$ 0.140	$ 36,655	$ 20,904
2031	20	$ 0.144	$ 37,755	$ 20,904
			present value	$ 438,980

Total Life Cycle cost (present value)

Capital cost	$	1,730,000
Operating cost	$	439,000
Total	$	2,169,000

Sludge Thickening

The WAS will need to be thickened prior to being fed to the AN digesters.
A GBT can be installed into the existing dewatering building

Initial Equipment Cost, 2 meter with appurtenances	$	200,000			
Equipment installation (15%)	$	30,000			15%
Support equipment (20%)	$	40,000			20%
Subtotal			$	270,000	
Electrical, Controls (20%)	$	54,000			20%
Site work and piping (20%)	$	54,000			20%
Mobilization, Bonding, Administration (12%)	$	32,400			12%
Subtotal			$	140,400	
Engineering and Administration	$	35,100			25%
Contingency	$	28,080			20%
Subtotal			$	63,180	
Total capital costs			**$**	**474,000**	(present worth)

Anaerobic digester sizing (complete mix, high-rate)

Based on peak week solids production from PFWRF and HARSB

Assume complete mix, high-rate digester, 95F operating temperature

Post Falls max week WAS load	29,980	lbs dry solids/day	[max week = 2.4 x Avg]
HARSB max week WAS load	11,960	lbs dry solids/day	[max week = 2.4 x Avg]
Total WAS load =	41,941	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	41,941	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	71,841	gpd	
	9,604	cf/day	

The HRT = SRT for a complete mix tank.
Use the minimum recommended SRT for the peak week loading condition.

Design HRT =	10	days	1991 MOP-8 Table 27-V
Digester liquid volume =	96,044	cf	
	718,408	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Tank Area	1,921	sq ft	
Tank diameter	49.5	ft	
Roundup dia to nearest 5 ft increment	50	ft	<<<<<
Actiual Tank Volume	49,086	cf	
	367,163	gal	
Total liquid digester liquid vol neglecting cone	98,172	cf	
	734,326	gal	
Actual volumetric loading	0.43	lbs VSS/cf-day	
	427	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	157	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	814	cy	<<<<<
concrete volume of floors (all tanks)	218	cy	<<<<<

Anaerobic digester sizing (complete mix, high-rate)

This is a check to see how the sizing based on peak week loading comapares to sizing based on avg day loading

Post Falls avg day WAS load	12,492	lbs dry solids/day	
HARSB avg day WAS load	4,984	lbs dry solids/day	
Total WAS load =	17,475	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	17,476	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	29,934	gpd	
	4,002	cf/day	
The HRT = SRT for a complete mix tank.			
Use the recommended SRT for the avgerage day loading condition.			
Design HRT =	20	days	1991 MOP-8 Table 27-V
Digester liquid volume =	80,037	cf	
	598,673	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Minimum Tank Area	1,601	sq ft	
Minimum Tank diameter	45.1	ft	
Roundup dia to nearest 5 ft increment	50	ft	<<<<<
Actiual Tank Volume	49,086	cf	
	367,163	gal	
Total liquid digester liquid vol neglecting cone	98,172	cf	
	734,326	gal	
Actual volumetric loading	0.18	lbs VSS/cf-day	
	178	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	157	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	814	cy	<<<<<
concrete volume of floors (all tanks)	218	cy	<<<<<

Anerobic digester capital costs						
		Qty	Unit	Unit cost	Cost	
Excavation at 3 times the tank volume		10,908	cy	$ 4	$ 43,632	
Tank 1						
Walls		814	cy	$ 1,000	$ 814,463	
Bottom		218	cy	$ 800	$ 174,528	
Tank 2						
Walls		814	cy	$ 1,000	$ 814,463	
Bottom		218	cy	$ 800	$ 174,528	
Equipment building		3000	sf	$ 220	$ 660,000	
Steel covers		2	ea	$ 90,000	$ 180,000	
Paint covers		1	ls	$ 100,000	$ 100,000	
Piping		1	ls	$ 105,000	$ 105,000	
Heat exchangers		2	ea	$ 25,000	$ 50,000	
Boilers and piping		2	ea	$ 100,000	$ 200,000	
Mixing system and gas equipment		1	ls	$ 500,000	$ 500,000	
Sludge pumping		1	ls	$ 75,000	$ 75,000	
Subtotal					$ 3,891,613	
Site work		20%			$ 778,323	
Electrical, controls and instrumentation		20%			$ 778,323	
Mobilization, Bonding, Administration		12%			$ 466,994	
Subtotal					$ 2,023,639	
Construction subtotal					$ 5,915,252	
Engineering and Administration (25%)		25%			$ 1,478,813.10	
Contingency (20%)		20%			$ 1,183,050.48	
Subtotal					$ 2,661,864	
Total capital costs				(present worth)	$ 8,577,116	
Total Life Cycle cost (present value)						
Operating cost	$ 8,577,000					

Anaerobic Digester Operating Costs

Mixing electrical cost					
Annual cost escalation	$ 0.03				
Interest rate	$ 0.03				
Elec cost per kWhr	$ 0.08				
Total Dig liquid volume	734,326	gallons			
Mixing energy input	0.05	hp/1000 gal			
Total mixing hp	36.72	hp/1000 gal			
Year	Period		Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
2011	0	239,939	$ 0.080	$ 19,195	$ 19,195
2012	1	239,939	$ 0.082	$ 19,771	$ 19,195
2013	2	239,939	$ 0.085	$ 20,364	$ 19,195
2014	3	239,939	$ 0.087	$ 20,975	$ 19,195
2015	4	239,939	$ 0.090	$ 21,604	$ 19,195
2016	5	239,939	$ 0.093	$ 22,252	$ 19,195
2017	6	239,939	$ 0.096	$ 22,920	$ 19,195
2018	7	239,939	$ 0.098	$ 23,608	$ 19,195
2019	8	239,939	$ 0.101	$ 24,316	$ 19,195
2020	9	239,939	$ 0.104	$ 25,045	$ 19,195
2021	10	239,939	$ 0.108	$ 25,797	$ 19,195
2022	11	239,939	$ 0.111	$ 26,571	$ 19,195
2023	12	239,939	$ 0.114	$ 27,368	$ 19,195
2024	13	239,939	$ 0.117	$ 28,189	$ 19,195
2025	14	239,939	$ 0.121	$ 29,034	$ 19,195
2026	15	239,939	$ 0.125	$ 29,905	$ 19,195
2027	16	239,939	$ 0.128	$ 30,803	$ 19,195
2028	17	239,939	$ 0.132	$ 31,727	$ 19,195
2029	18	239,939	$ 0.136	$ 32,678	$ 19,195
2030	19	239,939	$ 0.140	$ 33,659	$ 19,195
2031	20	239,939	$ 0.144	$ 34,669	$ 19,195
				present value	$ 403,098
Total Life Cycle cost (present value)					
Operating cost		$ 403,000			

Additional Treatment Cost

The filtrate from dewaterd anaerobic sludge is high in BOD and NH3-N.
It is assumed that the filtrate will be treated in a side stream, or that the sizes/capacities calculated here would be an incramental addition to existing facilities
Tank volume and aeration requirements are calculated and costs for each are estimated

VSS	78%
%TS of digester feed	7%
Average VSS destruction	50%

Year	Period	Dry Solids Wasted to digester	Fixed solids in DG Feed	Volatile solids in DG Feed	Wet weight of DG Feed	Water
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]
2011	0	6,672	1,468	5,204	95,313	88,641
2012	1	7,038	1,548	5,490	100,543	93,505
2013	2	7,404	1,629	5,775	105,773	98,369
2014	3	7,770	1,709	6,061	111,003	103,233
2015	4	8,136	1,790	6,346	116,233	108,097
2016	5	8,502	1,871	6,632	121,463	112,961
2017	6	8,869	1,951	6,917	126,693	117,824
2018	7	11,537	2,538	8,998	164,807	153,271
2019	8	11,993	2,639	9,355	171,333	159,340
2020	9	12,450	2,739	9,711	177,860	165,409
2021	10	12,907	2,840	10,067	184,386	171,479
2022	11	13,364	2,940	10,424	190,912	177,548
2023	12	13,821	3,041	10,780	197,438	183,617
2024	13	14,277	3,141	11,136	203,964	189,687
2025	14	14,734	3,242	11,493	210,490	195,756
2026	15	15,191	3,342	11,849	217,016	201,825
2027	16	15,648	3,443	12,205	223,542	207,894
2028	17	16,105	3,543	12,562	230,068	213,964
2029	18	16,562	3,644	12,918	236,595	220,033
2030	19	17,018	3,744	13,274	243,121	226,102
2031	20	17,475	3,845	13,631	249,647	232,172

	Period	Fixed Solids after Digestion (unchanged)	Volatile Solids after Digestion	Total Solids after digestion	Water after digestion (unchanged)	Wet weight of sludge after digestion	%TS of digested sludge
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]	
2011	0	1,468	2,602	4,070	88,641	92,711	4.4%
2012	1	1,548	2,745	4,293	93,505	97,798	4.4%
2013	2	1,629	2,888	4,517	98,369	102,885	4.4%
2014	3	1,709	3,030	4,740	103,233	107,973	4.4%
2015	4	1,790	3,173	4,963	108,097	113,060	4.4%
2016	5	1,871	3,316	5,186	112,961	118,147	4.4%
2017	6	1,951	3,459	5,410	117,824	123,234	4.4%
2018	7	2,538	4,499	7,037	153,271	160,308	4.4%
2019	8	2,639	4,677	7,316	159,340	166,656	4.4%
2020	9	2,739	4,856	7,595	165,409	173,004	4.4%
2021	10	2,840	5,034	7,873	171,479	179,352	4.4%
2022	11	2,940	5,212	8,152	177,548	185,700	4.4%
2023	12	3,041	5,390	8,431	183,617	192,048	4.4%
2024	13	3,141	5,568	8,709	189,687	198,396	4.4%
2025	14	3,242	5,746	8,988	195,756	204,744	4.4%
2026	15	3,342	5,925	9,267	201,825	211,092	4.4%
2027	16	3,443	6,103	9,545	207,894	217,440	4.4%
2028	17	3,543	6,281	9,824	213,964	223,788	4.4%
2029	18	3,644	6,459	10,103	220,033	230,136	4.4%
2030	19	3,744	6,637	10,381	226,102	236,484	4.4%
2031	20	3,845	6,815	10,660	232,172	242,831	4.4%

%TS of dewatered sludge cake		20%						
NH3-N in filtrate		921	mg/l	1997 MOP8 table 27-VI				
BOD in filtrate		8,527	mg/l	1997 MOP8 table 27-VI				
	Period	Wet weight of dewatered sludge cake	Water removed by dewatering	Water removed by dewatering	NH3-N load	BOD load	AOR Load	AOR Load
		[ppd]	[ppd]	[gpd]	[ppd]	[ppd]	[ppd]	[lbs/hr]
	0	20,349	72,362	8,676	67	617	1,232	51
	1	21,466	76,332	9,153	70	651	1,300	54
	2	22,583	80,303	9,629	74	685	1,367	57
	3	23,699	84,273	10,105	78	719	1,435	60
	4	24,816	88,244	10,581	81	752	1,503	63
	5	25,932	92,215	11,057	85	786	1,570	65
	6	27,049	96,185	11,533	89	820	1,638	68
	7	35,186	125,122	15,003	115	1,067	2,130	89
	8	36,580	130,076	15,597	120	1,109	2,215	92
	9	37,973	135,031	16,191	124	1,151	2,299	96
	10	39,366	139,986	16,785	129	1,194	2,384	99
	11	40,760	144,940	17,379	133	1,236	2,468	103
	12	42,153	149,895	17,973	138	1,278	2,552	106
	13	43,546	154,849	18,567	143	1,320	2,637	110
	14	44,940	159,804	19,161	147	1,363	2,721	113
	15	46,333	164,759	19,755	152	1,405	2,805	117
	16	47,726	169,713	20,349	156	1,447	2,890	120
	17	49,120	174,668	20,943	161	1,489	2,974	124
	18	50,513	179,623	21,537	165	1,532	3,058	127
	19	51,906	184,577	22,132	170	1,574	3,143	131
	20	53,300	189,532	22,726	175	1,616	3,227	134

Annual cost escalation	$ 0.03							
Interest rate	$ 0.03							
Elec cost per kWhr	$ 0.08							
Cs	9.17	mg/l	*O2 saturation constant under standard conditions*					
ACF	0.915	n/a	*Altitude Correction Factor*					
alpha	0.8	n/a	*O2 transfer correction factor*					
beta	0.95	n/a	*Salinity-surface tension correction factor*					
C1	2	mg/l	*Desired O2 in basin*					
T	20	degrees C	*Basin temperature*					
Cw	9.17	mg/l	*O2 saturation concentration at actual temperature*					
SOTR	3.5	lbs / HP-hr						
	Period	SOR	Hp Req'd	KiloWatts	KW-hrs/yr	Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[lbs/hr]				[$/kWhr]	[$/year]	[$/year]
	0	99	28	21	183,940	$ 0.080	$ 14,715	$ 14,715
	1	104	30	22	194,033	$ 0.082	$ 15,988	$ 15,523
	2	109	31	23	204,126	$ 0.085	$ 17,325	$ 16,330
	3	115	33	24	214,219	$ 0.087	$ 18,727	$ 17,138
	4	120	34	26	224,312	$ 0.090	$ 20,197	$ 17,945
	5	126	36	27	234,405	$ 0.093	$ 21,739	$ 18,752
	6	131	37	28	244,498	$ 0.096	$ 23,356	$ 19,560
	7	170	49	36	318,053	$ 0.098	$ 31,293	$ 25,444
	8	177	51	38	330,648	$ 0.101	$ 33,508	$ 26,452
	9	184	53	39	343,242	$ 0.104	$ 35,828	$ 27,459
	10	191	54	41	355,837	$ 0.108	$ 38,257	$ 28,467
	11	197	56	42	368,431	$ 0.111	$ 40,800	$ 29,474
	12	204	58	43	381,025	$ 0.114	$ 43,460	$ 30,482
	13	211	60	45	393,620	$ 0.117	$ 46,244	$ 31,490
	14	218	62	46	406,214	$ 0.121	$ 49,155	$ 32,497
	15	224	64	48	418,809	$ 0.125	$ 52,199	$ 33,505
	16	231	66	49	431,403	$ 0.128	$ 55,382	$ 34,512
	17	238	68	51	443,998	$ 0.132	$ 58,709	$ 35,520
	18	245	70	52	456,592	$ 0.136	$ 62,185	$ 36,527
	19	251	72	54	469,186	$ 0.140	$ 65,818	$ 37,535
	20	258	74	55	481,781	$ 0.144	$ 69,612	$ 38,542
							present value	$ 567,870

Design flow rate	22,726	gpd, based on the 20th year		
Design HRT =	2	days		
Tank volume	45,451	gallons		
	Qty	Unit	Unit cost	Cost
Side-stream treatment, tank	46,000	gallons	$ 2.00	$ 92,000
Mixing/aeration system	1	ls	$ 75,000	$ 75,000
Treatment equipment	1	ls	$ 150,000	$ 150,000
pumping	1	ls	$ 150,000	$ 150,000
Subtotal				$ 467,000
Equipment Installation	$ 375,000	%	10%	$ 37,500.00
Site work and piping	$ 467,000	%	10%	$ 46,700.00
Electrical and instrumentation	$ 467,000	%	20%	$ 93,400.00
Construction total				$ 644,600
Bonding, Administration	$ 644,600	%	12%	$ 77,352
Engineering and Administration (25%)	$ 644,600	%	25%	$ 161,150
Contingency (20%)	$ 644,600	%	20%	$ 128,920
Admin Total				$ 367,422
Total capital costs	(present worth)			$ 1,012,022
Total Life Cycle cost (present value)				
Capital cost		$ 1,012,000		
Operating cost		$ 568,000		
total		$ 1,580,000		

Cost of Dewatering Facility

Andritz belt filter press	2	m
BDP belt filter press	2.5	m
Total	4.5	m

Max Solids Loading Rate	600	lbs/meter/hr
Operating days per week	6	days/week
Operating hours per day	12	hours/day

Year	Period	Total Solids after digestion at max week max wk = 2.4xAvg [ppd]	%TS of digested sludge	Vol of Digested Sludge [gpd]	Meters of Belt Filter Presses needed	Is another BFP Needed?
2011	0	9,768	4.4%	26,679	1.6	No
2012	1	10,304	4.4%	28,143	1.7	No
2013	2	10,840	4.4%	29,607	1.8	No
2014	3	11,376	4.4%	31,071	1.8	No
2015	4	11,912	4.4%	32,535	1.9	No
2016	5	12,448	4.4%	33,999	2.0	No
2017	6	12,983	4.4%	35,463	2.1	No
2018	7	16,889	4.4%	46,132	2.7	No
2019	8	17,558	4.4%	47,959	2.8	No
2020	9	18,227	4.4%	49,785	3.0	No
2021	10	18,896	4.4%	51,612	3.1	No
2022	11	19,565	4.4%	53,439	3.2	No
2023	12	20,233	4.4%	55,266	3.3	No
2024	13	20,902	4.4%	57,092	3.4	No
2025	14	21,571	4.4%	58,919	3.5	No
2026	15	22,240	4.4%	60,746	3.6	No
2027	16	22,909	4.4%	62,573	3.7	No
2028	17	23,577	4.4%	64,399	3.8	No
2029	18	24,246	4.4%	66,226	3.9	No
2030	19	24,915	4.4%	68,053	4.0	No
2031	20	25,584	4.4%	69,880	4.1	No

Dewatering redundancy will be provided by operating more days per week and more hours per day

Dewatering feed tank will hold sludge from the digester until it is dewatered
Additional dewatering building space is niot needed.

	Qty	Unit	Unit cost	Cost
Dewatering feed tank	150,000	gallons	$ 1.50	$ 225,000
Dewatering building	-	sq	$ 225	$ -
Subtotal				$ 225,000
Mixing system for dewatering feed tank	1	ls	$ 50,000	$ 50,000
feed pumps	3	ls	$ 30,000	$ 90,000
BFP	-	ls	$ 225,000	$ -
sludge conveyor	-	ls	$ 70,000	$ -
Conveyor shuttle for loading trucks	-	ls	$ 25,000	$ -
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 158,000
Equipment Installation	$ 158,000	%	10%	$ 15,800
Site work and piping	$ 225,000	%	10%	$ 22,500
Electrical and instrumentation	$ 383,000	%	20%	$ 76,600
Construction total				$ 497,900
Bonding, Administration	$ 497,900	%	12%	$ 59,748
Engineering and Administration (25%)	$ 497,900	%	25%	$ 124,475
Contingency (20%)	$ 497,900	%	20%	$ 99,580
Admin Total				$ 283,803
Total capital costs	(present worth)			$ 782,000

Cost of sludge disposal by a third party

Annual cost escalation	$ 0.03		3.0%
Interest rate	$ 0.03		3.0%
Elec cost per kWhr	$ 0.08		
Initial disposal cost	$ 65.00	per wet ton	
%TS of dewatered sludge	20%		

Year	Period	Wet weight of dewatered sludge cake	>>>>>	Escalating Disposal cost	Disposal cost	Present worth of disposal cost
		[ppd]	[Wtons/yr]	[$/wet ton]	[$/year]	[$/year]
2011	0	20,349	3,714	$ 65.00	$ 241,394	$241,394
2012	1	21,466	3,918	$ 66.95	$ 262,279	$254,640
2013	2	22,583	4,121	$ 68.96	$ 284,200	$267,885
2014	3	23,699	4,325	$ 71.03	$ 307,200	$281,131
2015	4	24,816	4,529	$ 73.16	$ 331,324	$294,377
2016	5	25,932	4,733	$ 75.35	$ 356,619	$307,622
2017	6	27,049	4,936	$ 77.61	$ 383,133	$320,868
2018	7	35,186	6,422	$ 79.94	$ 513,347	$417,398
2019	8	36,580	6,676	$ 82.34	$ 549,685	$433,926
2020	9	37,973	6,930	$ 84.81	$ 587,741	$450,455
2021	10	39,366	7,184	$ 87.35	$ 627,586	$466,983
2022	11	40,760	7,439	$ 89.98	$ 669,293	$483,511
2023	12	42,153	7,693	$ 92.67	$ 712,937	$500,040
2024	13	43,546	7,947	$ 95.45	$ 758,598	$516,568
2025	14	44,940	8,201	$ 98.32	$ 806,356	$533,096
2026	15	46,333	8,456	$ 101.27	$ 856,297	$549,625
2027	16	47,726	8,710	$ 104.31	$ 908,510	$566,153
2028	17	49,120	8,964	$ 107.44	$ 963,084	$582,681
2029	18	50,513	9,219	$ 110.66	$ 1,020,115	$599,210
2030	19	51,906	9,473	$ 113.98	$ 1,079,701	$615,738
2031	20	53,300	9,727	$ 117.40	$ 1,141,944	$632,266
					Present Worth Cost	$ 9,320,000

Total Life Cycle cost (present value)

Operating cost $ 9,320,000

Summary Costs - Anaerobic Digestion Facility for PFWRF

	Capital Cost	Operating Cost	Total
Cost to haul sludgefrom HARSB to the Joint Digestion Facility at the PFWRF		$ -	$ -
Sludge Re-wetting at the Joint Digestion Facility	$ -	$ -	$ -
Aerobic Holding Tank	$ -	$ -	$ -
Sludge Thickening	$ 474,000		$ 474,000
Anerobic digesters	$ 8,054,000	$ 327,000	$ 8,381,000
Dewatering Facility	$ 782,000		$ 782,000
Side Stream Treatment	$ 959,000	$ 403,000	$ 1,362,000
Cost of sludge disposal		$ 6,610,000	$ 6,610,000
Total	$ 10,269,000	$ 7,340,000	$ 17,609,000

Common Assumptions

Note: There are other assumption in each individual tab

Yellow cells are user inputs.
Only change numbers in yellow cells.

Blue cells mean the value is copied from another place.
Don't change blue cells.

Orange cells are results.
Don't change orange cells

Annual cost escalation	3.0%	
Interest rate	3.0%	
Elec cost per kWhr	$ 0.08	
Concentration of digester feed solids	70,000	mg/l
	7.0%	
Volatile Solids of digester feed	78%	

Sludge Production Estimates

This data was copied in from the PF and HARSB Facilities Plan Biosolids alternative spreadsheets
It must be manually updated if the sludge production estimates are changed

Period	Year	Post Falls Flow [mgd]	Post Falls Avg Dry Solids Wasted at PFWRF [ppd]	Post Falls	HARSB Flow [mgd]	HARSB Avg Dry Solids Wasted at HARSB [ppd]	HARSB	Total Dry Solids Wasted [dry lbs/day]	
0	2011	2.40	4,664		1.21	-		4,664	
1	2012	2.54	4,936		1.27	-		4,936	
2	2013	2.68	5,208		1.32	-		5,208	
3	2014	2.82	5,480		1.38	-		5,480	
4	2015	2.96	5,752		1.44	-		5,752	
5	2016	3.10	6,024		1.49	-		6,024	
6	2017	3.24	6,296		1.55	-		6,296	
7	2018	3.38	8,120	begin alum additon	1.61	-	begin alum additon	8,120	
8	2019	3.52	8,456		1.66	-		8,456	
9	2020	3.66	8,792		1.72	-		8,792	
10	2021	3.80	9,129		1.78	-		9,129	
11	2022	3.94	9,465		1.83	-		9,465	
12	2023	4.08	9,801		1.89	-		9,801	
13	2024	4.22	10,138		1.95	-		10,138	
14	2025	4.36	10,474		2.00	-		10,474	
15	2026	4.50	10,810		2.06	-		10,810	
16	2027	4.64	11,146		2.12	-		11,146	
17	2028	4.78	11,483		2.17	-		11,483	
18	2029	4.92	11,819		2.23	-		11,819	
19	2030	5.06	12,155		2.29	-		12,155	
20	2031	5.20	12,492		2.34	-		12,492	<<<<Design Year
					2.40	-			
Sum			182,639			-		182,639	
								0%	
								100%	

Cost to truck solids from Post Falls to the Joint Digestion Facility at HARSB

This evaluation assumes that the solids are dewatered at Post Falls and re-wetted at HARSB

Annual cost escalation	3.0%	
Interest rate	3.0%	
%TS of dewatered sludge	14.0%	
Unit weight of dewaterd sludge	1,600	lbs/cy
Round trip truck time to Joint Digestion Site	3.00	/hr
Tuck capacity	12.00	cy
Trucking cost	$ 100.00	/hr

Year	Period	Avg Dry Solids Wasted at HARSB [ppd]	Dewatered Sludge [Wtons/day]	Sludge vol @ 1600 lbs/cy [cy/day]	Escalating Trucking Cost [$/hr]	Trucking Cost [$/year]	Present worth Cost of Trucking [$/year]
2011	0	-	0.0	-	$ 100.00	$ -	$ -
2012	1	-	0.0	-	$ 103.00	$ -	$ -
2013	2	-	0.0	-	$ 106.09	$ -	$ -
2014	3	-	0.0	-	$ 109.27	$ -	$ -
2015	4	-	0.0	-	$ 112.55	$ -	$ -
2016	5	-	0.0	-	$ 115.93	$ -	$ -
2017	6	-	0.0	-	$ 119.41	$ -	$ -
2018	7	-	0.0	-	$ 122.99	$ -	$ -
2019	8	-	0.0	-	$ 126.68	$ -	$ -
2020	9	-	0.0	-	$ 130.48	$ -	$ -
2021	10	-	0.0	-	$ 134.39	$ -	$ -
2022	11	-	0.0	-	$ 138.42	$ -	$ -
2023	12	-	0.0	-	$ 142.57	$ -	$ -
2024	13	-	0.0	-	$ 146.85	$ -	$ -
2025	14	-	0.0	-	$ 151.26	$ -	$ -
2026	15	-	0.0	-	$ 155.80	$ -	$ -
2027	16	-	0.0	-	$ 160.47	$ -	$ -
2028	17	-	0.0	-	$ 165.28	$ -	$ -
2029	18	-	0.0	-	$ 170.24	$ -	$ -
2030	19	-	0.0	-	$ 175.35	$ -	$ -
2031	20	-	0.0	-	$ 180.61	$ -	$ -
					present value		$ -

Total Life Cycle cost (present value)

Operating cost $ -

Sludge Re-wetting at the Joint Digestion Facility

This is the estimated costs to re-wet the PFWRF dewatered sludge at the Joint digestion Facility

Initial Equipment Cost	$	-	
Equipment installation (15%)	$	-	15%
Support equipment (20%)	$	-	20%
Subtotal	$	-	
Electrical, Controls (20%)	$	-	20%
Mobilization, Bonding, Administration (12%)	$	-	12%
Construction costs	$	-	
Engineering and Administration	$	-	25%
Contingency	$	-	20%
Total capital costs	$	-	(present worth)

Annual cost escalation	$	0.03	
Interest rate	$	0.03	
Elec cost per kWhr	$	0.08	
Hp		50	
Run time per day		0	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ -	$ -
2012	1	$ 0.082	$ -	$ -
2013	2	$ 0.085	$ -	$ -
2014	3	$ 0.087	$ -	$ -
2015	4	$ 0.090	$ -	$ -
2016	5	$ 0.093	$ -	$ -
2017	6	$ 0.096	$ -	$ -
2018	7	$ 0.098	$ -	$ -
2019	8	$ 0.101	$ -	$ -
2020	9	$ 0.104	$ -	$ -
2021	10	$ 0.108	$ -	$ -
2022	11	$ 0.111	$ -	$ -
2023	12	$ 0.114	$ -	$ -
2024	13	$ 0.117	$ -	$ -
2025	14	$ 0.121	$ -	$ -
2026	15	$ 0.125	$ -	$ -
2027	16	$ 0.128	$ -	$ -
2028	17	$ 0.132	$ -	$ -
2029	18	$ 0.136	$ -	$ -
2030	19	$ 0.140	$ -	$ -
2031	20	$ 0.144	$ -	$ -
			present value	$ -

Total Life Cycle cost (present value)		
Capital cost	$	-
Operating cost	$	-
Total	$	-

Aerobic Holding Tank

The existing two holding tanks are large enough to hold the WAS prior to feeding to the anaerobic digesters.
The second smaller tank can provide redundancy.

	Qty	Unit	Unit cost	Cost
Tank, complete	-	gal	$ 1.50	$ -
Blower bldg	0	sf	$ 220	$ -
Blowers/pumps	0	ea	$ 50,000	$ -
Diffuser system/mixing system	0	ls	$ 75,000	$ -
Subtotal				$ -
Site work	$ -		10%	$ -
Electrical, controls and instrumentation	$ -		20%	$ -
Mobilization, Bonding, Administration	$ -		12%	$ -
Subtotal				$ -
Total Construction				$ -
Engineering and Administration	$ -		25%	$ -
Contingency	$ -		20%	$ -
Total capital costs			(present worth)	$ -

Annual cost escalation	$ 0.03	
Interest rate	$ 0.03	
Elec cost per kWhr	$ 0.08	
Hp	40	
Run time per day	0	hrs

Year	Period	Escalating Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2011	0	$ 0.080	$ -	$ -
2012	1	$ 0.082	$ -	$ -
2013	2	$ 0.085	$ -	$ -
2014	3	$ 0.087	$ -	$ -
2015	4	$ 0.090	$ -	$ -
2016	5	$ 0.093	$ -	$ -
2017	6	$ 0.096	$ -	$ -
2018	7	$ 0.098	$ -	$ -
2019	8	$ 0.101	$ -	$ -
2020	9	$ 0.104	$ -	$ -
2021	10	$ 0.108	$ -	$ -
2022	11	$ 0.111	$ -	$ -
2023	12	$ 0.114	$ -	$ -
2024	13	$ 0.117	$ -	$ -
2025	14	$ 0.121	$ -	$ -
2026	15	$ 0.125	$ -	$ -
2027	16	$ 0.128	$ -	$ -
2028	17	$ 0.132	$ -	$ -
2029	18	$ 0.136	$ -	$ -
2030	19	$ 0.140	$ -	$ -
2031	20	$ 0.144	$ -	$ -
			present value	$ -

Total Life Cycle cost (present value)

Capital cost	$	-
Operating cost	$	-
Total	$	-

Sludge Thickening

The WAS will need to be thickened prior to being fed to the AN digesters.
A GBT can be installed into the existing dewatering building

Initial Equipment Cost, 2 meter with appurtenances	$	200,000			
Equipment installation (15%)	$	30,000			15%
Support equipment (20%)	$	40,000			20%
Subtotal			$	270,000	
Electrical, Controls (20%)	$	54,000			20%
Site work and piping (20%)	$	54,000			20%
Mobilization, Bonding, Administration (12%)	$	32,400			12%
Subtotal			$	140,400	
Engineering and Administration	$	35,100			25%
Contingency	$	28,080			20%
Subtotal			$	63,180	
Total capital costs			**$**	**474,000**	(present worth)

Anaerobic digester sizing (complete mix, high-rate)

Based on peak week solids production from PFWRF and HARSB

Assume complete mix, high-rate digester, 95F operating temperature

Post Falls max week WAS load	29,980	lbs dry solids/day	[max week = 2.4 x Avg]
HARSB max week WAS load	-	lbs dry solids/day	[max week = 2.4 x Avg]
Total WAS load =	29,980	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	29,981	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	51,353	gpd	
	6,865	cf/day	

The HRT = SRT for a complete mix tank.
Use the minimum recommended SRT for the peak week loading condition.

Design HRT =	10	days	1991 MOP-8 Table 27-V
Digester liquid volume =	68,654	cf	
	513,535	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Tank Area	1,373	sq ft	
Tank diameter	41.8	ft	
Roundup dia to nearest 5 ft increment	45	ft	<<<<<
Actiual Tank Volume	39,760	cf	
	297,402	gal	
Total liquid digester liquid vol neglecting cone	79,519	cf	
	594,804	gal	
Actual volumetric loading	0.38	lbs VSS/cf-day	
	377	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	141	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	733	cy	<<<<<
concrete volume of floors (all tanks)	177	cy	<<<<<

Anaerobic digester sizing (complete mix, high-rate)

This is a check to see how the sizing based on peak week loading comapares to sizing based on avg day loading

Post Falls avg day WAS load	12,492	lbs dry solids/day	
HARSB avg day WAS load	-	lbs dry solids/day	
Total WAS load =	12,492	lbs dry solids/day	
Assumed %VSS	78%		
Total VSS load =	12,493	lbs dry solids/day	
Assume WAS is thickened			
Thickened WAS concentration	70,000	mg/l	
Thickened Sludge Volume =	21,397	gpd	
	2,861	cf/day	
The HRT = SRT for a complete mix tank.			
Use the recommended SRT for the avgerage day loading condition.			
Design HRT =	20	days	1991 MOP-8 Table 27-V
Digester liquid volume =	57,212	cf	
	427,946	gal	
Number of tanks	2		
Assumed side water depth	25	ft	
Minimum Tank Area	1,144	sq ft	
Minimum Tank diameter	38.2	ft	
Roundup dia to nearest 5 ft increment	40	ft	<<<<<
Actiual Tank Volume	31,415	cf	
	234,984	gal	
Total liquid digester liquid vol neglecting cone	62,830	cf	
	469,968	gal	
Actual volumetric loading	0.20	lbs VSS/cf-day	
	199	lbs VSS/1000 cf-day	
Assumed additional working depth	10	ft	
total wall height	35		
circumference	126	ft	
Assumed wall thickness	2	ft	
Assumed floor thickness	1.5	ft	
concrete volume of walls (all tanks)	652	cy	<<<<<
concrete volume of floors (all tanks)	140	cy	<<<<<

Anerobic digester capital costs						
		Qty	Unit	Unit cost	Cost	
Excavation (3 times the tank volume)		8835	cy	$ 4	$ 35,342	
Tank 1						
Walls		733	cy	$ 1,000	$ 733,017	
Bottom		177	cy	$ 800	$ 141,368	
Tank 2						
Walls		733	cy	$ 1,000	$ 733,017	
Bottom		177	cy	$ 800	$ 141,368	
Equipment building		3000	sf	$ 220	$ 660,000	
Steel covers		2	ea	$ 90,000	$ 180,000	
Paint covers		1	ls	$ 100,000	$ 100,000	
Piping		1	ls	$ 105,000	$ 105,000	
Heat exchangers		2	ea	$ 25,000	$ 50,000	
Boilers and piping		2	ea	$ 100,000	$ 200,000	
Mixing system and gas equipment		1	ls	$ 500,000	$ 500,000	
Sludge pumping		1	ls	$ 75,000	$ 75,000	
Subtotal					$ 3,654,110	
Site work		20%			$ 730,822	
Electrical, controls and instrumentation		20%			$ 730,822	
Mobilization, Bonding, Administration		12%			$ 438,493	
Subtotal					$ 1,900,137	
Construction subtotal					$ 5,554,248	
Engineering and Administration (25%)		25%			$ 1,388,561.88	
Contingency (20%)		20%			$ 1,110,849.50	
Subtotal					$ 2,499,411	
Total capital costs				(present worth)	$ 8,053,659	
Total Life Cycle cost (present value)						
Operating cost	$ 8,054,000					

Anaerobic Digester Operating Costs

Mixing electrical cost					
Annual cost escalation	$ 0.03				
Interest rate	$ 0.03				
Elec cost per kWhr	$ 0.08				
Total Dig liquid volume	594,804	gallons			
Mixing energy input	0.05	hp/1000 gal			
Total mixing hp	29.74	hp/1000 gal			
Year	Period		Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
2011	0	194,351	$ 0.080	$ 15,548	$ 15,548
2012	1	194,351	$ 0.082	$ 16,015	$ 15,548
2013	2	194,351	$ 0.085	$ 16,495	$ 15,548
2014	3	194,351	$ 0.087	$ 16,990	$ 15,548
2015	4	194,351	$ 0.090	$ 17,499	$ 15,548
2016	5	194,351	$ 0.093	$ 18,024	$ 15,548
2017	6	194,351	$ 0.096	$ 18,565	$ 15,548
2018	7	194,351	$ 0.098	$ 19,122	$ 15,548
2019	8	194,351	$ 0.101	$ 19,696	$ 15,548
2020	9	194,351	$ 0.104	$ 20,287	$ 15,548
2021	10	194,351	$ 0.108	$ 20,895	$ 15,548
2022	11	194,351	$ 0.111	$ 21,522	$ 15,548
2023	12	194,351	$ 0.114	$ 22,168	$ 15,548
2024	13	194,351	$ 0.117	$ 22,833	$ 15,548
2025	14	194,351	$ 0.121	$ 23,518	$ 15,548
2026	15	194,351	$ 0.125	$ 24,223	$ 15,548
2027	16	194,351	$ 0.128	$ 24,950	$ 15,548
2028	17	194,351	$ 0.132	$ 25,699	$ 15,548
2029	18	194,351	$ 0.136	$ 26,470	$ 15,548
2030	19	194,351	$ 0.140	$ 27,264	$ 15,548
2031	20	194,351	$ 0.144	$ 28,082	$ 15,548
				present value	$ 326,510
Total Life Cycle cost (present value)					
Operating cost		$ 327,000			

Additional Treatment Cost

The filtrate from dewaterd anaerobic sludge is high in BOD and NH3-N.
It is assumed that the filtrate will be treated in a side stream, or that the sizes/capacities calculated here would be an incramental addition to existing facilities
Tank volume and aeration requirements are calculated and costs for each are estimated

VSS	78%
%TS of digester feed	7%
Average VSS destruction	50%

Year	Period	Dry Solids Wasted to digester	Fixed solids in DG Feed	Volatile solids in DG Feed	Wet weight of DG Feed	Water
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]
2011	0	4,664	1,026	3,638	66,625	61,961
2012	1	4,936	1,086	3,850	70,511	65,575
2013	2	5,208	1,146	4,062	74,398	69,190
2014	3	5,480	1,206	4,274	78,284	72,804
2015	4	5,752	1,265	4,487	82,170	76,419
2016	5	6,024	1,325	4,699	86,057	80,033
2017	6	6,296	1,385	4,911	89,943	83,647
2018	7	8,120	1,786	6,333	115,995	107,875
2019	8	8,456	1,860	6,596	120,799	112,343
2020	9	8,792	1,934	6,858	125,604	116,811
2021	10	9,129	2,008	7,120	130,408	121,280
2022	11	9,465	2,082	7,383	135,213	125,748
2023	12	9,801	2,156	7,645	140,017	130,216
2024	13	10,138	2,230	7,907	144,822	134,684
2025	14	10,474	2,304	8,170	149,626	139,152
2026	15	10,810	2,378	8,432	154,431	143,621
2027	16	11,146	2,452	8,694	159,235	148,089
2028	17	11,483	2,526	8,957	164,040	152,557
2029	18	11,819	2,600	9,219	168,844	157,025
2030	19	12,155	2,674	9,481	173,649	161,493
2031	20	12,492	2,748	9,744	178,453	165,962

	Period	Fixed Solids after Digestion (unchanged)	Volatile Solids after Digestion	Total Solids after digestion	Water after digestion (unchanged)	Wet weight of sludge after digestion	%TS of digested sludge
		[ppd]	[ppd]	[ppd]	[ppd]	[ppd]	
2011	0	1,026	1,819	2,845	61,961	64,806	4.4%
2012	1	1,086	1,925	3,011	65,575	68,586	4.4%
2013	2	1,146	2,031	3,177	69,190	72,367	4.4%
2014	3	1,206	2,137	3,343	72,804	76,147	4.4%
2015	4	1,265	2,243	3,509	76,419	79,927	4.4%
2016	5	1,325	2,349	3,675	80,033	83,708	4.4%
2017	6	1,385	2,455	3,841	83,647	87,488	4.4%
2018	7	1,786	3,167	4,953	107,875	112,828	4.4%
2019	8	1,860	3,298	5,158	112,343	117,501	4.4%
2020	9	1,934	3,429	5,363	116,811	122,175	4.4%
2021	10	2,008	3,560	5,568	121,280	126,848	4.4%
2022	11	2,082	3,691	5,774	125,748	131,521	4.4%
2023	12	2,156	3,822	5,979	130,216	136,195	4.4%
2024	13	2,230	3,954	6,184	134,684	140,868	4.4%
2025	14	2,304	4,085	6,389	139,152	145,542	4.4%
2026	15	2,378	4,216	6,594	143,621	150,215	4.4%
2027	16	2,452	4,347	6,799	148,089	154,888	4.4%
2028	17	2,526	4,478	7,005	152,557	159,562	4.4%
2029	18	2,600	4,609	7,210	157,025	164,235	4.4%
2030	19	2,674	4,741	7,415	161,493	168,908	4.4%
2031	20	2,748	4,872	7,620	165,962	173,582	4.4%

%TS of dewatered sludge cake		20%						
NH3-N in filtrate		921	mg/l	1997 MOP8 table 27-VI				
BOD in filtrate		8,527	mg/l	1997 MOP8 table 27-VI				
	Period	Wet weight of dewatered sludge cake	Water removed by dewatering	Water removed by dewatering	NH3-N load	BOD load	AOR Load	AOR Load
		[ppd]	[ppd]	[gpd]	[ppd]	[ppd]	[ppd]	[lbs/hr]
	0	14,224	50,581	6,065	47	431	861	36
	1	15,054	53,532	6,419	49	456	911	38
	2	15,884	56,483	6,772	52	482	962	40
	3	16,714	59,433	7,126	55	507	1,012	42
	4	17,543	62,384	7,480	57	532	1,062	44
	5	18,373	65,334	7,834	60	557	1,112	46
	6	19,203	68,285	8,188	63	582	1,163	48
	7	24,765	88,063	10,559	81	751	1,499	62
	8	25,791	91,711	10,996	84	782	1,562	65
	9	26,816	95,358	11,434	88	813	1,624	68
	10	27,842	99,006	11,871	91	844	1,686	70
	11	28,868	102,654	12,309	95	875	1,748	73
	12	29,894	106,301	12,746	98	906	1,810	75
	13	30,919	109,949	13,183	101	938	1,872	78
	14	31,945	113,596	13,621	105	969	1,934	81
	15	32,971	117,244	14,058	108	1,000	1,996	83
	16	33,997	120,891	14,495	111	1,031	2,058	86
	17	35,023	124,539	14,933	115	1,062	2,121	88
	18	36,048	128,187	15,370	118	1,093	2,183	91
	19	37,074	131,834	15,807	121	1,124	2,245	94
	20	38,100	135,482	16,245	125	1,155	2,307	96

Annual cost escalation	$ 0.03							
Interest rate	$ 0.03							
Elec cost per kWhr	$ 0.08							
Cs	9.17	mg/l	*O2 saturation constant under standard conditions*					
ACF	0.915	n/a	*Altitude Correction Factor*					
alpha	0.8	n/a	*O2 transfer correction factor*					
beta	0.95	n/a	*Salinity-surface tension correction factor*					
C1	2	mg/l	*Desired O2 in basin*					
T	20	degrees C	*Basin temperature*					
Cw	9.17	mg/l	*O2 saturation concentration at actual temperature*					
SOTR	3.5	lbs / HP-hr						
	Period	SOR	Hp Req'd	KiloWatts	KW-hrs/yr	Escalating Elect Unit Cost	Elec cost	Present worth of Elec cost
		[lbs/hr]				[$/kWhr]	[$/year]	[$/year]
	0	69	20	15	128,576	$ 0.080	$ 10,286	$ 10,286
	1	73	21	16	136,076	$ 0.082	$ 11,213	$ 10,886
	2	77	22	16	143,576	$ 0.085	$ 12,186	$ 11,486
	3	81	23	17	151,076	$ 0.087	$ 13,207	$ 12,086
	4	85	24	18	158,577	$ 0.090	$ 14,278	$ 12,686
	5	89	25	19	166,077	$ 0.093	$ 15,402	$ 13,286
	6	93	27	20	173,577	$ 0.096	$ 16,581	$ 13,886
	7	120	34	26	223,852	$ 0.098	$ 22,025	$ 17,908
	8	125	36	27	233,124	$ 0.101	$ 23,625	$ 18,650
	9	130	37	28	242,396	$ 0.104	$ 25,302	$ 19,392
	10	135	39	29	251,668	$ 0.108	$ 27,058	$ 20,133
	11	140	40	30	260,940	$ 0.111	$ 28,896	$ 20,875
	12	145	41	31	270,212	$ 0.114	$ 30,821	$ 21,617
	13	150	43	32	279,484	$ 0.117	$ 32,835	$ 22,359
	14	155	44	33	288,756	$ 0.121	$ 34,942	$ 23,101
	15	160	46	34	298,028	$ 0.125	$ 37,145	$ 23,842
	16	165	47	35	307,300	$ 0.128	$ 39,450	$ 24,584
	17	170	48	36	316,572	$ 0.132	$ 41,860	$ 25,326
	18	175	50	37	325,844	$ 0.136	$ 44,378	$ 26,068
	19	180	51	38	335,116	$ 0.140	$ 47,010	$ 26,809
	20	185	53	39	344,388	$ 0.144	$ 49,760	$ 27,551
							present value	$ 402,818

Design flow rate	16,245	gpd, based on the 20th year		
Design HRT =	2	days		
Tank volume	32,490	gallons		
	Qty	Unit	Unit cost	Cost
Side-stream treatment, tank	33,000	gallons	$ 2.00	$ 66,000
Mixing/aeration system	1	ls	$ 75,000	$ 75,000
Treatment equipment	1	ls	$ 150,000	$ 150,000
pumping	1	ls	$ 150,000	$ 150,000
Subtotal				$ 441,000
Equipment Installation	$ 375,000	%	10%	$ 37,500.00
Site work and piping	$ 441,000	%	10%	$ 44,100.00
Electrical and instrumentation	$ 441,000	%	20%	$ 88,200.00
Construction total				$ 610,800
Bonding, Administration	$ 610,800	%	12%	$ 73,296
Engineering and Administration (25%)	$ 610,800	%	25%	$ 152,700
Contingency (20%)	$ 610,800	%	20%	$ 122,160
Admin Total				$ 348,156
Total capital costs	(present worth)			$ 958,956
Total Life Cycle cost (present value)				
Capital cost		$ 959,000		
Operating cost		$ 403,000		
total		$ 1,362,000		

Cost of Dewatering Facility

Max SLR BDP 2.5 m belt filter press at 4% feed	1500	lbs/hr
Hydraulic loading rate	78	gpm
Operating days per week	5	days/week
Operating hours per day	10	hours/day

Year	Period	Total Solids after digestion	%TS of digested sludge	Vol of Digested Sludge	Number of Belt Filter Presses needed	Roundup
		[ppd]		[gpd]		
2011	0	2,845	4.4%	7,770	0.2	1.0
2012	1	3,011	4.4%	8,224	0.2	1.0
2013	2	3,177	4.4%	8,677	0.3	1.0
2014	3	3,343	4.4%	9,130	0.3	1.0
2015	4	3,509	4.4%	9,584	0.3	1.0
2016	5	3,675	4.4%	10,037	0.3	1.0
2017	6	3,841	4.4%	10,490	0.3	1.0
2018	7	4,953	4.4%	13,529	0.4	1.0
2019	8	5,158	4.4%	14,089	0.4	1.0
2020	9	5,363	4.4%	14,649	0.4	1.0
2021	10	5,568	4.4%	15,210	0.5	1.0
2022	11	5,774	4.4%	15,770	0.5	1.0
2023	12	5,979	4.4%	16,330	0.5	1.0
2024	13	6,184	4.4%	16,891	0.5	1.0
2025	14	6,389	4.4%	17,451	0.5	1.0
2026	15	6,594	4.4%	18,011	0.5	1.0
2027	16	6,799	4.4%	18,572	0.6	1.0
2028	17	7,005	4.4%	19,132	0.6	1.0
2029	18	7,210	4.4%	19,692	0.6	1.0
2030	19	7,415	4.4%	20,253	0.6	1.0
2031	20	7,620	4.4%	20,813	0.6	1.0

An additional BFP is not needed.
Dewatering redundancy will be provided by operating more days per week and more hours per day.

Dewatering feed tank will hold sludge from the digester until it is dewatered.
Additional dewatering building space is not needed.

	Qty	Unit	Unit cost	Cost
Dewatering feed tank	150,000	gallons	$ 1.50	$ 225,000
Dewatering building	-	sq	$ 225	$ -
Subtotal				$ 225,000
Mixing system for dewatering feed tank	1	ls	$ 50,000	$ 50,000
feed pumps	3	ls	$ 30,000	$ 90,000
BFP	-	ls	$ 225,000	$ -
sludge conveyor	-	ls	$ 70,000	$ -
Conveyor shuttle for loading trucks	-	ls	$ 25,000	$ -
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 158,000
Equipment Installation	$ 158,000	%	10%	$ 15,800
Site work and piping	$ 225,000	%	10%	$ 22,500
Electrical and instrumentation	$ 383,000	%	20%	$ 76,600
Construction total				$ 497,900
Bonding, Administration	$ 497,900	%	12%	$ 59,748
Engineering and Administration (25%)	$ 497,900	%	25%	$ 124,475
Contingency (20%)	$ 497,900	%	20%	$ 99,580
Admin Total				$ 283,803
Total capital costs	(present worth)			$ 782,000

Cost of sludge disposal by a third party

Annual cost escalation	$ 0.03		3.0%
Interest rate	$ 0.03		3.0%
Elec cost per kWhr	$ 0.08		
Initial disposal cost	$ 65.00	per wet ton	
%TS of dewatered sludge	20%		

Year	Period	Wet weight of dewatered sludge cake	>>>>>	Escalating Disposal cost	Disposal cost	Present worth of disposal cost
		[ppd]	[Wtons/yr]	[$/wet ton]	[$/year]	[$/year]
2011	0	14,224	2,596	$ 65.00	$ 168,737	$168,737
2012	1	15,054	2,747	$ 66.95	$ 183,937	$178,580
2013	2	15,884	2,899	$ 68.96	$ 199,897	$188,423
2014	3	16,714	3,050	$ 71.03	$ 216,650	$198,265
2015	4	17,543	3,202	$ 73.16	$ 234,228	$208,108
2016	5	18,373	3,353	$ 75.35	$ 252,665	$217,951
2017	6	19,203	3,505	$ 77.61	$ 271,998	$227,794
2018	7	24,765	4,520	$ 79.94	$ 361,304	$293,773
2019	8	25,791	4,707	$ 82.34	$ 387,557	$305,941
2020	9	26,816	4,894	$ 84.81	$ 415,061	$318,110
2021	10	27,842	5,081	$ 87.35	$ 443,866	$330,278
2022	11	28,868	5,268	$ 89.98	$ 474,025	$342,446
2023	12	29,894	5,456	$ 92.67	$ 505,595	$354,614
2024	13	30,919	5,643	$ 95.45	$ 538,632	$366,782
2025	14	31,945	5,830	$ 98.32	$ 573,196	$378,950
2026	15	32,971	6,017	$ 101.27	$ 609,350	$391,118
2027	16	33,997	6,204	$ 104.31	$ 647,156	$403,286
2028	17	35,023	6,392	$ 107.44	$ 686,683	$415,455
2029	18	36,048	6,579	$ 110.66	$ 727,999	$427,623
2030	19	37,074	6,766	$ 113.98	$ 771,176	$439,791
2031	20	38,100	6,953	$ 117.40	$ 816,288	$451,959
					Present Worth Cost	$ 6,610,000

Total Life Cycle cost (present value)

Operating cost $ 6,610,000

Item for Capital Costs	*Description of Project*	*Targeted Year to begin Project*	Improvement Alternative 2: Additional Treatment with Year Round River Discharge (Expand to partial reuse system, no new land)	Alt 2 (20-year O&M)	Improvement Alternative 3: Additional Treatment combined with 5.2 MGD Seasonal Reuse (expansion of reuse)	Alt 3 (20-year O&M)	Improvement Alternative 4: Additional Treatment combined with 5.2 MGD Year Round Reuse	Alt 4 (20-year O&M)
Tertiary Treatment Pilot Study	$2M Project in current FY 2013 City Budget	2013						
Class C Reuse (Demonstration Project)	Reuse on WRF and adjacent land	2013	$167,600	$140,000	$ 167,600	$ 140,000	$ 167,600	$ 140,000
Outfall Improvements - Phase I	South of I-90 to River	2013	$1,620,000	0	$ 1,620,000	$ -	$ 1,620,000	$ -
Laboratory and Control Building Improvements	Lab, Admin and control improvements	2014	$662,500	0	$ 662,500	$ -	$ 662,500	$ -
Preliminary Treatment - Equalization Tank	New EQ	2015	$7,528,168	$880,000	$ 7,528,168	$ 880,000	$ 7,528,168	$ 880,000
Preliminary Treatment - Headworks	Relocate Headworks	2015	$2,645,032		$ 2,645,032	$ -	$ 2,645,032	$ -
Tertiary Treatment [1]	Tertiary (assumes MF)	2015	$19,230,000	$11,080,000	$ 19,230,000	$ 5,540,000	$ 19,230,000	$ 2,770,000
Disinfection - Improvements to Existing UV	Mitigate deficiencies and reliability	2017	$550,500	0	$ 550,500	$ -	$ 550,500	$ -
Biosolids Treatment Improvements (Digestion) [1]	Digestion Improvements	2017	$9,971,800	($4,100,000)	$ 9,971,800	$ (4,100,000)	$ 9,971,800	$ (4,100,000)
Utility Water Pump Station		2017	$743,400	0	$ 743,400	$ -	$ 743,400	$ -
Secondary Treatment Improvements	Expand BNR Eqpt into Ditch 6 and Clarifier 8	2019	$3,730,000	$1,100,000	$ 3,730,000	$ 1,100,000	$ 3,730,000	$ 1,100,000
Disinfection Improvements - Class A UV	Necessary for Class A Reuse	2022	$1,943,000	$800,000	$ 1,943,000	$ 800,000	$ 1,943,000	$ 800,000
Phase 1 -Class A Seasonal Reuse, 3.2 MGD Capacity, 618 Acre Existing Site, retain river outfall for non-growing season. Purchase 314 acres from City of Rathdrum.	Necessary for Class A Reuse	2022	$17,800,000	$982,000	$ 17,800,000	$ 982,000	$ 17,800,000	$ 982,000
Expanded Reuse to 5.2 MGD (Seasonal Reuse)	Seasonal Reuse with no winter storage. Non-growing season discharge to River.	2022		``	$ 10,090,000	$ 565,000	$ 10,090,000	$ 565,000
Maintenance Shop		2023	$757,400	0	$ 757,400	$ -	$ 757,400	$ -
Outfall Improvements - Phase II (Pipeline for I-90 Crossing)	South of I-90 to WRF	2025	$280,000	0	$ 280,000	$ -	$ 280,000	$ -
Full Reuse to 5.2 MGD (Year Round)	Full Reuse, no river discharge (assumes river discharge only for non-Class A water compliance)	2027					$ 82,010,000	$ 1,237,000
TOTAL			**$ 67,600,000**	**$ 10,900,000**	**$ 77,700,000**	**$ 5,900,000**	**$ 159,700,000**	**$ 4,400,000**
Total Capital + O&M				$ 78,500,000		$ 83,600,000		$ 164,100,000

City of Post Falls

Report for

SEWER FINANCIAL PLAN AND CAPITALIZATION FEE

June 2013

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In Association with J-U-B ENGINEERS, Inc.

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SEWER FINANCIAL PLAN AND CAPITALIZATION FEE

1. INTRODUCTION

The primary goal of the financial plan is to develop a multi-year rate strategy that will provide stable revenue to meet the total operating and capital costs of providing wastewater service. The financial plan focuses on the amount of revenue needed to meet the system's total financial obligations which include:

- Fiscal policies
- Operating and maintenance costs
- Administration and overhead
- Capital costs
- Existing and new debt service obligations

In particular, the financial plan evaluates the financial impact related to the completion of the preferred alternative CIP identified in the City's Water Reclamation Facility Plan (WRFP) and Collection System Master Plan and develops a rate strategy for meeting these future costs.

2. FINANCIAL STRUCTURE

The City's sewer utility is responsible for funding all of its related costs through user fees. It does not depend on general tax revenues or general fund resources. The primary source of funding for the sewer utility is derived from ongoing monthly charges for service, with additional revenues coming from service fees, cell tower rental and intergovernmental transfers. The City controls the level of user charges by ordinance and, subject to statutory authority, can adjust user charges as needed to meet financial objectives.

The city maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible enterprise fund utility. The following funds have been reviewed as part of this financial plan.

- Wastewater Operating Fund – designated to cover operating costs.
- WWTP Capital Fund – used to cover upgrade and expansion project costs for the Wastewater Treatment Plant.
- Collector Capital Fund – used to cover upgrade and expansion project costs for the Collector System.
- Sewer Replacement Fund – used to cover repair and replacement costs for both the WWTP and the Collector System as well as any upgrade and expansion costs that the individual Capital Funds are unable to fund.
- Contingency Reserve Fund – set aside to cover emergencies.

- Bond Reserve Fund – set aside to cover bond reserve requirements and used to pay off bond retirement.

3. FISCAL POLICIES

This analysis is based on a framework of fiscal policies that promote the financial integrity and stability of the City's wastewater utility. A brief summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program are discussed below.

3.1 Reserve Funds

Like any business, a municipal utility requires certain minimum levels of cash reserves to operate – these reserves address variability and timing of expenditures and receipts, as well as occasional disruptions in activities, costs or revenues. Given the City's responsibility to provide an essential service at a certain standard, protection against financial disruptions is even more important than it would be for a private sector or non-essential counterpart.

In addition to protecting the utility against financial disruption, a defined reserve structure serves to maintain appropriate segregations of funds and to promote the use of resources for their intended purposes. The City has the following reserve funds.

Operating reserve is designed to provide a liquidity cushion to ensure that adequate cash working capital will be maintained to deal with significant cash balance fluctuations such as unanticipated cash expenses or lower than expected revenue collections. The City's current policy is to maintain a minimum balance in the Wastewater Operating Fund equal to 55 days of O&M. This target is within industry standards for a sewer utility.

The wastewater treatment plant capital fund and collector capital fund do not have a minimum target balance. All revenue that enters these funds is depleted to a zero balance if necessary to fund capital in any given year.

A capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility's infrastructure fail unexpectedly. The reserve could also be used for other unanticipated capital needs including capital project cost overruns. Industry practice ranges from maintaining a balance equal to 1 to 2 percent of fixed assets, an amount equal to a 5-year rolling average of CIP costs, or an amount determined sufficient to fund an equipment failure (other than catastrophic failure). The final target level should balance industry standards with the risk level of the City; a target of 1 percent of fixed assets has been used in this analysis. The City currently carries a contingency reserve fund balance in the range of $622,000 increasing to nearly $800,000 by FY 2032. This is below the target range of 1 percent of fixed assets and the difference has been used as a minimum target for the sewer replacement fund; the minimum for this fund ranges from $0 to nearly $820,000 as completed CIP projects increase the total value of fixed assets.

The bond reserve fund is generally set by covenant requirements and described in greater detail in the Debt section below. The City uses this fund to cover bond reserve requirements and to pay off bond retirement.

3.2 System Reinvestment

The purpose of system reinvestment funding is to provide for the replacement of aging system facilities to ensure sustainability of the system for ongoing operation. Each year, the utility's assets lose value, and as they lose value they are moving toward eventual replacement. That accumulating loss in value and future liability is measured for reporting purposes through an annual depreciation

expense, which is based on the original cost of the asset. While this reported expense reflects the consumption of the existing asset and its original investment, the replacement of that asset will likely cost much more, factoring in inflation and construction conditions. Therefore, the added annual replacement liability is even greater than the annual depreciation expense.

The City's current depreciation expense is $1.09 million. With the addition of the capital plan, the depreciation expense is anticipated to increase to $3.68 million by the end of the planning period. The City historically did not fund this expense, but has been making up for that in recent years by funding a small amount over the annual depreciation cost. In the analysis, the amount to fund system reinvestment ranges from $1.30 million to $3.68 million per year throughout the forecast period. These monies are put directly into the Sewer Replacement Fund and are made available for capital project costs.

3.3 Debt

It is prudent to consider policies related to debt management as part of the broader utility financial policy structure. As a security condition of issuance for some debt such as revenue bonds, the City would be required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other utility expenditures; the only outlays with a higher lien are O&M expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.00 coverage factor would imply that no additional cushion is required. A 1.25 coverage factor means revenue must be sufficient to pay O&M expenses, annual revenue bond debt service payments, plus an additional 25 percent of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be use for any utility purpose, including funding capital projects. Targeting a higher coverage factor can help the City achieve a better credit rating and provide lower interest rates for future debt issues. The City's existing bond covenants require a 1.25 debt coverage factor. In the analysis, a 1.50 debt coverage factor has been used to help the City receive the benefits of a higher credit rating and lower interest rates for the debt that is anticipated to be issued.

4. OPERATING COSTS

The financial plan can only provide a qualified assurance of financial feasibility if it considers the total system costs of providing sewer services, both operating and capital. The operating costs identify ongoing annual non-capital costs associated with the operating, maintenance and administration of the sewer system.

Operating costs are initially developed from the FY 2013 budget documents. Future costs are adjusted annually for inflationary increases. Any known future changes such as new or enhanced programs, increased operating costs and/or additional staffing needs are added in the years they are planned. The following is a list of the key expense factors and assumptions used to develop the financial forecast.

- **Annual Inflation Factors** – General and labor escalation 2.23 percent; benefits 8.00 percent; construction cost 3.19 percent
- **Existing Debt** – The City currently has a total of four outstanding debt issues, including three revenue bonds and one DEQ loan. Revenue bond annual payments total $861,000 in FY 2013, decreasing to $261,000 and expire between FY 2016 and FY 2028. DEQ payments range from $54,000 to $108,000 with the loan expiring in FY 2014. Final payments for revenue bonds in the year they expire are made from the bond reserve fund.
- **Revenue Bond Assumptions** – The forecast assumes a revenue bond interest rate of 3.00 percent in FY 2014 based on input from the City's financial advisor and 4.75 percent thereafter based on

recent Idaho Bond Bank Authority (IBBA) bonds; along with an issuance cost of 1.50 percent and a term of 20 years for all revenue bonds.

- **Future Debt and Transfers to Capital** – Will be described in greater detail in the Capital Costs section below.
- **Additional O&M Costs** – WWTP CIP is expected to add process improvements that result in increased O&M costs for the plant in FY 2014, 2016, 2020, and 2023 ranging from $7,000 to $598,000 as well as improvements to biosolids treatment that decrease O&M costs by $205,000 in FY 2018. Collector CIP is expected to add $14,500 in both FY 2015 and 2020 related to lift station site repair, maintenance, and upgrades.

Annual operating costs are funded through ongoing revenue received from user fees and charges. The following is a list of the key revenue factors and assumptions.

- **Revenue** – The City has two general revenue sources: revenue from charges for service (rate revenue) and miscellaneous (non-rate) revenue. In the event of a forecasted annual shortfall, rate revenue can be increased to meet the annual revenue requirement. Non-rate revenues are forecast to increase with inflation or growth depending on the nature of the revenue.
- **Growth** – Although a 3.50 percent growth rate is used for engineering planning purposes to determine CIP for the WRFP, rate revenue was escalated based on a 1.00 percent growth rate provided by the City. The lower growth rate is based on recent experience and the economic downturn, and will more accurately project future revenue.
- **Capitalization Fee Revenue** – This fee represents the one-time charge for new customers connecting to the system. The fee revenue for this plan is based on the City's current Capitalization Fee of $4,659 for City customers and $3,036 for Rathdrum customers, which is escalated annually by 2.85 percent based on ENR. Additional new units range from 154 to 185 new units per year with 83% of the new units anticipated in the City. The fee is anticipated to generate revenue of $715,000 in FY 2014 to $1.51 million in FY 2032. Approximately $50,000 per year of capitalization fee revenue is used to offset debt service during FY 2013 through FY 2016. The remaining capitalization fee revenue will go the wastewater and collector capital funds. The Capitalization Fee has been updated as part of this plan and will be discussed further in section 9.

5. CAPITAL COSTS

The CIP developed for the WRFP and the Collection System Master Plan identifies the total capital obligations of the planning period. Once the capital costs are identified, a capital funding plan defines a strategy for funding the CIP considering available funding sources such as, existing reserves, capitalization fees, external contributions from grants/developers and new debt proceeds, if required.

The CIP identifies $45.82 million in project costs over the 6-year planning horizon and $80.62 million in the 20-year period for the preferred alternative Wastewater Treatment Plant (WWTP). When additional CIP developed by the City for the Collection System is added, total CIP costs increase to $53.51 million in the 6-year period and $94.99 million in the 20-year period. This CIP consists of replacement and expansion projects. Costs are stated in 2012 dollars and are escalated by 3.19 percent annually to the year of planned spending for financing projections.

A summary of the 20-year CIP is shown in Table 1. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs. Approximately 56.33 percent (2012 dollars) of the capital costs are included in the 6-year planning period. The Preliminary and Tertiary Treatment projects account for 58.69 percent of the 6-year CIP. Table 2

provides detail for the 6-year CIP. Detail for the 20-year CIP can be found on pages 6 through 8 in Appendix A.

Table 1: 6 and 20-Year CIP

Year	2012$	Inflated
FY 2012/13	$ 6,500,370	$ 6,500,370
FY 2013/14	881,270	909,410
FY 2014/15	32,651,980	34,770,554
FY 2015/16	593,361	652,037
FY 2016/17	11,448,352	12,982,166
FY 2017/18	1,434,804	1,678,989
6-Year Total	**$ 53,510,136**	**$ 57,493,526**
2019-2032	41,479,321	55,267,431
20-Year Total	**$ 94,989,457**	**$ 112,760,957**

Table 2: Detailed 6-Year CIP (2012$)

Project	2013	2014	2015	2016	2017	2018
Capital From FY 2012/13 Budget						
Pilot Filtration Plants	2,000,000					
Construction Costs	500,000					
Facility Plan per EPA permit	100,000					100,000
WWTP CIP from JUB - Alternative 3						
Preliminary Treatment - Headworks			2,645,032			
Preliminary Treatment - Equalization Tank			7,528,168			
Tertiary Treatment			19,230,000			
Disinfection - Improvements to Existing UV					550,500	
Outfall Imrovements - Phase I	1,620,000					
Class C Reuse (Demonstration Project)	167,600					
Biosolids Treatment Improvements					9,971,800	
Laboratory and Control Building Improvements		662,500				
Utility Water Pump Station					743,400	
Collector CIP - Escalated from 2011$ to 2012$						
3rd Ave Lift Station - 11	1,894,000					
Idahline Lift Station - 2			2,394,082			
Corbin Lift Station - 3			321,705			
McGuire Lift Station - 5			314,223			
Jacklin Lift Station - 1				410,709		
Howell Lift Station - 20						1,152,152
Oversizing	20,639	20,639	20,639	20,639	20,639	20,639
Lift Stations	94,938	94,938	94,938	58,820	58,820	58,820
Pipe Replacement	103,193	103,193	103,193	103,193	103,193	103,193
Total	**$ 6,500,370**	**$ 881,270**	**$ 32,651,980**	**$ 593,361**	**$ 11,448,352**	**$ 1,434,804**

5.1 Capital Financing Strategy

An ideal capital funding strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume bond financing to meet needs for which the City's available cash resources are insufficient. Revenue bonds have been used as the debt funding instrument in this analysis. The capital financing strategy developed to fund the CIP identified in the WRFP and the Collection System Master Plan assumes the following funding resources:

- Accumulated capital cash reserves
- Annual revenue collections from capitalization fees
- Annual cash from rates earmarked for system reinvestment funding

- Annual transfers of excess cash (over minimum balance targets) from the operating fund, if any
- Revenue bond financing

Based on information provided by the City, the WWTP Capital Fund began FY 2013 with $0.95 million in cash reserves, the Collector Capital Fund began with $1.77 million, and the Sewer Replacement Fund began with $5.56 million. A transfer of $5.15 million is assumed to be made from the Wastewater Operating Fund to the Sewer Replacement Fund to help fund upcoming capital needs. This transfer amount is the excess cash in the Wastewater Operating Fund above the minimum target amount.

System reinvestment funding ranging from $1.30 million to $3.68 million in FY 2013 to FY 2032 is used to help fund capital projects. This amount must be supported with the ongoing rates of the system.

Annual capitalization fee revenue collections are budgeted at an annual amount of $1.08 million in FY 2013, but start the forecast more conservatively at $0.71 million in FY 2014 and increase to $1.51 million in FY 2032, with new connections ranging from 154 to 185 per year.

The capital funding strategy developed for this financial plan forecasts the need to issue $57.70 million in new debt. New debt issues totaling $28.70 million are anticipated between FY 2013 and FY 2018 with an additional $29.00 million anticipated in FY 2022. The annual debt service associated with these debt issues ranges from $1.75 million in FY 2015 to $5.00 million in FY 2032 and must also be supported by the ongoing rates of the system. The City actively pursues low-cost loans, where appropriate, and issues revenue bonds to finance capital project costs in excess of available cash resources. The analysis performed assumes all revenue bond financing for debt issues.

The resources described above are forecasted to fund 100 percent of the 20-year CIP. Table 3 presents the corresponding 20-year capital financing strategy.

Table 3: 20-Year Capital Funding Strategy

Year	Capital Expenditures 2012$	Capital Expenditures Escalated	Revenue Bond Financing	Cash Funding	Total Financial Resources
FY 2013	$ 6,500,370	**$ 6,500,370**	$ -	$ 6,500,370	**$ 6,500,370**
FY 2014	881,270	**909,410**	-	909,410	**909,410**
FY 2015	32,651,980	**34,770,554**	20,200,000	14,570,554	**34,770,554**
FY 2016	593,361	**652,037**	-	652,037	**652,037**
FY 2017	11,448,352	**12,982,166**	8,500,000	4,482,166	**12,982,166**
FY 2018	1,434,804	**1,678,989**	-	1,678,989	**1,678,989**
Subtotal	**$ 53,510,136**	**$ 57,493,526**	**$ 28,700,000**	**$ 28,793,526**	**$ 57,493,526**
FY 2019 - FY 2032	41,479,321	**55,267,431**	29,000,000	26,267,431	**55,267,431**
Total	**$ 94,989,457**	**$ 112,760,957**	**$ 57,700,000**	**$ 55,060,957**	**$ 112,760,957**

The capital funding plan is developed separate from the evaluation of ongoing revenue needs of the utility. As seen in Table 3, the system's capital needs are inconsistent from year to year. To minimize the impact these peaks and valleys will have on cash flow and ultimately on monthly rates, the capital funding plan assumes that capital is funded from cash available in reserves and from annual rate funding. New debt financing is assumed only when other resources are depleted. Treating capital funding in this manner minimizes rate impacts from annual capital funding needs. Capital funding only impacts rates directly through the level of rate funded system reinvestment assumed and through annual debt service as a result of new debt being issued.

6. FINANCIAL FORECAST

The financial plan, or revenue requirement analysis, forecasts the amount of operating and capital costs to determine the annual revenue required. The objective of the financial forecast is to evaluate the sufficiency of the current level of rates in meeting the total revenue requirements of the system. In addition to annual operating costs, the revenue of the utility must also meet debt covenant requirements and minimum reserve level targets.

Although the financial plan is completed for the 20-year time horizon of the WRFP, the rate strategy focuses on the shorter term planning period of FY 2013 through FY 2018. It is imperative that the City review the proposed rates and rate assumptions annually to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates should be adjusted as needed.

Table 4 summarizes the annual revenue requirement for the 6-year horizon based on the forecast of revenues, expenditures, fund balances and fiscal policies. The summary for the 20-year horizon can be found on page 1 in Appendix A.

Table 4: 6-Year Financial Forecast

Revenue Requirement	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018
Revenues						
Rate Revenues Under Existing Rate	$ 4,814,700	$ 4,862,847	$ 4,911,475	$ 4,960,590	$ 5,010,196	$ 5,060,298
Capitalzation Fees Towards Debt	50,034	50,836	49,097	49,753	-	-
Non-Rate Revenues	152,171	154,885	157,652	160,474	163,352	166,287
Total Revenues	**$ 5,016,905**	**$ 5,068,568**	**$ 5,118,224**	**$ 5,170,817**	**$ 5,173,548**	**$ 5,226,585**
Expenses						
Cash Operating Expenses	$ 2,770,801	$ 2,847,189	$ 2,933,397	$ 3,605,693	$ 3,695,681	$ 3,583,452
Existing Debt Service	914,522	953,731	826,515	413,905	413,955	413,828
New Debt Service	-	-	1,750,477	1,750,477	2,487,064	2,487,064
Rate Funded System Reinvestment	1,376,007	1,300,000	1,300,000	1,300,000	2,300,000	2,300,000
Total Expenses	**$ 5,061,330**	**$ 5,100,920**	**$ 6,810,390**	**$ 7,070,076**	**$ 8,896,700**	**$ 8,784,344**
Net Surplus (Deficiency)	**$ (44,426)**	**$ (32,352)**	**$ (1,692,166)**	**$ (1,899,259)**	**$ (3,723,152)**	**$ (3,557,758)**
% of Rate Revenue	**0.92%**	**0.67%**	**34.62%**	**46.49%**	**74.31%**	**70.31%**
Annual Rate Adjustment	**2.50%**	**14.50%**	**14.50%**	**10.00%**	**9.00%**	**7.00%**
Cumulative Annual Rate Adjustment	**2.50%**	**17.36%**	**34.38%**	**47.82%**	**61.12%**	**72.40%**
Rate Revenues After Rate Increase	$ 4,935,068	$ 5,707,159	$ 6,600,044	$ 7,332,649	$ 8,072,513	$ 8,723,965
Net Cash Flow After Rate Increase	**75,942**	**811,960**	**(3,597)**	**472,800**	**(660,835)**	**105,908**
Coverage After Rate Increases	**2.89**	**3.58**	**1.50**	**1.53**	**1.59**	**1.85**

The City increased rates by 2.5 percent in FY 2013. The financial forecast indicates the need to follow this with 14.5 percent rate increases in FY 2014 and FY 2015, followed by a 10.0 percent increase in FY 2016, a 9.0 percent increase in FY 2017, and a 7.0 percent increase in FY 2018. The rate increases are needed to cover the existing level of O&M expenses, meet the debt service requirements related to the capital program and maintain adequate ending fund balance targets.

6.1 Funds and Reserves

Table 5 shows a summary of the projected Operating, Capital, and Reserve ending fund balances through FY 2018 based on the rate forecasts presented in the previous section. As discussed earlier, the Wastewater Operating Fund has a minimum target of 55 days of O&M expenses. The Sewer Replacement Fund target balance is set at 1 percent of fixed assets, less the Contingency Reserve Fund. Both funds remain above their minimum fund balances through FY 2018 and only dip below

during years of peak capital costs. The combined fund balance is maintained at or above the target level throughout the forecast.

Table 5: Ending Cash Balance Summary

Ending Fund Balances	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018
Operating Funds	$ 3,619,073	$ 3,392,353	$ 2,033,694	$ 2,368,173	$ 1,507,187	$ 1,485,473
Capital Funds	9,322,608	11,450,863	305,235	1,829,673	698,645	2,312,526
Reserve Funds	1,530,000	1,534,169	3,292,318	2,907,860	3,673,525	3,710,260
Total	**$ 14,471,682**	**$ 16,377,385**	**$ 5,631,247**	**$ 7,105,706**	**$ 5,879,357**	**$ 7,508,259**
Combined Minimum Target Balance	*1,278,151*	*1,275,234*	*3,294,983*	*2,987,112*	*3,860,777*	*3,854,161*

Appendix A presents backup documentation related to this financial plan.

7. CURRENT AND PROJECTED RATES

7.1 Current Rates

The City's current rate structure is a flat rate for wastewater that includes a stormwater charge. The total bill is $29.51 per month, of which $1.68 is attributed to stormwater management. Commercial units are charged an additional $5.56 per 1,000 gallons of water use over 5,000 gallons each month. These rates include a 2.5 percent increase over FY 2012 rates.

7.2 Projected Rates

The analysis in this financial plan indicates a need for 14.5 percent increases in FY 2014 and FY 2015, a 10.0 percent increase in FY 2016, a 9.0 percent increase in FY 2017, and a 7.0 percent increase in FY 2018 to cover all costs and meet targets. Future residential rate projections through the end of the twenty year horizon can be found on page 1 in Appendix A. It is assumed that the proposed rate increases would be applied equally to all classes and to each rate component (fixed and variable). Table 6 shows the monthly rates for the six year planning period based on these increases.

Table 6: 6-Year Projected Monthly Rates

Class	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018
Residential						
Fixed Rate	$ 29.51	$ 33.79	$ 38.69	$ 42.56	$ 46.39	$ 49.63
Commercial						
Fixed Rate	$ 29.51	$ 33.79	$ 38.69	$ 42.56	$ 46.39	$ 49.63
Volume Charge	5.56	6.36	7.28	8.01	8.73	9.34

Table 7 shows monthly residential bill comparisons for the 6-year planning period with the projected annual increases.

Table 7: 6-Year Monthly Residential Bill Comparisons

Residential	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018
Monthly Bill	$ 29.51	$ 33.79	$ 38.69	$ 42.56	$ 46.39	$ 49.63
$ Difference	$ 0.72	$ 4.28	$ 4.90	$ 3.87	$ 3.83	$ 3.25
Rate Increase	2.50%	14.50%	14.50%	10.00%	9.00%	7.00%

8. AFFORDABILITY

The Department of Environmental Quality uses an affordability index to qualify borrowers for disadvantaged loans with decreased interest rates and principal forgiveness. To qualify for these loans, rates must exceed 1.5 percent of the median household income for the service area. The median household income for the City of Post Falls was $45,336 in 2006 – 2010 according to the U.S. Census Bureau. The 2010 figures are escalated based on the assumed 2.23 percent general cost inflation to show the median household income in future years. Table 8 presents the City's rates, with the projected rate increases for the forecast period, tested against the 1.5 percent monthly affordability threshold.

Table 8: Affordability Test

Year	Inflation	Median HH Income	1.5% Monthly Threshold	Projected Monthly Bill
2010		$ 45,336	$ 56.67	
2011	2.23%	46,347	57.93	
2012	2.23%	47,381	59.23	$ 28.79
2013	2.23%	48,437	60.55	29.51
2014	2.23%	49,517	61.90	33.79
2015	2.23%	50,621	63.28	38.69
2016	2.23%	51,750	64.69	42.56
2017	2.23%	52,904	66.13	46.39
2018	2.23%	54,084	67.61	49.63

Applying the 1.5 percent test, the City's rates are forecasted to remain within the indicated affordability range through FY 2018.

9. CAPITALIZATION FEE (CAP FEE)

The City's capitalization fee is a one-time charge paid for by new customers for system capacity. Cap fees are an allocation of capital costs on a proportional basis. They are based on capacity demand and the cost to provide that capacity. Properties which are already connected do not pay cap fees unless they "redevelop" and require increased capacity.

In the absence of a capitalization fee, growth related capital costs would be borne in large part by existing customers. In addition, the net investment in the utility already collected from existing customers through rates, charges, and fees would be diluted by the addition of new customers, effectively subsidizing new customers with prior customers' payments. To establish equity, a capitalization fee should recover a proportionate share of the existing and future infrastructure costs from a new customer. From a financial perspective, a new customer should become financially equivalent to an existing customer by paying the capitalization fee.

The method used to determine the capitalization fee includes provisions for both the City's investment in existing system capacity and its planned future investments to meet future system needs. The resulting system cost is then spread proportionally over the total customer base served. The components of the capitalization fee are described below. Further details can be found on pages 12 through 20 in Appendix A.

- **Existing System Costs** – The original cost of the existing system is determined from utility records. The replacement cost is then calculated based on the Engineering News-Record (ENR) Construction Cost Index (CCI). Adjustments to the existing system replacement costs include:

  Plus: Construction work in progress. To acknowledge that the City may have investments in capital projects that are currently underway – these projects are not completed or booked as

assets, but do represent an investment made by the City in the system. Consequently, the cost of construction work in progress is added to the existing system cost basis.

Less: Contributed assets. Assets funded by developers, grants or special property assessments are excluded from the cost basis on the premise that the capacity fee should only recover costs actually incurred by the City.

Less: Outstanding debt principal. This is subtracted from existing system costs to avoid double-charging by recognizing that new customers will be paying for debt service through their monthly user rates.

Less: Depreciation. The replacement cost of depreciation is calculated based on the Engineering News-Record Construction Cost Index (ENR-CCI) and is subtracted from the replacement cost to recognize the remaining value of the system.

Plus: General costs split proportionately. General costs do not have a specific customer capacity so they are split proportionately and added to the each function to ensure they are split equitably between existing and future capacity.

Less: Existing system value associated with current connections on the system and no longer available.

Net calculation, including adjustments identified above, represents the existing system available capacity costs that are included in the capitalization fee. These costs are shown in Table 9.

Table 9: Existing System Costs

Existing System Costs	Treatment	Collection	Pumping	General
Plant Replacement Cost [a]	$ 52,306,976	$ 38,371,085	$ 7,110,593	$ 3,288,683
plus: Construction work in progress	15,690,388	-	-	-
less: Contributed Assets	(4,653,802)	(17,375,976)	-	(190,575)
less: Outstanding debt principal [b]	(4,249,578)	(1,408,515)	(477,034)	(207,845)
less: Depreciation	(23,624,375)	(12,969,237)	(3,722,570)	(591,250)
EXISTING COST BASIS	$ 35,469,609	$ 6,617,358	$ 2,910,990	$ 2,299,014
plus: General Costs Split Proportionately	1,812,196	338,091	148,727	$ (2,299,014)
less: Existing Capacity [c]	(22,140,380)	(3,411,032)	(1,500,520)	-
TOTAL EXISTING SYSTEM AVAILABLE CAPACITY COSTS	**$15,141,426**	**$ 3,544,417**	**$ 1,559,196**	**$ -**

[a] Plant replacement cost equals total plant-in-service plus contributed assets inflated to current dollars with ENR CCI
[b] Total existing debt principal outstanding split proportionately between functions based on assets and adjustments
[c] Exisitng capacity is the proportion of the exisitng system that is used by currently connected SUs; based on all customers for treatment related costs (62.4%) and only Post Falls customers for collection and pumping related costs (51.5%)

- **Future System Costs** – Includes total capital projects planned for construction and identified in an approved comprehensive system planning document. All projects for the Treatment portion occur within the 20-year horizon of this financial analysis. Two projects for the Pumping portion occur just past the 20-year time horizon, but due to the importance of the projects in meeting future needs and the assurance that they will be completed, they have been included in the cap fee calculations. Adjustments to the future system costs include:

  Less: Existing user capital costs. The capital improvement program has been allocated based on engineering and planning criteria between those projects benefitting existing users, those projects benefitting new users or a combination. Except for the portion that would be needed to increase the size of the system, the existing user replacement projects are excluded from the calculation.

The net calculation, including adjustments identified above, represents the future system capacity costs. These costs, shown in Table 10, represent future facilities needed to serve growth and improve the system for regulatory compliance and are included in the capitalization fee.

It is important to note that current-year dollars, not inflated dollars, are used when calculating the capitalization fee. This approach assumes that the capitalization fee will be updated annually to track construction cost inflation.

Table 10: Future System Costs

Future System Costs	Treatment	Collection	Pumping
Total Capital Improvement Program [a]	$ 80,619,400	$ -	$ 18,686,886
less: Exisiting Needs	(29,639,245)	-	(5,477,177)
TOTAL FUTURE SYSTEM CAPACITY COSTS	**$50,980,155**	**$ -**	**$13,209,709**

[a] Total capital costs in current dollars include all projects required to meet future needs

- **Customer Base/System Capacity** – The system capacity is shown in Service Units (SUs) and is calculated based on the City Code 13.16.020 definition of 5,000 gallons per month per SU, which equates to 164.38 gallons per day (gpd). Since capacity differs between functions of the plant, these calculations have been split by function. Based on engineering calculations, future plant capacity is expected to be 5.20 million gallons per day (MGD) and future collection and pumping capacity is expected to serve 7.62 MGD. Current connected capacity for treatment includes all current connections for Post Falls and Rathdrum, while collection and pumping include only connections for Post Falls. Table 11 shows how these numbers equate to SUs for each function.

Table 11: Customer Base

Customer Base	Treatment	Collection	Pumping
Buildout Units	31,633	46,351	46,351
Existing Connected Capacity	(15,189)	(12,543)	(12,543)
FUTURE AVAILABLE CAPACITY	16,444	33,808	33,808

- **Capitalization Fee** – The sum of the available existing system costs and the future system costs is divided by the available system capacity for each function. These are added together to determine the maximum allowable capitalization fee. Table 12 shows the results of this calculation.

Table 12: Capitalization Fee

Capitalization Fee	Treatment	Collection	Pumping
Existing System Costs	$ 15,141,426	$ 3,544,417	$ 1,559,196
Future System Costs	50,980,155	-	13,209,709
Total Cost Basis	$ 66,121,580	$ 3,544,417	$ 14,768,905
Allocable Customer Base	16,444	33,808	33,808
Total Capitalization Fee per Capacity Unit by Function	$ 4,021	$ 105	$ 437
TOTAL CAPITALIZATION FEE			**$ 4,563**

The updated capitalization fee for the City of Post Falls is $97 less than the previous fee of $4,659. The previous fee was calculated for dwelling units less than 1,000 square feet, with a higher rate for dwelling units of 1,000 square feet or more. The updated capitalization fee is calculated per SU, which focuses on actual flow and stays consistent with City Code 13.16.020 in defining one SU as all monthly sanitary sewer flows averaging 5,000 gallons per month or less.

The City of Rathdrum also sends its wastewater flow to the City of Post Falls Water Reclamation Facility. Rathdrum is responsible for all collectors, interceptors, transmission pipelines, pumps, lift stations, and any other conceivable appurtenances necessary to transmit wastewater to the sewage treatment plant or to the designated point of connection, and therefore pay only the treatment portion of the capitalization fee to the City of Post Falls. Based on the updated capitalization fee calculation, this would increase Rathdrum's fee from $3,036 to $4,021 per SU.

As mentioned previously, the capitalization fee should be updated annually to track construction cost inflation. This should be done with an accredited escalation index, such as the ENR CCI.

10. CONCLUSION

The results of this analysis indicate that rate increases are necessary to fund ongoing operating needs and future debt requirements to fund the CIP. Implementation of the proposed rate increases should provide for continued financial viability while maintaining generally affordable rates.

In addition, the updated CIP, future capacity and current connections to the wastewater system show the need for capitalization fee increases for Rathdrum and an initial decrease for Post Falls to ensure that new customers pay an equitable portion of capital costs.

It is recommended that the City regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the total sewer utility financial obligations.

APPENDIX A

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Summary

Revenue Requirement	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
Revenues																				
Rate Revenues Under Existing Rate	$ 4,814,700	$ 4,862,847	$ 4,911,475	$ 4,960,590	$ 5,010,196	$ 5,060,298	$ 5,110,901	$ 5,162,010	$ 5,213,630	$ 5,265,766	$ 5,318,424	$ 5,371,608	$ 5,425,324	$ 5,479,578	$ 5,534,373	$ 5,589,717	$ 5,645,614	$ 5,702,071	$ 5,759,091	$ 5,816,682
Capitalzation Fees Towards Debt	50,034	50,836	49,097	49,753	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Rate Revenues [a]	152,171	154,885	157,652	160,474	163,352	166,287	169,281	172,334	175,448	178,624	181,863	187,315	192,967	198,826	204,902	211,201	217,733	224,508	231,534	238,822
Total Revenues	**$ 5,016,905**	**$ 5,068,568**	**$ 5,118,224**	**$ 5,170,817**	**$ 5,173,548**	**$ 5,226,585**	**$ 5,280,182**	**$ 5,334,344**	**$ 5,389,078**	**$ 5,444,390**	**$ 5,500,287**	**$ 5,558,924**	**$ 5,618,291**	**$ 5,678,404**	**$ 5,739,275**	**$ 5,800,918**	**$ 5,863,348**	**$ 5,926,579**	**$ 5,990,626**	**$ 6,055,504**
Expenses																				
Cash Operating Expenses	$ 2,770,801	$ 2,847,189	$ 2,933,397	$ 3,605,693	$ 3,695,681	$ 3,583,452	$ 3,674,566	$ 3,838,118	$ 3,936,794	$ 4,038,728	$ 4,257,409	$ 4,418,470	$ 4,586,075	$ 4,760,507	$ 4,942,064	$ 5,131,055	$ 5,327,806	$ 5,532,657	$ 5,745,965	$ 5,968,103
Existing Debt Service	914,522	953,731	826,515	413,905	413,955	413,828	408,213	411,745	409,663	412,171	409,065	410,550	411,420	260,600	260,825	-	-	-	-	-
New Debt Service	-	-	1,750,477	1,750,477	2,487,064	2,487,064	2,487,064	2,487,064	2,487,064	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126
Rate Funded System Reinvestment	1,376,007	1,300,000	1,300,000	1,300,000	2,300,000	2,300,000	2,300,000	2,300,000	2,300,000	2,800,000	2,800,000	2,800,000	3,200,000	3,620,820	3,628,693	3,640,022	3,648,406	3,657,057	3,665,985	3,675,198
Total Expenses	**$ 5,061,330**	**$ 5,100,920**	**$ 6,810,390**	**$ 7,070,076**	**$ 8,896,700**	**$ 8,784,344**	**$ 8,869,843**	**$ 9,036,927**	**$ 9,133,521**	**$ 12,251,025**	**$ 12,466,600**	**$ 12,629,146**	**$ 13,197,621**	**$ 13,642,053**	**$ 13,831,708**	**$ 13,771,203**	**$ 13,976,338**	**$ 14,189,841**	**$ 14,412,076**	**$ 14,643,427**
Net Surplus (Deficiency)	**$ (44,426)**	**$ (32,352)**	**$ (1,692,166)**	**$ (1,899,259)**	**$ (3,723,152)**	**$ (3,557,758)**	**$ (3,589,661)**	**$ (3,702,583)**	**$ (3,744,443)**	**$ (6,806,635)**	**$ (6,966,312)**	**$ (7,070,223)**	**$ (7,579,330)**	**$ (7,963,649)**	**$ (8,092,432)**	**$ (7,970,285)**	**$ (8,112,990)**	**$ (8,263,262)**	**$ (8,421,451)**	**$ (8,587,923)**
Additions to Meet Coverage	-	-	(8,412)	(406,693)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Surplus (Deficiency)	**$ (44,426)**	**$ (32,352)**	**$ (1,700,578)**	**$ (2,305,952)**	**$ (3,723,152)**	**$ (3,557,758)**	**$ (3,589,661)**	**$ (3,702,583)**	**$ (3,744,443)**	**$ (6,806,635)**	**$ (6,966,312)**	**$ (7,070,223)**	**$ (7,579,330)**	**$ (7,963,649)**	**$ (8,092,432)**	**$ (7,970,285)**	**$ (8,112,990)**	**$ (8,263,262)**	**$ (8,421,451)**	**$ (8,587,923)**
% of Rate Revenue	**0.92%**	**0.67%**	**34.62%**	**46.49%**	**74.31%**	**70.31%**	**70.24%**	**71.73%**	**71.82%**	**129.26%**	**130.98%**	**131.62%**	**139.70%**	**145.33%**	**146.22%**	**142.59%**	**143.70%**	**144.92%**	**146.23%**	**147.64%**
Annual Rate Adjustment	**2.50%**	**14.50%**	**14.50%**	**10.00%**	**9.00%**	**7.00%**	**7.00%**	**7.00%**	**7.00%**	**7.00%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**
Cumulative Annual Rate Adjustment	**2.50%**	**17.36%**	**34.38%**	**47.82%**	**61.12%**	**72.40%**	**84.47%**	**97.38%**	**111.20%**	**125.98%**	**131.63%**	**137.42%**	**143.36%**	**149.44%**	**155.68%**	**162.07%**	**168.62%**	**175.34%**	**182.22%**	**189.28%**
Net Revenue from Rate Increases	$ 120,368	$ 844,312	$ 1,688,568	$ 2,372,058	$ 3,062,317	$ 3,663,667	$ 4,317,088	$ 5,026,817	$ 5,797,436	$ 6,633,892	$ 7,000,698	$ 7,381,762	$ 7,777,603	$ 8,188,753	$ 8,615,765	$ 9,059,214	$ 9,519,692	$ 9,997,813	$ 10,494,213	$ 11,009,551
Net Surplus / (Deficiency)	**$ 75,942**	**$ 811,960**	**$ (12,010)**	**$ 66,106**	**$ (660,835)**	**$ 105,908**	**$ 727,427**	**$ 1,324,234**	**$ 2,052,993**	**$ (172,743)**	**$ 34,385**	**$ 311,540**	**$ 198,273**	**$ 225,103**	**$ 523,333**	**$ 1,088,929**	**$ 1,406,702**	**$ 1,734,551**	**$ 2,072,762**	**$ 2,421,628**
Remaining Adj Req % of Rate Revenue	-1.58%	-16.70%	0.24%	-1.33%	13.19%	-2.09%	-14.23%	-25.65%	-39.38%	3.28%	-0.65%	-5.80%	-3.65%	-4.11%	-9.46%	-19.48%	-24.92%	-30.42%	-35.99%	-41.63%
Rate Revenues After Rate Increase	$ 4,935,068	$ 5,707,159	$ 6,600,044	$ 7,332,649	$ 8,072,513	$ 8,723,965	$ 9,427,989	$ 10,188,827	$ 11,011,066	$ 11,899,659	$ 12,319,122	$ 12,753,371	$ 13,202,927	$ 13,668,330	$ 14,150,139	$ 14,648,931	$ 15,165,306	$ 15,699,883	$ 16,253,304	$ 16,826,233
Net Cash Flow After Rate Increase	**75,942**	**811,960**	**(3,597)**	**472,800**	**(660,835)**	**105,908**	**727,427**	**1,324,234**	**2,052,993**	**(172,743)**	**34,385**	**311,540**	**198,273**	**225,103**	**523,333**	**1,088,929**	**1,406,702**	**1,734,551**	**2,072,762**	**2,421,628**
Coverage After Rate Increases	**2.89**	**3.58**	**1.50**	**1.53**	**1.59**	**1.85**	**2.08**	**2.28**	**2.53**	**1.50**	**1.55**	**1.60**	**1.65**	**1.71**	**1.82**	**1.89**	**2.05**	**2.13**	**2.20**	**2.28**
Sample Residential Monthly Bill	$ 29.51	$ 33.79	$ 38.69	$ 42.56	$ 46.39	$ 49.63	$ 53.11	$ 56.83	$ 60.80	$ 65.06	$ 66.69	$ 68.35	$ 70.06	$ 71.81	$ 73.61	$ 75.45	$ 77.34	$ 79.27	$ 81.25	$ 83.28
Monthly Average Increase ($)	0.72	4.28	4.90	3.87	3.83	3.25	3.47	3.72	3.98	4.26	1.63	1.67	1.71	1.75	1.80	1.84	1.89	1.93	1.98	2.03

Fund Balance	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
Operating Funds	$ 3,619,073	$ 3,392,353	$ 2,033,694	$ 2,368,173	$ 1,507,187	$ 1,485,473	$ 1,516,968	$ 1,566,459	$ 1,600,092	$ 1,451,350	$ 1,507,506	$ 1,747,610	$ 1,798,809	$ 1,851,840	$ 1,906,777	$ 1,963,700	$ 2,022,692	$ 2,083,838	$ 2,147,229	$ 2,212,959
Capital Funds	9,322,608	11,450,863	305,235	1,829,673	698,645	2,312,526	607,042	4,118,871	8,090,484	404,458	2,650,970	6,229,622	9,964,645	14,643,802	19,732,918	25,350,302	31,575,227	38,268,628	45,449,968	53,139,381
Reserve Funds	1,530,000	1,534,169	3,292,318	2,907,860	3,673,525	3,710,260	3,765,914	3,822,403	3,879,739	6,450,997	6,547,762	6,645,978	6,745,668	6,690,778	6,791,140	6,632,382	6,731,867	6,832,845	6,935,338	7,039,368
Total	**$ 14,471,682**	**$ 16,377,385**	**$ 5,631,247**	**$ 7,105,706**	**$ 5,879,357**	**$ 7,508,259**	**$ 5,889,924**	**$ 9,507,733**	**$ 13,570,315**	**$ 8,306,806**	**$ 10,706,238**	**$ 14,623,210**	**$ 18,509,122**	**$ 23,186,419**	**$ 28,430,835**	**$ 33,946,384**	**$ 40,329,786**	**$ 47,185,312**	**$ 54,532,535**	**$ 62,391,708**
Combined Minimum Target Balance	*$ 1,278,151*	*$ 1,275,234*	*$ 3,294,983*	*$ 2,987,112*	*$ 3,860,777*	*$ 3,854,161*	*$ 3,912,961*	*$ 3,937,923*	*$ 3,956,732*	*$ 6,881,091*	*$ 6,918,151*	*$ 6,936,389*	*$ 6,960,550*	*$ 6,986,028*	*$ 7,007,311*	*$ 7,031,307*	*$ 7,054,863*	*$ 7,079,634*	*$ 7,105,677*	*$ 7,133,052*

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Assumptions

Economic & Financial Factors	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
1 General Cost Inflation	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
2 Construction Cost Inflation	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%
3 Labor Cost Inflation	2.00%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%
4 Customer Growth	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
5 Benefit Cost Inflation	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
6 General Inflation plus Composite Growth	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	5.04%	5.04%	5.04%	5.04%	5.04%	5.04%	5.04%	5.04%	5.04%
7 Investment Interest	0.27%	0.50%	0.50%	1.00%	1.00%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
8 Additional Escalation	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
9 No Escalation	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10 Other	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Accounting Assumptions		FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
FISCAL POLICY RESTRICTIONS																					
Min. Op. Fund Balance Target (days of O&M expense)		55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
Max. Op. Fund Balance (days of O&M expense)		400	360	180	180	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Minimum Capital Fund Balance Target																					
Select Minimum Capital Fund Balance Target	1	Defined as % of Plant																			
1 - Defined as % of Plant																					
Plant-in-Service in 2012	$ 48,138,465																				
Minimum Capital Fund Balance - % of plant assets		1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
2 - Amount at Right ==>		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
RATE FUNDED SYSTEM REINVESTMENT																					
Select Reinvestment Funding Strategy	3	User Input																			
Amount of Annual Cash Funding from Rates																					
1 - Equal to Annual Depreciation Expense		$ 1,086,895	$ 1,107,366	$ 2,184,020	$ 2,195,852	$ 2,473,810	$ 2,479,137	$ 2,656,111	$ 2,681,676	$ 2,708,571	$ 3,554,857	$ 3,590,467	$ 3,597,631	$ 3,613,190	$ 3,620,820	$ 3,628,693	$ 3,640,022	$ 3,648,406	$ 3,657,057	$ 3,665,985	$ 3,675,198
2 - Equal to Annual Depreciation Expense less Annual Debt Principal Payments		414,157	371,032	855,119	819,082	1,158,394	1,103,826	1,223,535	1,179,353	1,138,900	916,717	832,216	709,038	588,777	449,847	465,148	327,609	440,529	296,806	146,122	(11,859)
3 - Equal to Amount at Right ==>		1,376,007	1,300,000	1,300,000	1,300,000	2,300,000	2,300,000	2,300,000	2,300,000	2,300,000	2,800,000	2,800,000	2,800,000	3,200,000	3,620,820	3,628,693	3,640,022	3,648,406	3,657,057	3,665,985	3,675,198
4 - Do Not Fund System Reinvestment																					
Percent allocated to WWTP	60%	Terry stated expected split																			
Percent allocated to Collector	40%																				

Capital Financing Assumptions		FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
CAPITALIZATION FEES																					
POST FALLS		2.85%																			
Capitalization Fee	$ 4,659	$ 4,792	$ 4,945	$ 5,103	$ 5,266	$ 5,434	$ 5,608	$ 5,787	$ 5,972	$ 6,162	$ 6,359	$ 6,562	$ 6,772	$ 6,988	$ 7,211	$ 7,441	$ 7,679	$ 7,924	$ 8,177	$ 8,438	$ 8,708
Fox Tail Surcharge	3,410	3,507	3,619	3,735	3,854	3,977	4,104	4,235	4,371	4,510	4,654	4,803	4,956	5,114	5,278	5,446	5,620	5,800	5,985	6,176	6,373
Crownpoint Surcharge	693	713	736	759	783	808	834	861	888	917	946	976	1,007	1,040	1,073	1,107	1,142	1,179	1,216	1,255	1,295
Total Equivalent Residential Units (Estimate)	12,543	12,758	12,885	13,014	13,144	13,276	13,408	13,543	13,678	13,815	13,953	14,092	14,233	14,376	14,519	14,665	14,811	14,959	15,109	15,260	15,413
Fox Tail	cap 138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crownpoint	cap 439	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
City		215	128	129	130	131	133	134	135	137	138	140	141	142	144	145	147	148	150	151	153
Additional Units Per Year		215	128	129	130	131	133	134	135	137	138	140	141	142	144	145	147	148	150	151	153
WWTP Sewer Cap Fees	75%	750,000	473,162	493,154	513,990	535,707	558,341	581,932	606,519	632,146	658,855	686,692	715,706	745,945	777,462	810,311	844,548	880,231	917,422	956,184	996,584
Fox Tail Collector Surcharge		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crownpoint Collector Surcharge		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Collector Sewer Cap Fees	25%	250,000	157,721	164,385	171,330	178,569	186,114	193,977	202,173	210,715	219,618	228,897	238,569	248,648	259,154	270,104	281,516	293,410	305,807	318,728	332,195
Total Collector Cap Fees + Surcharges		250,000	157,721	164,385	171,330	178,569	186,114	193,977	202,173	210,715	219,618	228,897	238,569	248,648	259,154	270,104	281,516	293,410	305,807	318,728	332,195
Post Falls Capitalization Fee Revenues (WWTP + Collector incl. Surcharges)		$ 1,000,000	$ 630,883	$ 657,539	$ 685,321	$ 714,276	$ 744,455	$ 775,909	$ 808,693	$ 842,861	$ 878,473	$ 915,589	$ 954,274	$ 994,593	$ 1,036,616	$ 1,080,415	$ 1,126,063	$ 1,173,641	$ 1,223,229	$ 1,274,912	$ 1,328,778
RATHDRUM																					
Capitalization Fee	$ 3,036	$ 3,036	$ 3,133	$ 3,233	$ 3,336	$ 3,443	$ 3,553	$ 3,666	$ 3,783	$ 3,904	$ 4,029	$ 4,157	$ 4,290	$ 4,427	$ 4,568	$ 4,714	$ 4,865	$ 5,020	$ 5,180	$ 5,346	$ 5,517
Total Equivalent Residential Units (Estimate)	2,646	2,671	2,697	2,724	2,752	2,779	2,807	2,835	2,863	2,892	2,921	2,950	2,980	3,009	3,040	3,070	3,101	3,132	3,163	3,195	3,227
Additional Units Per Year		25	27	27	27	28	28	28	28	29	29	29	30	30	30	30	31	31	31	32	32
Rathdrum Intermun. Cap Fees		$ 75,000	$ 83,672	$ 87,207	$ 90,892	$ 94,732	$ 98,734	$ 102,906	$ 107,254	$ 111,785	$ 116,509	$ 121,431	$ 126,562	$ 131,909	$ 137,483	$ 143,291	$ 149,346	$ 155,656	$ 162,232	$ 169,087	$ 176,231
Total Capitalization Fee Revenues		**$ 1,075,000**	**$ 714,555**	**$ 744,746**	**$ 776,212**	**$ 809,008**	**$ 843,190**	**$ 878,815**	**$ 915,947**	**$ 954,646**	**$ 994,981**	**$ 1,037,021**	**$ 1,080,836**	**$ 1,126,503**	**$ 1,174,099**	**$ 1,223,706**	**$ 1,275,409**	**$ 1,329,297**	**$ 1,385,461**	**$ 1,443,999**	**$ 1,505,009**
REVENUE BONDS																					
Term (years)		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Interest Cost		3.00%	3.00%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%	4.75%
Issuance Cost		1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
Revenue Bond Coverage Requirement	1.50																				
PWTF LOAN																					
Term (years; no more than 20 years)		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Interest Cost		0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Required Local Match		15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%
GO BONDS																					
Term (years)		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Interest Cost		5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Issuance Cost		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Operating Revenue and Expenditure Forecast

		Revenues		FORECAST BASIS	Budget FY 2012 / 2013	Projection FY 2013 / 2014	Projection FY 2014 / 2015	Projection FY 2015 / 2016	Projection FY 2016 / 2017	Projection FY 2017 / 2018	Projection FY 2018 / 2019	Projection FY 2019 / 2020	Projection FY 2020 / 2021	Projection FY 2021 / 2022	Projection FY 2022 / 2023	Projection FY 2023 / 2024	Projection FY 2024 / 2025	Projection FY 2025 / 2026	Projection FY 2026 / 2027	Projection FY 2027 / 2028	Projection FY 2028 / 2029	Projection FY 2029 / 2030	Projection FY 2030 / 2031	Projection FY 2031 / 2032
		Rate Revenues																						
650	33611	Utility Collection - Sewer	4	Customer Growth	$ 3,949,700	$ 3,989,197	$ 4,029,089	$ 4,069,380	$ 4,110,074	$ 4,151,174	$ 4,192,686	$ 4,234,613	$ 4,276,959	$ 4,319,729	$ 4,362,926	$ 4,406,555	$ 4,450,621	$ 4,495,127	$ 4,540,078	$ 4,585,479	$ 4,631,334	$ 4,677,647	$ 4,724,424	$ 4,771,668
	33604	Rathdrum Sewer Charge	4	Customer Growth	635,000	641,350	647,764	654,241	660,784	667,391	674,065	680,806	687,614	694,490	701,435	708,449	715,534	722,689	729,916	737,215	744,587	752,033	759,554	767,149
653	33611	Utility Collection - Storm	4	Customer Growth	230,000	232,300	234,623	236,969	239,339	241,732	244,150	246,591	249,057	251,548	254,063	256,604	259,170	261,761	264,379	267,023	269,693	272,390	275,114	277,865
		Other	4	Customer Growth	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
					$ 4,814,700	**$ 4,862,847**	**$ 4,911,475**	**$ 4,960,590**	**$ 5,010,196**	**$ 5,060,298**	**$ 5,110,901**	**$ 5,162,010**	**$ 5,213,630**	**$ 5,265,766**	**$ 5,318,424**	**$ 5,371,608**	**$ 5,425,324**	**$ 5,479,578**	**$ 5,534,373**	**$ 5,589,717**	**$ 5,645,614**	**$ 5,702,071**	**$ 5,759,091**	**$ 5,816,682**
		Non-Rate Revenues																						
650	37020	Investment Income	1	General Cost Inflation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	37040	Designated Investment Income	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33713	Utility Penalty - Svc Fee	4	Customer Growth	55,000	55,550	56,106	56,667	57,233	57,806	58,384	58,967	59,557	60,153	60,754	61,362	61,975	62,595	63,221	63,853	64,492	65,137	65,788	66,446
	39630	Miscellaneous Income	1	General Cost Inflation	2,497	2,553	2,609	2,668	2,727	2,788	2,850	2,913	2,978	3,044	3,112	3,237	3,366	3,501	3,641	3,786	3,938	4,095	4,259	4,430
	39655	Rental Income Cell Tower	1	General Cost Inflation	9,504	9,716	9,932	10,153	10,379	10,610	10,847	11,088	11,335	11,587	11,845	12,319	12,812	13,324	13,857	14,412	14,988	15,588	16,211	16,860
	33605	Sampling Revenue	1	General Cost Inflation	5,250	5,367	5,486	5,609	5,733	5,861	5,992	6,125	6,261	6,401	6,543	6,805	7,077	7,360	7,655	7,961	8,279	8,611	8,955	9,313
651	37020	Investment Income	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	37203	Cash Carryover Bond Proceeds	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	38625	Sewer Cap Fees	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	38620	Rathdrum Intermun. Cap Fees	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	37660	Transfer Street/Fleet Rent	1	General Cost Inflation	79,920	81,700	83,519	85,378	87,279	89,223	91,209	93,240	95,316	97,439	99,608	103,593	107,736	112,046	116,528	121,189	126,036	131,078	136,321	141,774
652	37020	Investment Income	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	37203	Cash Carryover Bond Proceeds	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28630	Sewer Cap Fees - Enterprise	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Total Non-rate revenues			**$ 152,171**	**$ 154,885**	**$ 157,652**	**$ 160,474**	**$ 163,352**	**$ 166,287**	**$ 169,281**	**$ 172,334**	**$ 175,448**	**$ 178,624**	**$ 181,863**	**$ 187,315**	**$ 192,967**	**$ 198,826**	**$ 204,902**	**$ 211,201**	**$ 217,733**	**$ 224,508**	**$ 231,534**	**$ 238,822**
TOTAL REVENUES					**$ 4,966,871**	**$ 5,017,732**	**$ 5,069,127**	**$ 5,121,064**	**$ 5,173,548**	**$ 5,226,585**	**$ 5,280,182**	**$ 5,334,344**	**$ 5,389,078**	**$ 5,444,390**	**$ 5,500,287**	**$ 5,558,924**	**$ 5,618,291**	**$ 5,678,404**	**$ 5,739,275**	**$ 5,800,918**	**$ 5,863,348**	**$ 5,926,579**	**$ 5,990,626**	**$ 6,055,504**

		Expenditures		FORECAST BASIS	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
	650-463	**Wastewater Operating**																						
	62000	Advertising & Legal Fees	3	Labor Cost Inflation	$ 350	$ 358	$ 366	$ 374	$ 382	$ 391	$ 399	$ 408	$ 417	$ 427	$ 436	$ 446	$ 456	$ 466	$ 476	$ 487	$ 498	$ 509	$ 520	$ 532
	62010	Attorney Fees	3	Labor Cost Inflation	1,500	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
	62040	Contracts/Professional	3	Labor Cost Inflation	20,000	20,445	20,901	21,366	21,842	22,328	22,825	23,333	23,853	24,384	24,927	25,482	26,049	26,629	27,222	27,829	28,448	29,082	29,729	30,391
	62060	Dues & Membership	1	General Cost Inflation	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385	2,438	2,493	2,592	2,696	2,804	2,916	3,033	3,154	3,280	3,411	3,548
	62140	Janitorial Services	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	52150	Biosolids Disposal	1	General Cost Inflation	325,000	332,237	339,634	347,197	354,927	362,830	370,909	379,168	387,610	396,241	405,064	421,266	438,117	455,642	473,867	492,822	512,535	533,036	554,358	576,532
	52180	Other Contracts	1	General Cost Inflation	10,000	10,223	10,450	10,683	10,921	11,164	11,413	11,667	11,926	12,192	12,464	12,962	13,481	14,020	14,581	15,164	15,770	16,401	17,057	17,739
	62320	Locate Service	1	General Cost Inflation	4,000	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771	4,877	4,985	5,185	5,392	5,608	5,832	6,066	6,308	6,560	6,823	7,096
	63006	Supplies - Lift Station	1	General Cost Inflation	15,000	15,334	15,675	16,024	16,381	16,746	17,119	17,500	17,890	18,288	18,695	19,443	20,221	21,030	21,871	22,746	23,655	24,602	25,586	26,609
	63008	Supplies - Caustic	1	General Cost Inflation	65,000	66,447	67,927	69,439	70,985	72,566	74,182	75,834	77,522	79,248	81,013	84,253	87,623	91,128	94,773	98,564	102,507	106,607	110,872	115,306
	63060	Office Supplies	1	General Cost Inflation	2,500	2,556	2,613	2,671	2,730	2,791	2,853	2,917	2,982	3,048	3,116	3,241	3,370	3,505	3,645	3,791	3,943	4,100	4,264	4,435
	63070	Postage	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	63110	First Aid/Safety	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	63141	Towels	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	63150	Cleaning Supplies	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	63330	Supplies - Collection	1	General Cost Inflation	15,000	15,334	15,675	16,024	16,381	16,746	17,119	17,500	17,890	18,288	18,695	19,443	20,221	21,030	21,871	22,746	23,655	24,602	25,586	26,609
	63400	STP Lab	1	General Cost Inflation	25,000	25,557	26,126	26,707	27,302	27,910	28,531	29,167	29,816	30,480	31,159	32,405	33,701	35,049	36,451	37,909	39,426	41,003	42,643	44,349
	63480	Palymer	1	General Cost Inflation	20,000	20,445	20,901	21,366	21,842	22,328	22,825	23,333	23,853	24,384	24,927	25,924	26,961	28,039	29,161	30,328	31,541	32,802	34,114	35,479
	63490	Aluminum Sulfate	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	63560	IPT Lab Supplies	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	63871	IPT Contract Analysis	1	General Cost Inflation	30,000	30,668	31,351	32,049	32,763	33,492	34,238	35,000	35,779	36,576	37,391	38,886	40,442	42,059	43,742	45,491	47,311	49,203	51,171	53,218
	63910	Sludge Handling/Storage	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	64010	Travel & Meetings	1	General Cost Inflation	4,000	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771	4,877	4,985	5,185	5,392	5,608	5,832	6,066	6,308	6,560	6,823	7,096
	64020	Training	1	General Cost Inflation	3,000	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578	3,658	3,739	3,889	4,044	4,206	4,374	4,549	4,731	4,920	5,117	5,322
	65004	Utilities - PF	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	65005	Pickup Fuel	1	General Cost Inflation	12,000	12,267	12,540	12,820	13,105	13,397	13,695	14,000	14,312	14,630	14,956	15,554	16,177	16,824	17,497	18,197	18,924	19,681	20,469	21,287
	65010	Avista - Gas	1	General Cost Inflation	18,000	18,401	18,811	19,229	19,658	20,095	20,543	21,000	21,468	21,946	22,434	23,332	24,265	25,236	26,245	27,295	28,387	29,522	30,703	31,931
	65021	Electric	1	General Cost Inflation	250,000	255,567	261,257	267,074	273,021	279,100	285,315	291,667	298,162	304,801	311,588	324,051	337,013	350,494	364,513	379,094	394,258	410,028	426,429	443,486
	65023	Electric - KEC	1	General Cost Inflation	15,000	15,334	15,675	16,024	16,381	16,746	17,119	17,500	17,890	18,288	18,695	19,443	20,221	21,030	21,871	22,746	23,655	24,602	25,586	26,609
	65024	Electric Avista - Lift Station	1	General Cost Inflation	100,000	102,227	104,503	106,830	109,208	111,640	114,126	116,667	119,265	121,920	124,635	129,620	134,805	140,197	145,805	151,638	157,703	164,011	170,572	177,394
	65030	Telephone	1	General Cost Inflation	7,000	7,156	7,315	7,478	7,645	7,815	7,989	8,167	8,349	8,534	8,724	9,073	9,436	9,814	10,206	10,615	11,039	11,481	11,940	12,418
	65050	Sanitation	1	General Cost Inflation	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385	2,438	2,493	2,592	2,696	2,804	2,916	3,033	3,154	3,280	3,411	3,548
	65080	Water	1	General Cost Inflation	15,000	15,334	15,675	16,024	16,381	16,746	17,119	17,500	17,890	18,288	18,695	19,443	20,221	21,030	21,871	22,746	23,655	24,602	25,586	26,609
	65110	Aquifer Assessment - County	1	General Cost Inflation	200	204	209	214	218	223	228	233	239	244	249	259	270	280	292	303	315	328	341	355
	66012	Computer Software Maint. Supp	1	General Cost Inflation	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385	2,438	2,493	2,592	2,696	2,804	2,916	3,033	3,154	3,280	3,411	3,548
	66110	Furniture Replace & Repair	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	66190	Small Equipment	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	67090	Tools	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	67170	Auto Service	1	General Cost Inflation	3,000	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578	3,658	3,739	3,889	4,044	4,206	4,374	4,549	4,731	4,920	5,117	5,322
	67180	Fabrications	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
	67221	Generator Fuel	1	General Cost Inflation	4,000	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771	4,877	4,985	5,185	5,392	5,608	5,832	6,066	6,308	6,560	6,823	7,096
	68010	Bldg & Grounds Maint & Repair	1	General Cost Inflation	5,000	5,111	5,225	5,341	5,460	5,582	5,706	5,833	5,963	6,096	6,232	6,481	6,740	7,010	7,290	7,582	7,885	8,201	8,529	8,870
	68021	L/S Maintenance & Repairs	1	General Cost Inflation	30,000	30,668	31,351	32,049	32,763	33,492	34,238	35,000	35,779	36,576	37,391	38,886	40,442	42,059	43,742	45,491	47,311	49,203	51,171	53,218
	68022	STP Lab	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	68025	Plant Maintenance & Repairs	1	General Cost Inflation	40,000	40,891	41,801	42,732	43,683	44,656	45,650	46,667	47,706	48,768	49,854	51,848	53,922	56,079	58,322	60,655	63,081	65,604	68,229	70,958
	68350	Sewer Line Cleaning	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	68360	EPA/NNPES	1	General Cost Inflation	16,500	16,867	17,243	17,627	18,019	18,421	18,831	19,250	19,679	20,117	20,565	21,387	22,243	23,133	24,058	25,020	26,021	27,062	28,144	29,270
	68820	Chlorine	1	General Cost Inflation	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385	2,438	2,493	2,592	2,696	2,804	2,916	3,033	3,154	3,280	3,411	3,548
	80010	Computer	1	General Cost Inflation	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385	2,438	2,493	2,592	2,696	2,804	2,916	3,033	3,154	3,280	3,411	3,548
	80030	Software Upgrades	1	General Cost Inflation	2,500	2,556	2,613	2,671	2,730	2,791	2,853	2,917	2,982	3,048	3,116	3,241	3,370	3,505	3,645	3,791	3,943	4,100	4,264	4,435
	90040	Truck Replacement	1	General Cost Inflation	30,000	30,668	31,351	32,049	32,763	33,492	34,238	35,000	35,779	36,576	37,391	38,886	40,442	42,059	43,742	45,491	47,311	49,203	51,171	53,218
	91390	Radio & Speakers	1	General Cost Inflation	28,500	29,135	29,783	30,446	31,124	31,817	32,526	33,250	33,990	34,747	35,521	36,942	38,419	39,956	41,555	43,217	44,945	46,743	48,613	50,557
	80240	Locator	1	General Cost Inflation	1,000	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193	1,219	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,706	1,774
	80240	L/S Gauges	1	General Cost Inflation	6,000	6,134	6,270	6,410	6,553	6,698	6,848	7,000	7,156	7,315	7,478	7,777	8,088	8,412	8,748	9,098	9,462	9,841	10,234	10,644
	93040	20' x 36' Storage Building	1	General Cost Inflation	9,000	9,200	9,405	9,615	9,829	10,048	10,271	10,500	10,734	10,973	11,217	11,666	12,132	12,618	13,122	13,647	14,193	14,761	15,351	15,966
	62092	SCADA system evaluation	1	General Cost Inflation	7,500	7,667	7,838	8,012	8,191	8,373	8,559	8,750	8,945	9,144	9,348	9,722	10,110	10,515	10,935	11,373	11,828	12,301	12,793	13,305
	91520	Hydro Excavating unit	1	General Cost Inflation	7,000	7,156	7,315	7,478	7,645	7,815	7,989	8,167	8,349	8,534	8,724	9,073	9,436	9,814	10,206	10,615	11,039	11,481	11,940	12,418
	91195	Phosporus Analyzer	1	General Cost Inflation	75,000	76,670	78,377	80,122	81,906	83,730	85,594	87,500	89,449	91,440	93,476	97,215	101,104	105,148	109,354	113,728	118,277	123,008	127,929	133,046
	93280	Landscaping	1	General Cost Inflation	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385	2,438	2,493	2,592	2,696	2,804	2,916	3,033	3,154	3,280	3,411	3,548
	69001	Transfer to General Fund	1	General Cost Inflation	471,459	481,957	492,688	503,658	514,873	526,337	538,057	550,037	562,284	574,804	587,603	611,107	635,551	660,973	687,412	714,909	743,505	773,245	804,175	836,342

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Operating Revenue and Expenditure Forecast

Expenditures			FORECAST BASIS	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
69002	Transfer to Comp Liability	1	General Cost Inflation	44,958	45,959	46,982	48,028	49,098	50,191	51,309	52,451	53,619	54,813	56,033	58,275	60,606	63,030	65,551	68,173	70,900	73,736	76,686	79,753
69810	Bad Debt	1	General Cost Inflation	1,500	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789	1,829	1,870	1,944	2,022	2,103	2,187	2,275	2,366	2,460	2,559	2,661
72000	Uniform Expense	1	General Cost Inflation	1,500	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789	1,829	1,870	1,944	2,022	2,103	2,187	2,275	2,366	2,460	2,559	2,661
71000	Salaries	3	Labor Cost Inflation	522,315	533,945	545,834	557,988	570,412	583,113	596,097	609,369	622,938	636,808	650,987	665,482	680,300	695,448	710,933	726,763	742,945	759,487	776,398	793,686
71030	Employer FICA	3	Labor Cost Inflation	39,957	40,847	41,756	42,686	43,637	44,608	45,601	46,617	47,655	48,716	49,801	50,909	52,043	53,202	54,386	55,597	56,835	58,101	59,394	60,717
71040	Employer Retirement	3	Labor Cost Inflation	54,269	55,477	56,712	57,975	59,266	60,585	61,934	63,313	64,723	66,164	67,638	69,144	70,683	72,257	73,866	75,511	77,192	78,911	80,668	82,464
71050	Employer Workmen Comp	3	Labor Cost Inflation	21,235	21,707	22,191	22,685	23,190	23,706	24,234	24,774	25,325	25,889	26,466	27,055	27,657	28,273	28,903	29,546	30,204	30,877	31,564	32,267
71060	Employer Unemployment Ins	3	Labor Cost Inflation	5,223	5,339	5,458	5,580	5,704	5,831	5,961	6,094	6,229	6,368	6,510	6,655	6,803	6,954	7,109	7,268	7,429	7,595	7,764	7,937
71070	Employer Insurance	5	Benefit Cost Inflation	125,623	135,672	146,526	158,248	170,908	184,581	199,347	215,295	232,518	251,120	267,443	284,827	303,340	323,057	344,056	366,420	390,237	415,602	442,617	471,387
651-463	**Wastewater Capital - WWTP**																						
95500	Facility Plan per EPA permit	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WWTP CIP Additional O&M	1	General Cost Inflation	-	7,000	7,156	605,315	618,793	427,571	437,092	501,824	512,998	524,420	653,447	679,585	706,769	735,039	764,441	795,019	826,819	859,892	894,288	930,059
652	**Wastewater Capital - Collector**																						
	Collector CIP Additional O&M	1	General Cost Inflation	-	-	14,500	14,823	15,153	15,490	15,835	30,688	31,371	32,070	32,784	34,095	35,459	36,877	38,352	39,886	41,482	43,141	44,867	46,661
653-464	**Wastewater Storm Water**																						
62040	Contracts/Professional	3	Labor Cost Inflation	2,500	2,556	2,613	2,671	2,730	2,791	2,853	2,917	2,982	3,048	3,116	3,185	3,256	3,329	3,403	3,479	3,556	3,635	3,716	3,799
62060	Dues & Membership	1	General Cost Inflation	600	613	627	641	655	670	685	700	716	732	748	778	809	841	875	910	946	984	1,023	1,064
63060	Office Supplies	1	General Cost Inflation	400	409	418	427	437	447	457	467	477	488	499	518	539	561	583	607	631	656	682	710
63070	Postage	1	General Cost Inflation	200	204	209	214	218	223	228	233	239	244	249	259	270	280	292	303	315	328	341	355
63110	First Aid/Safety	1	General Cost Inflation	75	77	78	80	82	84	86	88	89	91	93	97	101	105	109	114	118	123	128	133
64010	Travel & Meetings	1	General Cost Inflation	300	307	314	320	328	335	342	350	358	366	374	389	404	421	437	455	473	492	512	532
64020	Training	1	General Cost Inflation	750	767	784	801	819	837	856	875	894	914	935	972	1,011	1,051	1,094	1,137	1,183	1,230	1,279	1,330
64030	Gasoline	1	General Cost Inflation	4,000	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771	4,877	4,985	5,185	5,392	5,608	5,832	6,066	6,308	6,560	6,823	7,096
64050	Educational Materials	1	General Cost Inflation	750	767	784	801	819	837	856	875	894	914	935	972	1,011	1,051	1,094	1,137	1,183	1,230	1,279	1,330
65081	Irrigation Accounts	1	General Cost Inflation	70,000	71,559	73,152	74,781	76,446	78,148	79,888	81,667	83,485	85,344	87,245	90,734	94,364	98,138	102,064	106,146	110,392	114,808	119,400	124,176
65110	Aquifer Assessment - County	1	General Cost Inflation	8	8	8	9	9	9	9	9	10	10	10	10	11	11	12	12	13	13	14	14
66014	Software Licensing	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
66061	Office Machine Maint/Repair	1	General Cost Inflation	100	102	105	107	109	112	114	117	119	122	125	130	135	140	146	152	158	164	171	177
66190	Small Equipment	1	General Cost Inflation	500	511	523	534	546	558	571	583	596	610	623	648	674	701	729	758	789	820	853	887
68010	Bldg & Grounds Maint & Repair	1	General Cost Inflation	100	102	105	107	109	112	114	117	119	122	125	130	135	140	146	152	158	164	171	177
68220	Chemicals	1	General Cost Inflation	5,000	5,111	5,225	5,341	5,460	5,582	5,706	5,833	5,963	6,096	6,232	6,481	6,740	7,010	7,290	7,582	7,885	8,201	8,529	8,870
68225	Water Testing	1	General Cost Inflation	3,000	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578	3,658	3,739	3,889	4,044	4,206	4,374	4,549	4,731	4,920	5,117	5,322
68380	Swale Maintenance	1	General Cost Inflation	10,000	10,223	10,450	10,683	10,921	11,164	11,413	11,667	11,926	12,192	12,464	12,962	13,481	14,020	14,581	15,164	15,770	16,401	17,057	17,739
91200	Mower	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69001	Transfer to General Fund	1	General Cost Inflation	14,583	14,908	15,240	15,579	15,926	16,280	16,643	17,014	17,392	17,780	18,176	18,903	19,659	20,445	21,263	22,113	22,998	23,918	24,874	25,869
69002	Transfer to Comp Liability	1	General Cost Inflation	828	846	865	885	904	924	945	966	988	1,010	1,032	1,073	1,116	1,161	1,207	1,256	1,306	1,358	1,412	1,469
89200	Replacement Fund	1	General Cost Inflation	42,870	43,825	44,800	45,798	46,818	47,860	48,926	50,015	51,129	52,267	53,431	55,568	57,791	60,103	62,507	65,007	67,607	70,312	73,124	76,049
72000	Uniform Expense	1	General Cost Inflation	200	204	209	214	218	223	228	233	239	244	249	259	270	280	292	303	315	328	341	355
71000	Salaries	3	Labor Cost Inflation	57,582	58,864	60,174	61,514	62,884	64,284	65,715	67,179	68,674	70,204	71,767	73,365	74,998	76,668	78,375	80,120	81,904	83,728	85,592	87,498
71030	Employer FICA	3	Labor Cost Inflation	4,405	4,503	4,603	4,706	4,811	4,918	5,027	5,139	5,254	5,371	5,490	5,612	5,737	5,865	5,996	6,129	6,266	6,405	6,548	6,694
71040	Employer Retirement	3	Labor Cost Inflation	5,055	5,168	5,283	5,401	5,521	5,644	5,769	5,898	6,029	6,163	6,301	6,441	6,584	6,731	6,881	7,034	7,191	7,351	7,514	7,682
71050	Employer Workman Comp	3	Labor Cost Inflation	1,931	1,974	2,018	2,063	2,109	2,156	2,204	2,253	2,303	2,354	2,407	2,460	2,515	2,571	2,628	2,687	2,747	2,808	2,871	2,934
71060	Employer Unemployment Ins	3	Labor Cost Inflation	576	589	602	615	629	643	657	672	687	702	718	734	750	767	784	801	819	837	856	875
71070	Employer Insurance	5	Benefit Cost Inflation	8,387	9,058	9,783	10,566	11,411	12,324	13,310	14,374	15,524	16,766	17,856	19,017	20,253	21,569	22,971	24,464	26,054	27,748	29,552	31,472
	Add'l O&M from CIP		*From CIP*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Cash O&M Expenditures				**$ 2,770,801**	**$ 2,847,189**	**$ 2,933,397**	**$ 3,605,693**	**$ 3,695,681**	**$ 3,583,452**	**$ 3,674,566**	**$ 3,838,118**	**$ 3,936,794**	**$ 4,038,728**	**$ 4,257,409**	**$ 4,418,470**	**$ 4,586,075**	**$ 4,760,507**	**$ 4,942,064**	**$ 5,131,055**	**$ 5,327,806**	**$ 5,532,657**	**$ 5,745,965**	**$ 5,968,103**
	Depreciation Expense in	2010	$ 1,086,895																				
	Depreciation Expense		*Last year's plus annual additions from CIP*	$ 1,086,895	$ 1,107,366	$ 2,184,020	$ 2,195,852	$ 2,473,810	$ 2,479,137	$ 2,656,111	$ 2,681,676	$ 2,708,571	$ 3,554,857	$ 3,590,467	$ 3,597,631	$ 3,613,190	$ 3,620,820	$ 3,628,693	$ 3,640,022	$ 3,648,406	$ 3,657,057	$ 3,665,985	$ 3,675,198
			debt principal payments	$ (672,738)	$ (736,333)	$ (1,328,902)	$ (1,376,770)	$ (1,315,416)	$ (1,375,311)	$ (1,432,576)	$ (1,502,323)	$ (1,569,671)	$ (2,638,139)	$ (2,758,251)	$ (2,888,593)	$ (3,024,413)	$ (3,170,973)	$ (3,163,544)	$ (3,312,413)	$ (3,207,877)	$ (3,360,251)	$ (3,519,863)	$ (3,687,057)
			System Reinvestment Funding	$ 414,157	$ 371,032	$ 855,119	$ 819,082	$ 1,158,394	$ 1,103,826	$ 1,223,535	$ 1,179,353	$ 1,138,900	$ 916,717	$ 832,216	$ 709,038	$ 588,777	$ 449,847	$ 465,148	$ 327,609	$ 440,529	$ 296,806	$ 146,122	$ -
TOTAL EXPENSES				**$ 3,857,696**	**$ 3,954,555**	**$ 5,117,418**	**$ 5,801,545**	**$ 6,169,491**	**$ 6,062,589**	**$ 6,330,676**	**$ 6,519,794**	**$ 6,645,365**	**$ 7,593,584**	**$ 7,847,875**	**$ 8,016,101**	**$ 8,199,266**	**$ 8,381,327**	**$ 8,570,756**	**$ 8,771,077**	**$ 8,976,212**	**$ 9,189,715**	**$ 9,411,950**	**$ 9,643,301**

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Existing Debt Input

Existing Debt Service - Revenue Bonds	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
Revenue Bond 2004																				
Annual Interest Payment	$ 51,604	$ 35,726	$ 19,848	$ 3,970	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Principal Payment	396,950	396,950	396,950	396,950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Annual Payment	$ 448,554	$ 432,676	$ 416,798	$ 400,920	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Use of Debt reserve for Debt Service	-	-	-	400,920	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue Bond 2005																				
Annual Interest Payment	$ 63,280	$ 60,130	$ 56,568	$ 53,005	$ 49,255	$ 45,528	$ 41,513	$ 37,058	$ 32,400	$ 27,540	$ 22,478	$ 17,213	$ 11,745	$ 6,075	$ -	$ -	$ -	$ -	$ -	$ -
Annual Principal Payment	90,000	95,000	95,000	100,000	105,000	110,000	110,000	115,000	120,000	125,000	130,000	135,000	140,000	150,000	-	-	-	-	-	-
Total Annual Payment	$ 153,280	$ 155,130	$ 151,568	$ 153,005	$ 154,255	$ 155,528	$ 151,513	$ 152,058	$ 152,400	$ 152,540	$ 152,478	$ 152,213	$ 151,745	$ 156,075	$ -	$ -	$ -	$ -	$ -	$ -
Use of Debt reserve for Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	156,075	-	-	-	-	-	-
Revenue Bond 2008																				
Annual Interest Payment	$ 123,800	$ 118,400	$ 113,150	$ 105,900	$ 99,700	$ 93,300	$ 86,700	$ 79,688	$ 72,263	$ 64,631	$ 56,588	$ 48,338	$ 39,675	$ 30,600	$ 20,825	$ 10,625	$ -	$ -	$ -	$ -
Annual Principal Payment	135,000	140,000	145,000	155,000	160,000	165,000	170,000	180,000	185,000	195,000	200,000	210,000	220,000	230,000	240,000	250,000	-	-	-	-
Total Annual Payment	$ 258,800	$ 258,400	$ 258,150	$ 260,900	$ 259,700	$ 258,300	$ 256,700	$ 259,688	$ 257,263	$ 259,631	$ 256,588	$ 258,338	$ 259,675	$ 260,600	$ 260,825	$ 260,625	$ -	$ -	$ -	$ -
Use of Debt reserve for Debt Service	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	260,625	-	-	-	-
TOTAL REVENUE BONDS																				
Annual Interest Payment	$ 238,684	$ 214,256	$ 189,565	$ 162,875	$ 148,955	$ 138,828	$ 128,213	$ 116,745	$ 104,663	$ 92,171	$ 79,065	$ 65,550	$ 51,420	$ 36,675	$ 20,825	$ 10,625	$ -	$ -	$ -	$ -
Annual Principal Payment	621,950	631,950	636,950	651,950	265,000	275,000	280,000	295,000	305,000	320,000	330,000	345,000	360,000	380,000	240,000	250,000	-	-	-	-
Total Annual Payment	$ 860,634	$ 846,206	$ 826,515	$ 814,825	$ 413,955	$ 413,828	$ 408,213	$ 411,745	$ 409,663	$ 412,171	$ 409,065	$ 410,550	$ 411,420	$ 416,675	$ 260,825	$ 260,625	$ -	$ -	$ -	$ -
Use of Debt Reserve for Debt Service	-	-	-	400,920	-	-	-	-	-	-	-	-	-	156,075	-	260,625	-	-	-	-
Annual Debt Reserve Target on Existing Revenue Bonds	860,634	846,206	826,515	413,955	413,955	413,828	412,171	412,171	412,171	412,171	410,550	410,550	411,420	416,675	416,675	416,675	416,675	416,675	416,675	416,675

Existing Debt Service - Other Loans	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
DEQ 1992																				
Annual Interest Payment	$ 3,101	$ 3,142	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Principal Payment	50,788	104,383	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Annual Payment	$ 53,889	$ 107,525	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL OTHER LOANS																				
Annual Interest Payment	$ 3,101	$ 3,142	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Principal Payment	50,788	104,383	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Annual Payment	$ 53,889	$ 107,525	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Existing Debt Service - Total Loan Payments	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
TOTAL LOAN PAYMENTS																				
Annual Interest Payments	$ 241,784	$ 217,397	$ 189,565	$ 162,875	$ 148,955	$ 138,828	$ 128,213	$ 116,745	$ 104,663	$ 92,171	$ 79,065	$ 65,550	$ 51,420	$ 36,675	$ 20,825	$ 10,625	$ -	$ -	$ -	$ -
Annual Principal Payments	672,738	736,333	636,950	651,950	265,000	275,000	280,000	295,000	305,000	320,000	330,000	345,000	360,000	380,000	240,000	250,000	-	-	-	-
Total Annual Payments	$ 914,522	$ 953,731	$ 826,515	$ 814,825	$ 413,955	$ 413,828	$ 408,213	$ 411,745	$ 409,663	$ 412,171	$ 409,065	$ 410,550	$ 411,420	$ 416,675	$ 260,825	$ 260,625	$ -	$ -	$ -	$ -

City of Post Falls
Sewer Financial Plan and Cap Fee Update
Capital Improvement Program

Project Costs and O&M Impacts in Year:	FY 2013

TOTAL FORECASTED PROJECT COSTS IN CURRENT DOLLARS

No	Description	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	TOTAL CURRENT COSTS
1	**Capital From FY 2012/13 Budget**																					$ -
2	Pilot Filtration Plants	2,000,000																				2,000,000
3	Construction Costs	500,000																				500,000
4	Facility Plan per EPA permit	100,000					100,000					100,000					100,000					400,000
5																						-
6	**WWTP CIP from JUB - Alternative 3**																					-
7	Preliminary Treatment - Headworks			2,645,032																		2,645,032
8	Preliminary Treatment - Equalization Tank			7,528,168																		7,528,168
9	Secondary Treatment Improvements							3,730,000														3,730,000
10	Tertiary Treatment Pilot Study	-																				-
11	Tertiary Treatment			19,230,000																		19,230,000
12	Disinfection - Improvements to Existing UV					550,500																550,500
13	Outfall Imrovements - Phase I	1,620,000																				1,620,000
14	Outfall Imrovements - Phase II (Pipeline for I-90 Crossing)													280,000								280,000
15	Class C Reuse (Demonstration Project)	167,600																				167,600
16	Biosolids Treatment Improvements					9,971,800																9,971,800
17	Laboratory and Control Building Improvements		662,500																			662,500
18	Maintenance Shop											757,400										757,400
19	Utility Water Pump Station					743,400																743,400
20	Disinfection Improvements - Class A UV Upgrades										1,943,000											1,943,000
21	Phase 1 - Class A Seasonal Reuse, 3.2 MGD Capacity (incl. 314 acres new land)										17,800,000											17,800,000
22	Phase 2 - Expand Class A Seasonal Reuse, 5.2 MGD Capacity										10,090,000											10,090,000
23	**Collector CIP**																					-
24	3rd Ave Lift Station - 11	1,894,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,894,000
25	Idahline Lift Station - 2	-	-	2,394,082	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,394,082
26	Corbin Lift Station - 3	-	-	321,705	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	321,705
27	McGuire Lift Station - 5	-	-	314,223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314,223
28	Jacklin Lift Station - 1	-	-	-	410,709	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	410,709
29	Howell Lift Station - 20	-	-	-	-	-	1,152,152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,152,152
30	Montrose Lift Station - 27	-	-	-	-	-	-	755,632	-	-	-	-	-	-	-	-	-	-	-	-	-	755,632
31	Fisher Lift Station - 21	-	-	-	-	-	-	-	239,408	-	-	-	-	-	-	-	-	-	-	-	-	239,408
32	Ponderosa Lift Station - 14	-	-	-	-	-	-	-	389,038	-	-	-	-	-	-	-	-	-	-	-	-	389,038
33	Pioneer Ridge Lift Station - 6	-	-	-	-	-	-	-	-	29,926	-	-	-	-	-	-	-	-	-	-	-	29,926
34	Riverside Harbor Lift Station - 16	-	-	-	-	-	-	-	-	680,817	-	-	-	-	-	-	-	-	-	-	-	680,817
35	Prarie Falls II Lift Station - 18	-	-	-	-	-	-	-	-	29,926	-	-	-	-	-	-	-	-	-	-	-	29,926
36	Greyling Estates - 28	-	-	-	-	-	-	-	-	29,926	-	-	-	-	-	-	-	-	-	-	-	29,926
37	Beck Lift Station - 24	-	-	-	-	-	-	-	-	-	456,372	-	-	-	-	-	-	-	-	-	-	456,372
38	Oversizing	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	412,773
39	Lift Stations	94,938	94,938	94,938	58,820	58,820	58,820	58,820	58,820	184,716	184,716	184,716	184,716	184,716	184,716	184,716	184,716	184,716	184,716	184,716	184,716	2,795,504
40	Pipe Replacement	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	103,193	2,063,864
41	12th Ave Lift Station - 28																					-
42	SCADA																					-
43																						-
44																						-
45																						-
46																						-
	Total Capital Projects	**$ 6,500,370**	**$ 881,270**	**$ 32,651,980**	**$ 593,361**	**$ 11,448,352**	**$ 1,434,804**	**$ 4,668,284**	**$ 811,098**	**$ 1,079,143**	**$ 30,597,920**	**$ 1,165,948**	**$ 308,548**	**$ 588,548**	**$ 308,548**	**$ 308,548**	**$ 408,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 94,989,457**
	Total New Users Projects	4,148,913	365,033	19,605,667	431,348	6,233,959	1,172,791	4,506,271	543,808	791,234	20,830,226	778,039	20,639	300,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	59,873,035
	Total Existing Users Projects	2,351,457	516,236	13,046,313	162,013	5,214,393	262,013	162,013	267,290	287,909	9,767,693	387,909	287,909	287,909	287,909	287,909	387,909	287,909	287,909	287,909	287,909	35,116,422
	Total WWTP Capital Projects	**$ 4,387,600**	**$ 662,500**	**$ 29,403,200**	**$ -**	**$ 11,265,700**	**$ 100,000**	**$ 3,730,000**	**$ -**	**$ -**	**$ 29,833,000**	**$ 857,400**	**$ -**	**$ 280,000**	**$ -**	**$ -**	**$ 100,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 80,619,400**
	Total WWTP New Users Projects	2,746,807	344,394	16,555,018	-	6,213,320	-	3,730,000	-	-	20,353,216	757,400	-	280,000	-	-	-	-	-	-	-	50,980,155
	Total WWTP Existing Users Projects	1,640,793	318,106	12,848,182	-	5,052,380	100,000	-	-	-	9,479,784	100,000	-	-	-	-	100,000	-	-	-	-	29,639,245
	Total Collector Capital Projects	**$ 2,112,770**	**$ 218,770**	**$ 3,248,780**	**$ 593,361**	**$ 182,652**	**$ 1,334,804**	**$ 938,284**	**$ 811,098**	**$ 1,079,143**	**$ 764,920**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 308,548**	**$ 14,370,057**
	Total Collector New Users Projects	1,402,106	20,639	3,050,649	431,348	20,639	1,172,791	776,271	543,808	791,234	477,011	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	20,639	8,892,880
	Total Collector Existing Users Projects	710,664	198,131	198,131	162,013	162,013	162,013	162,013	267,290	287,909	287,909	287,909	287,909	287,909	287,909	287,909	287,909	287,909	287,909	287,909	287,909	5,477,177
	Projects by Grants / Developer Donations																					
	Projects by Enterprise Fund																					

City of Post Falls
Sewer Financial Plan and Cap Fee Update
Capital Improvement Program

Project Costs and O&M Impacts in Year:

No	Description	Useful Life (Years)	For Cap Fee Calculation: % New Users	% Existing Users	Collector/ Other Expense	WWTP Expense	Specific Funding Source 1-Enterprise Fund, 2-Grants & Developer Donations		New Users 2013$ Costs	Existing Users 2013$ Costs
1	**Capital From FY 2012/13 Budget**	50	0%	100%	0%	100%	1	Enterprise Fund	$ -	$ -
2	Pilot Filtration Plants	50	52%	48%	0%	100%	1	Enterprise Fund	1,039,681	960,319
3	Construction Costs	50	0%	100%	0%	100%	1	Enterprise Fund	-	500,000
4	Facility Plan per EPA permit	50	0%	100%	0%	100%	1	Enterprise Fund	-	400,000
5		50	0%	100%	0%	100%	1	Enterprise Fund	-	-
6	**WWTP CIP from JUB - Alternative 3**	50	0%	100%	0%	100%	1	Enterprise Fund	-	-
7	Preliminary Treatment - Headworks	50	100%	0%	0%	100%	1	Enterprise Fund	2,645,032	-
8	Preliminary Treatment - Equalization Tank	30	52%	48%	0%	100%	1	Enterprise Fund	3,913,448	3,614,720
9	Secondary Treatment Improvements	30	100%	0%	0%	100%	1	Enterprise Fund	3,730,000	-
10	Tertiary Treatment Pilot Study	5	52%	48%	0%	100%	1	Enterprise Fund	-	-
11	Tertiary Treatment	30	52%	48%	0%	100%	1	Enterprise Fund	9,996,537	9,233,463
12	Disinfection - Improvements to Existing UV	30	52%	48%	0%	100%	1	Enterprise Fund	286,172	264,328
13	Outfall Imrovements - Phase I	50	100%	0%	0%	100%	1	Enterprise Fund	1,620,000	-
14	Outfall Imrovements - Phase II (Pipeline for I-90 Crossing)	50	100%	0%	0%	100%	1	Enterprise Fund	280,000	-
15	Class C Reuse (Demonstration Project)	20	52%	48%	0%	100%	1	Enterprise Fund	87,125	80,475
16	Biosolids Treatment Improvements	50	52%	48%	0%	100%	1	Enterprise Fund	5,183,748	4,788,052
17	Laboratory and Control Building Improvements	40	52%	48%	0%	100%	1	Enterprise Fund	344,394	318,106
18	Maintenance Shop	40	100%	0%	0%	100%	1	Enterprise Fund	757,400	-
19	Utility Water Pump Station	30	100%	0%	0%	100%	1	Enterprise Fund	743,400	-
20	Disinfection Improvements - Class A UV Upgrades	30	52%	48%	0%	100%	1	Enterprise Fund	1,010,051	932,949
21	Phase 1 - Class A Seasonal Reuse, 3.2 MGD Capacity (incl. 314 acres new land)	50	52%	48%	0%	100%	1	Enterprise Fund	9,253,165	8,546,835
22	Phase 2 - Expand Class A Seasonal Reuse, 5.2 MGD Capacity	50	100%	0%	0%	100%	1	Enterprise Fund	10,090,000	-
23	**Collector CIP**	50	0%	100%	0%	100%	1	Enterprise Fund	-	-
24	3rd Ave Lift Station - 11	39	73%	27%	100%	0%	1	Enterprise Fund	1,381,467	512,533
25	Idahline Lift Station - 2	50	100%	0%	100%	0%	1	Enterprise Fund	2,394,082	-
26	Corbin Lift Station - 3	37	100%	0%	100%	0%	1	Enterprise Fund	321,705	-
27	McGuire Lift Station - 5	50	100%	0%	100%	0%	1	Enterprise Fund	314,223	-
28	Jacklin Lift Station - 1	50	100%	0%	100%	0%	1	Enterprise Fund	410,709	-
29	Howell Lift Station - 20	0	100%	0%	100%	0%	1	Enterprise Fund	1,152,152	-
30	Montrose Lift Station - 27	38	100%	0%	100%	0%	1	Enterprise Fund	755,632	-
31	Fisher Lift Station - 21	33	100%	0%	100%	0%	1	Enterprise Fund	239,408	-
32	Ponderosa Lift Station - 14	36	73%	27%	100%	0%	1	Enterprise Fund	283,761	105,277
33	Pioneer Ridge Lift Station - 6	0	100%	0%	100%	0%	1	Enterprise Fund	29,926	-
34	Riverside Harbor Lift Station - 16	43	100%	0%	100%	0%	1	Enterprise Fund	680,817	-
35	Prarie Falls II Lift Station - 18	0	100%	0%	100%	0%	1	Enterprise Fund	29,926	-
36	Greyling Estates - 28	0	100%	0%	100%	0%	1	Enterprise Fund	29,926	-
37	Beck Lift Station - 24	45	100%	0%	100%	0%	1	Enterprise Fund	456,372	-
38	Oversizing	90	100%	0%	100%	0%	1	Enterprise Fund	412,773	-
39	Lift Stations	50	0%	100%	100%	0%	1	Enterprise Fund	-	2,795,504
40	Pipe Replacement	90	0%	100%	100%	0%	1	Enterprise Fund	-	2,063,864
41	12th Ave Lift Station - 28	50	100%	0%	100%	0%	1	Enterprise Fund	-	-
42	SCADA	50	100%	0%	100%	0%	1	Enterprise Fund	-	-
43		50	0%	100%	0%	100%	1	Enterprise Fund	-	-
44		50	0%	100%	0%	100%	1	Enterprise Fund	-	-
45		50	0%	100%	0%	100%	1	Enterprise Fund	-	-
46		50	0%	100%	0%	100%	1	Enterprise Fund	-	-
	Total Capital Projects		**63%**	**37%**	**15%**	**85%**			**$ 59,873,035**	**$ 35,116,422**
	Total New Users Projects									
	Total Existing Users Projects									
	Total WWTP Capital Projects									
	Total WWTP New Users Projects									
	Total WWTP Existing Users Projects									
	Total Collector Capital Projects									
	Total Collector New Users Projects									
	Total Collector Existing Users Projects									
	Projects by Grants / Developer Donations									
	Projects by Enterprise Fund									

City of Post Falls
Sewer Financial Plan and Cap Fee Update
Capital Improvement Program

Project Costs and O&M Impacts in Year:

TOTAL FORECASTED PROJECT COSTS INFLATED TO YEAR OF CONSTRUCTION

No	Description	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	TOTAL ESCALATED COSTS
1	**Capital From FY 2012/13 Budget**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	Pilot Filtration Plants	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,000,000
3	Construction Costs	500,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500,000
4	Facility Plan per EPA permit	100,000	-	-	-	-	117,019	-	-	-	-	136,934	-	-	-	-	160,238	-	-	-	-	514,191
5		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	**WWTP CIP from JUB - Alternative 3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Preliminary Treatment - Headworks	-	-	2,816,651	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,816,651
8	Preliminary Treatment - Equalization Tank	-	-	8,016,622	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,016,622
9	Secondary Treatment Improvements	-	-	-	-	-	-	4,504,174	-	-	-	-	-	-	-	-	-	-	-	-	-	4,504,174
10	Tertiary Treatment Pilot Study	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Tertiary Treatment	-	-	20,477,710	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,477,710
12	Disinfection - Improvements to Existing UV	-	-	-	-	624,254	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	624,254
13	Outfall Imrovements - Phase I	1,620,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,620,000
14	Outfall Imrovements - Phase II (Pipeline for I-90 Crossing)	-	-	-	-	-	-	-	-	-	-	-	-	408,292	-	-	-	-	-	-	-	408,292
15	Class C Reuse (Demonstration Project)	167,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	167,600
16	Biosolids Treatment Improvements	-	-	-	-	11,307,790	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,307,790
17	Laboratory and Control Building Improvements	-	683,655	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	683,655
18	Maintenance Shop	-	-	-	-	-	-	-	-	-	-	1,037,136	-	-	-	-	-	-	-	-	-	1,037,136
19	Utility Water Pump Station	-	-	-	-	842,998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	842,998
20	Disinfection Improvements - Class A UV Upgrades	-	-	-	-	-	-	-	-	-	2,578,293	-	-	-	-	-	-	-	-	-	-	2,578,293
21	Phase 1 - Class A Seasonal Reuse, 3.2 MGD Capacity (incl. 314 acres new land)	-	-	-	-	-	-	-	-	-	23,619,975	-	-	-	-	-	-	-	-	-	-	23,619,975
22	Phase 2 - Expand Class A Seasonal Reuse, 5.2 MGD Capacity	-	-	-	-	-	-	-	-	-	13,389,076	-	-	-	-	-	-	-	-	-	-	13,389,076
23	**Collector CIP**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	3rd Ave Lift Station - 11	1,894,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,894,000
25	Idahline Lift Station - 2	-	-	2,549,418	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,549,418
26	Corbin Lift Station - 3	-	-	342,578	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	342,578
27	McGuire Lift Station - 5	-	-	334,611	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	334,611
28	Jacklin Lift Station - 1	-	-	-	451,323	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	451,323
29	Howell Lift Station - 20	-	-	-	-	-	1,348,233	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,348,233
30	Montrose Lift Station - 27	-	-	-	-	-	-	912,466	-	-	-	-	-	-	-	-	-	-	-	-	-	912,466
31	Fisher Lift Station - 21	-	-	-	-	-	-	-	298,330	-	-	-	-	-	-	-	-	-	-	-	-	298,330
32	Ponderosa Lift Station - 14	-	-	-	-	-	-	-	484,786	-	-	-	-	-	-	-	-	-	-	-	-	484,786
33	Pioneer Ridge Lift Station - 6	-	-	-	-	-	-	-	-	38,482	-	-	-	-	-	-	-	-	-	-	-	38,482
34	Riverside Harbor Lift Station - 16	-	-	-	-	-	-	-	-	875,465	-	-	-	-	-	-	-	-	-	-	-	875,465
35	Prarie Falls II Lift Station - 18	-	-	-	-	-	-	-	-	38,482	-	-	-	-	-	-	-	-	-	-	-	38,482
36	Greyling Estates - 28	-	-	-	-	-	-	-	-	38,482	-	-	-	-	-	-	-	-	-	-	-	38,482
37	Beck Lift Station - 24	-	-	-	-	-	-	-	-	-	605,589	-	-	-	-	-	-	-	-	-	-	605,589
38	Oversizing	20,639	21,298	21,978	22,680	23,404	24,151	24,922	25,718	26,539	27,387	28,261	29,164	30,095	31,056	32,048	33,071	34,127	35,217	36,341	37,502	565,596
39	Lift Stations	94,938	97,969	101,098	64,637	66,701	68,831	71,028	73,296	237,527	245,111	252,938	261,015	269,350	277,951	286,826	295,985	305,436	315,190	325,254	335,640	4,046,721
40	Pipe Replacement	103,193	106,488	109,889	113,398	117,019	120,755	124,611	128,590	132,696	136,934	141,306	145,818	150,475	155,280	160,238	165,355	170,635	176,084	181,706	187,508	2,827,979
41	12th Ave Lift Station - 28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	SCADA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total Capital Projects	$ 6,500,370	$ 909,410	$ 34,770,554	$ 652,037	$ 12,982,166	$ 1,678,989	$ 5,637,202	$ 1,010,720	$ 1,387,674	$ 40,602,364	$ 1,596,576	$ 435,997	$ 858,211	$ 464,286	$ 479,112	$ 654,649	$ 510,198	$ 526,490	$ 543,302	$ 560,650	$ 112,760,957
	Total New Users Projects	4,148,913	376,689	20,877,751	474,002	7,069,165	1,372,384	5,441,562	677,646	1,017,450	27,640,978	1,065,397	29,164	438,387	31,056	32,048	33,071	34,127	35,217	36,341	37,502	70,868,850
	Total Existing Users Projects	2,351,457	532,721	13,892,803	178,034	5,913,001	306,605	195,640	333,074	370,223	12,961,386	531,178	406,834	419,825	433,230	447,064	621,578	476,071	491,273	506,960	523,149	41,892,107
	Total WWTP Capital Projects	$ 4,387,600	$ 683,655	$ 31,310,982	$ -	$ 12,775,043	$ 117,019	$ 4,504,174	$ -	$ -	$ 39,587,343	$ 1,174,070	$ -	$ 408,292	$ -	$ -	$ 160,238	$ -	$ -	$ -	$ -	95,108,415
	Total WWTP New Users Projects	2,746,807	355,392	17,629,165	-	7,045,761	-	4,504,174	-	-	27,008,002	1,037,136	-	408,292	-	-	-	-	-	-	-	60,734,729
	Total WWTP Existing Users Projects	1,640,793	328,263	13,681,817	-	5,729,282	117,019	-	-	-	12,579,341	136,934	-	-	-	-	160,238	-	-	-	-	34,373,687
	Total Collector Capital Projects	$ 2,112,770	$ 225,755	$ 3,459,572	$ 652,037	$ 207,123	$ 1,561,970	$ 1,133,028	$ 1,010,720	$ 1,387,674	$ 1,015,021	$ 422,506	$ 435,997	$ 449,919	$ 464,286	$ 479,112	$ 494,411	$ 510,198	$ 526,490	$ 543,302	$ 560,650	17,652,541
	Total Collector New Users Projects	1,402,106	21,298	3,248,585	474,002	23,404	1,372,384	937,388	677,646	1,017,450	632,976	28,261	29,164	30,095	31,056	32,048	33,071	34,127	35,217	36,341	37,502	10,134,122
	Total Collector Existing Users Projects	710,664	204,458	210,986	178,034	183,719	189,586	195,640	333,074	370,223	382,045	394,245	406,834	419,825	433,230	447,064	461,340	476,071	491,273	506,960	523,149	7,518,420
	Projects by Grants / Developer Donations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Projects by Enterprise Fund	$ 6,500,370	$ 909,410	$ 34,770,554	$ 652,037	$ 12,982,166	$ 1,678,989	$ 5,637,202	$ 1,010,720	$ 1,387,674	$ 40,602,364	$ 1,596,576	$ 435,997	$ 858,211	$ 464,286	$ 479,112	$ 654,649	$ 510,198	$ 526,490	$ 543,302	$ 560,650	112,760,957

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Capital Funding Analysis

WWTP Expenditures	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032	2013 - 2032 TOTAL
WWTP Capital Projects																					
WWTP Improvement Upgrades & Expansions	$ 2,746,807	$ 355,392	$ 17,629,165	$ -	$ 7,045,761	$ -	$ 4,504,174	$ -	$ -	$ 27,008,002	$ 1,037,136	$ -	$ 408,292	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 60,734,729
WWTP Repairs and Replacements	1,640,793	328,263	13,681,817	-	5,729,282	117,019	-	-	-	12,579,341	136,934	-	-	-	-	160,238	-	-	-	-	34,373,687
Total WWTP Capital Expenditures	**$ 4,387,600**	**$ 683,655**	**$ 31,310,982**	**$ -**	**$ 12,775,043**	**$ 117,019**	**$ 4,504,174**	**$ -**	**$ -**	**$ 39,587,343**	**$ 1,174,070**	**$ -**	**$ 408,292**	**$ -**	**$ -**	**$ 160,238**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 95,108,415**
WWTP Upgrade & Expansion Funding Sources																					
Project Specific Grants/Developer Donations	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PWTF Loan Proceeds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WWTP Improvement Upgrades & Expansions	(2,746,807)	(355,392)	(17,629,165)	-	(7,045,761)	-	(4,504,174)	-	-	(27,008,002)	(1,037,136)	-	(408,292)	-	-	-	-	-	-	-	(60,734,729)
Funding Needed	(2,746,807)	(355,392)	(17,629,165)	-	(7,045,761)	-	(4,504,174)	-	-	(27,008,002)	(1,037,136)	-	(408,292)	-	-	-	-	-	-	-	
WWTP Capital Funding	1,720,831	355,392	682,623	-	1,191,119	-	1,351,770	-	-	2,265,800	808,123	-	408,292	-	-	-	-	-	-	-	8,783,951
WWTP Capital Fund Balance Deficiency	(1,025,976)	-	(16,946,542)	-	(5,854,642)	-	(3,152,403)	-	-	(24,742,202)	(229,013)	-	-	-	-	-	-	-	-	-	(51,950,778)
WWTP Repair & Replacement Funding Sources																					
Project Specific Grants/Developer Donations	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PWTF Loan Proceeds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WWTP Repairs and Replacements	(1,640,793)	(328,263)	(13,681,817)	-	(5,729,282)	(117,019)	-	-	-	(12,579,341)	(136,934)	-	-	-	-	(160,238)	-	-	-	-	(34,373,687)
WWTP Capital Fund Balance Deficiency	(1,025,976)	-	(16,946,542)	-	(5,854,642)	-	(3,152,403)	-	-	(24,742,202)	(229,013)	-	-	-	-	-	-	-	-	-	(51,950,778)
Funding Needed	(2,666,769)	(328,263)	(30,628,359)	-	(11,583,924)	(117,019)	(3,152,403)	-	-	(37,321,543)	(365,947)	-	-	-	-	(160,238)	-	-	-	-	(86,324,464)
Replacement Fund	2,666,769	328,263	12,693,285	-	2,878,377	117,019	3,152,403	-	-	8,302,073	365,947	-	-	-	-	160,238	-	-	-	-	30,664,374
Replacement Fund Balance Deficiency	-	-	(17,935,074)	-	(8,705,547)	-	-	-	-	(29,019,469)	-	-	-	-	-	-	-	-	-	-	(55,660,090)
Revenue Bond Proceeds	-	-	18,200,000	-	8,500,000	-	-	-	-	29,000,000	-	-	-	-	-	-	-	-	-	-	55,700,000

Collector Expenditures	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032	TOTAL
Collector Capital Projects																					
Collector Improvement Upgrades & Expansions	$ 1,402,106	$ 21,298	$ 3,248,585	$ 474,002	$ 23,404	$ 1,372,384	$ 937,388	$ 677,646	$ 1,017,450	$ 632,976	$ 28,261	$ 29,164	$ 30,095	$ 31,056	$ 32,048	$ 33,071	$ 34,127	$ 35,217	$ 36,341	$ 37,502	$ 10,134,122
Collector Repairs and Replacements	710,664	204,458	210,986	178,034	183,719	189,586	195,640	333,074	370,223	382,045	394,245	406,834	419,825	433,230	447,064	461,340	476,071	491,273	506,960	523,149	7,518,420
Total Collector Capital Expenditures	**$ 2,112,770**	**$ 225,755**	**$ 3,459,572**	**$ 652,037**	**$ 207,123**	**$ 1,561,970**	**$ 1,133,028**	**$ 1,010,720**	**$ 1,387,674**	**$ 1,015,021**	**$ 422,506**	**$ 435,997**	**$ 449,919**	**$ 464,286**	**$ 479,112**	**$ 494,411**	**$ 510,198**	**$ 526,490**	**$ 543,302**	**$ 560,650**	**$ 17,652,541**
Collector Upgrade & Expansion Funding Sources																					
Project Specific Grants/Developer Donations	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PWTF Loan Proceeds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Collector Improvement Upgrades & Expansions	(1,402,106)	(21,298)	(3,248,585)	(474,002)	(23,404)	(1,372,384)	(937,388)	(677,646)	(1,017,450)	(632,976)	(28,261)	(29,164)	(30,095)	(31,056)	(32,048)	(33,071)	(34,127)	(35,217)	(36,341)	(37,502)	(10,134,122)
Funding Needed	(1,402,106)	(21,298)	(3,248,585)	(474,002)	(23,404)	(1,372,384)	(937,388)	(677,646)	(1,017,450)	(632,976)	(28,261)	(29,164)	(30,095)	(31,056)	(32,048)	(33,071)	(34,127)	(35,217)	(36,341)	(37,502)	(10,134,122)
Collector Capital Funding	1,402,106	21,298	927,175	171,330	23,404	342,831	193,977	202,173	210,715	219,618	28,261	29,164	30,095	31,056	32,048	33,071	34,127	35,217	36,341	37,502	4,041,508
Collector Capital Fund Balance Deficiency	-	-	(2,321,411)	(302,672)	-	(1,029,553)	(743,411)	(475,473)	(806,735)	(413,358)	-	-	-	-	-	-	-	-	-	-	(6,092,613)
Collector Repair & Replacement Funding Sources																					
Project Specific Grants/Developer Donations	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PWTF Loan Proceeds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Collector Repairs and Replacements	(710,664)	(204,458)	(210,986)	(178,034)	(183,719)	(189,586)	(195,640)	(333,074)	(370,223)	(382,045)	(394,245)	(406,834)	(419,825)	(433,230)	(447,064)	(461,340)	(476,071)	(491,273)	(506,960)	(523,149)	(7,518,420)
Collector Capital Fund Balance Deficiency	-	-	(2,321,411)	(302,672)	-	(1,029,553)	(743,411)	(475,473)	(806,735)	(413,358)	-	-	-	-	-	-	-	-	-	-	(6,092,613)
Funding Needed	(710,664)	(204,458)	(2,532,397)	(480,707)	(183,719)	(1,219,139)	(939,051)	(808,547)	(1,176,958)	(795,403)	(394,245)	(406,834)	(419,825)	(433,230)	(447,064)	(461,340)	(476,071)	(491,273)	(506,960)	(523,149)	(13,611,033)
Replacement Fund	710,664	204,458	4,926	480,707	183,719	1,219,139	141,261	808,547	1,176,958	795,403	394,245	406,834	419,825	433,230	447,064	461,340	476,071	491,273	506,960	523,149	10,285,772
Replacement Fund Balance Deficiency	-	-	(2,527,471)	-	-	-	(797,790)	-	-	-	-	-	-	-	-	-	-	-	-	-	(3,325,261)
Revenue Bond Proceeds	-	-	2,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,000,000

Total Revenue Bond Proceeds	-	-	20,200,000	-	8,500,000	-	-	-	-	29,000,000	-	-	-	-	-	-	-	-	-	-	57,700,000

New Debt Computations	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032	TOTAL
REVENUE BONDS																					
Amount to Fund	$ -	$ -	$ 20,200,000	$ -	$ 8,500,000	$ -	$ -	$ -	$ -	$ 29,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 57,700,000
Issuance Costs	-	-	334,271	-	140,659	-	-	-	-	479,894	-	-	-	-	-	-	-	-	-	-	954,824
Reserve Required	-	-	1,750,477	-	736,587	-	-	-	-	2,513,062	-	-	-	-	-	-	-	-	-	-	5,000,126
Amount of Debt Issue	$ -	$ -	$ 22,284,749	$ -	$ 9,377,246	$ -	$ -	$ -	$ -	$ 31,992,956	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 63,654,950
OTHER LOANS																					
Amount to Fund	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Issuance Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amount of Debt Issue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
PWTF LOAN																					
Amount to Fund	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Debt Service Summary	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032	TOTAL
EXISTING DEBT SERVICE																					
Annual Interest Payments	$ 241,784	$ 217,397	$ 189,565	$ 162,875	$ 148,955	$ 138,828	$ 128,213	$ 116,745	$ 104,663	$ 92,171	$ 79,065	$ 65,550	$ 51,420	$ 36,675	$ 20,825	$ 10,625	$ -	$ -	$ -	$ -	$ 1,805,355
Annual Principal Payments	672,738	736,333	636,950	651,950	265,000	275,000	280,000	295,000	305,000	320,000	330,000	345,000	360,000	380,000	240,000	250,000	-	-	-	-	6,342,971
Total Debt Service Payments	$ 914,522	$ 953,731	$ 826,515	$ 814,825	$ 413,955	$ 413,828	$ 408,213	$ 411,745	$ 409,663	$ 412,171	$ 409,065	$ 410,550	$ 411,420	$ 416,675	$ 260,825	$ 260,625	$ -	$ -	$ -	$ -	$ 8,148,326
Revenue Bond Payments Only	860,634	846,206	826,515	814,825	413,955	413,828	408,213	411,745	409,663	412,171	409,065	410,550	411,420	416,675	260,825	260,625	-	-	-	-	7,986,912
NEW DEBT SERVICE																					
Annual Interest Payments	$ -	$ -	$ 1,058,526	$ 1,025,658	$ 1,436,648	$ 1,386,753	$ 1,334,489	$ 1,279,741	$ 1,222,393	$ 2,681,987	$ 2,571,875	$ 2,456,533	$ 2,335,713	$ 2,209,153	$ 2,076,582	$ 1,937,713	$ 1,792,249	$ 1,639,875	$ 1,480,263	$ 1,313,069	$ 31,239,220
Annual Principal Payments	-	-	691,952	724,820	1,050,416	1,100,311	1,152,576	1,207,323	1,264,671	2,318,139	2,428,251	2,543,593	2,664,413	2,790,973	2,923,544	3,062,413	3,207,877	3,360,251	3,519,863	3,687,057	39,698,444
Total Debt Service Payments	$ -	$ -	$ 1,750,477	$ 1,750,477	$ 2,487,064	$ 2,487,064	$ 2,487,064	$ 2,487,064	$ 2,487,064	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 5,000,126	$ 70,937,664
Revenue Bond Payments Only	-	-	1,750,477	1,750,477	2,487,064	2,487,064	2,487,064	2,487,064	2,487,064	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	70,937,664
TOTAL DEBT SERVICE PAYMENTS	**$ 914,522**	**$ 953,731**	**$ 2,576,992**	**$ 2,565,302**	**$ 2,901,019**	**$ 2,900,892**	**$ 2,895,277**	**$ 2,898,809**	**$ 2,896,727**	**$ 5,412,297**	**$ 5,409,191**	**$ 5,410,676**	**$ 5,411,546**	**$ 5,416,801**	**$ 5,260,951**	**$ 5,260,751**	**$ 5,000,126**	**$ 5,000,126**	**$ 5,000,126**	**$ 5,000,126**	**$ 79,085,990**
Total Interest Payments	241,784	217,397	1,248,091	1,188,532	1,585,603	1,525,581	1,462,701	1,396,486	1,327,056	2,774,158	2,650,940	2,522,083	2,387,133	2,245,828	2,097,407	1,948,338	1,792,249	1,639,875	1,480,263	1,313,069	33,044,575
Total Principal Payments	672,738	736,333	1,328,902	1,376,770	1,315,416	1,375,311	1,432,576	1,502,323	1,569,671	2,638,139	2,758,251	2,888,593	3,024,413	3,170,973	3,163,544	3,312,413	3,207,877	3,360,251	3,519,863	3,687,057	46,041,416
Total Revenue Bond Payments Only	860,634	846,206	2,576,992	2,565,302	2,901,019	2,900,892	2,895,277	2,898,809	2,896,727	5,412,297	5,409,191	5,410,676	5,411,546	5,416,801	5,260,951	5,260,751	5,000,126	5,000,126	5,000,126	5,000,126	78,924,576

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Revenue Requirements Analysis

Cash Flow Sufficiency Test	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
EXPENSES																				
Cash Operating Expenses	$ 2,770,801	$ 2,847,189	$ 2,933,397	$ 3,605,693	$ 3,695,681	$ 3,583,452	$ 3,674,566	$ 3,838,118	$ 3,936,794	$ 4,038,728	$ 4,257,409	$ 4,418,470	$ 4,586,075	$ 4,760,507	$ 4,942,064	$ 5,131,055	$ 5,327,806	$ 5,532,657	$ 5,745,965	$ 5,968,103
Existing Debt Service	914,522	953,731	826,515	413,905	413,955	413,828	408,213	411,745	409,663	412,171	409,065	410,550	411,420	260,600	260,825	-	-	-	-	-
New Debt Service	-	-	1,750,477	1,750,477	2,487,064	2,487,064	2,487,064	2,487,064	2,487,064	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126	5,000,126
Rate Funded System Reinvestment	1,376,007	1,300,000	1,300,000	1,300,000	2,300,000	2,300,000	2,300,000	2,300,000	2,300,000	2,800,000	2,800,000	2,800,000	3,200,000	3,620,820	3,628,693	3,640,022	3,648,406	3,657,057	3,665,985	3,675,198
Total Expenses	$ 5,061,330	$ 5,100,920	$ 6,810,390	$ 7,070,076	$ 8,896,700	$ 8,784,344	$ 8,869,843	$ 9,036,927	$ 9,133,521	$ 12,251,025	$ 12,466,600	$ 12,629,146	$ 13,197,621	$ 13,642,053	$ 13,831,708	$ 13,771,203	$ 13,976,338	$ 14,189,841	$ 14,412,076	$ 14,643,427
REVENUES																				
Rate Revenue	$ 4,814,700	$ 4,862,847	$ 4,911,475	$ 4,960,590	$ 5,010,196	$ 5,060,298	$ 5,110,901	$ 5,162,010	$ 5,213,630	$ 5,265,766	$ 5,318,424	$ 5,371,608	$ 5,425,324	$ 5,479,578	$ 5,534,373	$ 5,589,717	$ 5,645,614	$ 5,702,071	$ 5,759,091	$ 5,816,682
Capitalization Fees Towards Debt	50,034	50,836	49,097	49,753	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Non Rate Revenue	152,171	154,885	157,652	160,474	163,352	166,287	169,281	172,334	175,448	178,624	181,863	187,315	192,967	198,826	204,902	211,201	217,733	224,508	231,534	238,822
Total Revenue	$ 5,016,905	$ 5,068,568	$ 5,118,224	$ 5,170,817	$ 5,173,548	$ 5,226,585	$ 5,280,182	$ 5,334,344	$ 5,389,078	$ 5,444,390	$ 5,500,287	$ 5,558,924	$ 5,618,291	$ 5,678,404	$ 5,739,275	$ 5,800,918	$ 5,863,348	$ 5,926,579	$ 5,990,626	$ 6,055,504
NET CASH FLOW (DEFICIENCY)	**$ (44,426)**	**$ (32,352)**	**$ (1,692,166)**	**$ (1,899,259)**	**$ (3,723,152)**	**$ (3,557,758)**	**$ (3,589,661)**	**$ (3,702,583)**	**$ (3,744,443)**	**$ (6,806,635)**	**$ (6,966,312)**	**$ (7,070,223)**	**$ (7,579,330)**	**$ (7,963,649)**	**$ (8,092,432)**	**$ (7,970,285)**	**$ (8,112,990)**	**$ (8,263,262)**	**$ (8,421,451)**	**$ (8,587,923)**
% of Rate Revenue	0.92%	0.67%	34.45%	38.29%	74.31%	70.31%	70.24%	71.73%	71.82%	129.26%	130.98%	131.62%	139.70%	145.33%	146.22%	142.59%	143.70%	144.92%	146.23%	147.64%

Coverage Sufficiency Test	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
EXPENSES																				
Cash Operating Expenses	$ 2,770,801	$ 2,847,189	$ 2,933,397	$ 3,605,693	$ 3,695,681	$ 3,583,452	$ 3,674,566	$ 3,838,118	$ 3,936,794	$ 4,038,728	$ 4,257,409	$ 4,418,470	$ 4,586,075	$ 4,760,507	$ 4,942,064	$ 5,131,055	$ 5,327,806	$ 5,532,657	$ 5,745,965	$ 5,968,103
Revenue Bond Debt Service	860,634	846,206	2,576,992	2,565,302	2,901,019	2,900,892	2,895,277	2,898,809	2,896,727	5,412,297	5,409,191	5,410,676	5,411,546	5,416,801	5,260,951	5,260,751	5,000,126	5,000,126	5,000,126	5,000,126
Revenue Bond Coverage Requirement at 1.5	430,317	423,103	1,288,496	1,282,651	1,450,510	1,450,446	1,447,638	1,449,405	1,448,363	2,706,149	2,704,596	2,705,338	2,705,773	2,708,401	2,630,476	2,630,376	2,500,063	2,500,063	2,500,063	2,500,063
Total Expenses	$ 4,061,751	$ 4,116,498	$ 6,798,886	$ 7,453,646	$ 8,047,210	$ 7,934,790	$ 8,017,481	$ 8,186,332	$ 8,281,884	$ 12,157,174	$ 12,371,195	$ 12,534,484	$ 12,703,394	$ 12,885,709	$ 12,833,490	$ 13,022,181	$ 12,827,995	$ 13,032,846	$ 13,246,154	$ 13,468,292
ALLOWABLE REVENUES																				
Rate Revenue	$ 4,814,700	$ 4,862,847	$ 4,911,475	$ 4,960,590	$ 5,010,196	$ 5,060,298	$ 5,110,901	$ 5,162,010	$ 5,213,630	$ 5,265,766	$ 5,318,424	$ 5,371,608	$ 5,425,324	$ 5,479,578	$ 5,534,373	$ 5,589,717	$ 5,645,614	$ 5,702,071	$ 5,759,091	$ 5,816,682
Other Revenue	152,171	154,885	157,652	160,474	163,352	166,287	169,281	172,334	175,448	178,624	181,863	187,315	192,967	198,826	204,902	211,201	217,733	224,508	231,534	238,822
Interest Earnings - All Funds	172,500	15,723	29,181	26,630	58,312	53,359	87,792	79,243	91,540	104,224	118,535	123,839	144,734	157,601	175,160	196,070	214,162	237,245	261,519	287,039
Total Revenue	$ 5,139,371	$ 5,033,455	$ 5,098,308	$ 5,147,694	$ 5,231,860	$ 5,279,944	$ 5,367,974	$ 5,413,587	$ 5,480,618	$ 5,548,614	$ 5,618,823	$ 5,682,762	$ 5,763,025	$ 5,836,005	$ 5,914,435	$ 5,996,988	$ 6,077,509	$ 6,163,823	$ 6,252,145	$ 6,342,543
Coverage Realized	2.75	2.58	0.84	0.60	0.53	0.58	0.58	0.54	0.53	0.28	0.25	0.23	0.22	0.20	0.18	0.16	0.15	0.13	0.10	0.07
COVERAGE SURPLUS (DEFICIENCY)	**$ 1,077,620**	**$ 916,957**	**$ (1,700,578)**	**$ (2,305,952)**	**$ (2,815,350)**	**$ (2,654,846)**	**$ (2,649,507)**	**$ (2,772,745)**	**$ (2,801,267)**	**$ (6,608,560)**	**$ (6,752,373)**	**$ (6,851,722)**	**$ (6,940,369)**	**$ (7,049,704)**	**$ (6,919,055)**	**$ (7,025,193)**	**$ (6,750,485)**	**$ (6,869,023)**	**$ (6,994,010)**	**$ (7,125,749)**

Maximum Revenue Deficiency	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
Sufficiency Test Driving the Deficiency	*Cash*	*Cash*	*Coverage*	*Coverage*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*	*Cash*
Maximum Deficiency From Tests	$ 44,426	$ 32,352	$ 1,700,578	$ 2,305,952	$ 3,723,152	$ 3,557,758	$ 3,589,661	$ 3,702,583	$ 3,744,443	$ 6,806,635	$ 6,966,312	$ 7,070,223	$ 7,579,330	$ 7,963,649	$ 8,092,432	$ 7,970,285	$ 8,112,990	$ 8,263,262	$ 8,421,451	$ 8,587,923
less: Net Revenue From Prior Rate Increases	-	(121,571)	(852,755)	(1,705,454)	(2,395,779)	(3,092,940)	(3,700,303)	(4,360,258)	(5,077,085)	(5,855,410)	(6,700,231)	(7,070,705)	(7,455,580)	(7,855,379)	(8,270,640)	(8,701,923)	(9,149,806)	(9,614,889)	(10,097,791)	(10,599,155)
Total Revenue Deficiency	$ 44,426	$ -	$ 847,823	$ 600,498	$ 1,327,373	$ 464,818	$ -	$ -	$ -	$ 951,225	$ 266,081	$ -	$ 123,750	$ 108,271	$ -	$ -	$ -	$ -	$ -	$ -

Rate Increases	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
Rate Revenue with no Increase	$ 4,814,700	$ 4,862,847	$ 4,911,475	$ 4,960,590	$ 5,010,196	$ 5,060,298	$ 5,110,901	$ 5,162,010	$ 5,213,630	$ 5,265,766	$ 5,318,424	$ 5,371,608	$ 5,425,324	$ 5,479,578	$ 5,534,373	$ 5,589,717	$ 5,645,614	$ 5,702,071	$ 5,759,091	$ 5,816,682
Revenues from Prior Rate Increases	-	121,571	852,755	1,705,454	2,395,779	3,092,940	3,700,303	4,360,258	5,077,085	5,855,410	6,700,231	7,070,705	7,455,580	7,855,379	8,270,640	8,701,923	9,149,806	9,614,889	10,097,791	10,599,155
Rate Revenue Before Rate Increase (Incl. previous increases)	4,814,700	4,984,418	5,764,230	6,666,044	7,405,975	8,153,238	8,811,204	9,522,269	10,290,716	11,121,176	12,018,655	12,442,313	12,880,904	13,334,956	13,805,014	14,291,640	14,795,421	15,316,959	15,856,882	16,415,837
Required Annual Rate Increase	0.92%	0.00%	14.71%	9.01%	17.92%	5.70%	0.00%	0.00%	0.00%	8.55%	2.21%	0.00%	0.96%	0.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of Months New Rates Will Be In Effect	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Info: Percentage Increase to Generate Required Revenue	*0.92%*	*0.00%*	*14.71%*	*9.01%*	*17.92%*	*5.70%*	*0.00%*	*0.00%*	*0.00%*	*8.55%*	*2.21%*	*0.00%*	*0.96%*	*0.81%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*
Policy Induced Rate Increases	2.50%	14.50%	14.50%	10.00%	9.00%	7.00%	7.00%	7.00%	7.00%	7.00%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
ANNUAL RATE INCREASE	**2.50%**	**14.50%**	**14.50%**	**10.00%**	**9.00%**	**7.00%**	**7.00%**	**7.00%**	**7.00%**	**7.00%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**	**2.50%**
CUMULATIVE RATE INCREASE	**2.50%**	**17.36%**	**34.38%**	**47.82%**	**61.12%**	**72.40%**	**84.47%**	**97.38%**	**111.20%**	**125.98%**	**131.63%**	**137.42%**	**143.36%**	**149.44%**	**155.68%**	**162.07%**	**168.62%**	**175.34%**	**182.22%**	**189.28%**

Impacts of Rate Increases	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
Rate Revenues After Rate Increase	$ 4,935,068	$ 5,707,159	$ 6,600,044	$ 7,332,649	$ 8,072,513	$ 8,723,965	$ 9,427,989	$ 10,188,827	$ 11,011,066	$ 11,899,659	$ 12,319,122	$ 12,753,371	$ 13,202,927	$ 13,668,330	$ 14,150,139	$ 14,648,931	$ 15,165,306	$ 15,699,883	$ 16,253,304	$ 16,826,233
Full Year Rate Revenues After Rate Increase	*4,935,068*	*5,707,159*	*6,600,044*	*7,332,649*	*8,072,513*	*8,723,965*	*9,427,989*	*10,188,827*	*11,011,066*	*11,899,659*	*12,319,122*	*12,753,371*	*13,202,927*	*13,668,330*	*14,150,139*	*14,648,931*	*15,165,306*	*15,699,883*	*16,253,304*	*16,826,233*
Net Cash Flow After Rate Increase	75,942	811,960	(3,597)	472,800	(660,835)	105,908	727,427	1,324,234	2,052,993	(172,743)	34,385	311,540	198,273	225,103	523,333	1,088,929	1,406,702	1,734,551	2,072,762	2,421,628
Coverage After Rate Increase	2.89	3.58	1.50	1.53	1.59	1.85	2.08	2.28	2.53	1.50	1.55	1.60	1.65	1.71	1.82	1.89	2.05	2.13	2.20	2.28

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Fund Activity

Funds	FY 2012 / 2013	FY 2013 / 2014	FY 2014 / 2015	FY 2015 / 2016	FY 2016 / 2017	FY 2017 / 2018	FY 2018 / 2019	FY 2019 / 2020	FY 2020 / 2021	FY 2021 / 2022	FY 2022 / 2023	FY 2023 / 2024	FY 2024 / 2025	FY 2025 / 2026	FY 2026 / 2027	FY 2027 / 2028	FY 2028 / 2029	FY 2029 / 2030	FY 2030 / 2031	FY 2031 / 2032
650 OPERATING FUND - Wastewater Operating																				
Beginning Balance Wastewater Operating	$ 7,935,959	$ 3,036,494	$ 2,808,187	$ 1,446,607	$ 1,778,150	$ 911,264	$ 883,591	$ 906,057	$ 946,385	$ 970,716	$ 812,534	$ 859,108	$ 1,089,486	$ 1,130,813	$ 1,173,824	$ 1,218,591	$ 1,265,192	$ 1,313,706	$ 1,364,217	$ 1,416,813
plus: Net Cash Flow after Rate Increase	75,942	811,960	(3,597)	472,800	(660,835)	105,908	727,427	1,324,234	2,052,993	(172,743)	34,385	311,540	198,273	225,103	523,333	1,088,929	1,406,702	1,734,551	2,072,762	2,421,628
plus: Investment Earnings & Designated Investment Income	169,755	8,274	14,041	7,233	17,782	9,113	13,254	13,591	14,196	14,561	12,188	12,887	16,342	16,962	17,607	18,279	18,978	19,706	20,463	21,252
less: Transfer to Sewer Replacement Operating Fund	(5,145,162)	(1,048,542)	(1,372,023)	(148,490)	(223,833)	(142,694)	(718,214)	(1,297,497)	(2,042,857)	-	-	(94,048)	(173,288)	(199,055)	(496,173)	(1,060,608)	(1,377,166)	(1,703,745)	(2,040,629)	(2,388,107)
Ending Balance	**$ 3,036,494**	**$ 2,808,187**	**$ 1,446,607**	**$ 1,778,150**	**$ 911,264**	**$ 883,591**	**$ 906,057**	**$ 946,385**	**$ 970,716**	**$ 812,534**	**$ 859,108**	**$ 1,089,486**	**$ 1,130,813**	**$ 1,173,824**	**$ 1,218,591**	**$ 1,265,192**	**$ 1,313,706**	**$ 1,364,217**	**$ 1,416,813**	**$ 1,471,587**
Minimum Target Balance - Operating	*417,518*	*429,029*	*442,019*	*543,324*	*556,883*	*539,972*	*553,702*	*578,347*	*593,216*	*608,575*	*641,527*	*665,797*	*691,052*	*717,337*	*744,695*	*773,173*	*802,820*	*833,688*	*865,830*	*899,303*
Maximum Target Balance - Operating	*3,036,494*	*2,808,187*	*1,446,607*	*1,778,150*	*911,264*	*883,591*	*906,057*	*946,385*	*970,716*	*995,851*	*1,049,772*	*1,089,486*	*1,130,813*	*1,173,824*	*1,218,591*	*1,265,192*	*1,313,706*	*1,364,217*	*1,416,813*	*1,471,587*
Info: No. of Days of Cash Operating Expenses	*400*	*360*	*180*	*180*	*90*	*90*	*90*	*90*	*90*	*73*	*74*	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*	*90*
650 OPERATING FUND - Sewer Replacement																				
Beginning Balance Sewer Replacement	$ 5,557,992	$ 8,701,728	$ 10,541,262	$ 305,235	$ 1,274,544	$ 543,479	$ 1,655,450	$ 607,042	$ 3,405,097	$ 6,622,073	$ 404,458	$ 2,450,334	$ 4,974,304	$ 8,002,381	$ 11,509,061	$ 15,359,499	$ 19,668,943	$ 24,513,477	$ 29,750,708	$ 35,396,622
plus: Transfer from Wastewater Operating	5,145,162	1,048,542	1,372,023	148,490	223,833	142,694	718,214	1,297,497	2,042,857	-	-	94,048	173,288	199,055	496,173	1,060,608	1,377,166	1,703,745	2,040,629	2,388,107
plus: Investment Earnings	-	23,712	52,706	1,526	12,745	5,435	24,832	9,106	51,076	99,331	6,067	36,755	74,615	120,036	172,636	230,392	295,034	367,702	446,261	530,949
plus: Grants/ Donations/ Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
plus: Net Debt Proceeds Available for Projects	-	-	20,200,000	-	8,500,000	-	-	-	-	29,000,000	-	-	-	-	-	-	-	-	-	-
plus: Rate Funded System Reinvestment - WWTP	825,604	780,000	780,000	780,000	1,380,000	1,380,000	1,380,000	1,380,000	1,380,000	1,680,000	1,680,000	1,680,000	1,920,000	2,172,492	2,177,216	2,184,013	2,189,043	2,194,234	2,199,591	2,205,119
plus: Rate Funded System Reinvestment - Collector	550,403	520,000	520,000	520,000	920,000	920,000	920,000	920,000	920,000	1,120,000	1,120,000	1,120,000	1,280,000	1,448,328	1,451,477	1,456,009	1,459,362	1,462,823	1,466,394	1,470,079
Total Wastewater Replacement Sources	**$12,079,161**	**$11,073,983**	**$33,465,991**	**$ 1,755,251**	**$12,311,122**	**$ 2,991,608**	**$ 4,698,496**	**$ 4,213,644**	**$ 7,799,031**	**$38,521,404**	**$ 3,210,525**	**$ 5,381,137**	**$ 8,422,206**	**$11,942,292**	**$15,806,563**	**$20,290,521**	**$24,989,549**	**$30,241,982**	**$35,903,583**	**$41,990,876**
less: Capital Expenditures	(3,377,432)	(532,721)	(33,160,756)	(480,707)	(11,767,643)	(1,336,158)	(4,091,454)	(808,547)	(1,176,958)	(38,116,946)	(760,191)	(406,834)	(419,825)	(433,230)	(447,064)	(621,578)	(476,071)	(491,273)	(506,960)	(523,149)
Ending Balance [a]	**$ 8,701,728**	**$10,541,262**	**$ 305,235**	**$ 1,274,544**	**$ 543,479**	**$ 1,655,450**	**$ 607,042**	**$ 3,405,097**	**$ 6,622,073**	**$ 404,458**	**$ 2,450,334**	**$ 4,974,304**	**$ 8,002,381**	**$11,509,061**	**$15,359,499**	**$19,668,943**	**$24,513,477**	**$29,750,708**	**$35,396,622**	**$41,467,728**
Minimum Target Balance - Replacement	-	-	*275,971*	*279,356*	*402,874*	*413,297*	*460,024*	*460,341*	*464,281*	*860,219*	*865,947*	*859,916*	*857,952*	*851,890*	*845,816*	*841,334*	*835,242*	*829,145*	*823,046*	*816,947*
651 CAPITAL FUND - WWTP																				
Beginning Balance	$ 945,365	$ -	$ 150,606	$ -	$ 555,129	$ -	$ 657,076	$ -	$ 713,773	$ 1,468,411	$ -	$ -	$ 842,267	$ 1,324,464	$ 2,259,276	$ 3,246,767	$ 4,289,362	$ 5,389,589	$ 6,550,086	$ 7,773,608
plus: Sewer Cap Fees	825,000	556,834	580,361	604,882	630,439	657,076	684,838	713,773	743,931	775,363	808,123	842,267	877,854	914,945	953,602	993,893	1,035,886	1,079,654	1,125,271	1,172,815
plus: Investment Earnings	500	-	753	-	5,551	-	9,856	-	10,707	22,026	-	-	12,634	19,867	33,889	48,702	64,340	80,844	98,251	116,604
less: Capitalization Fees Towards Debt	(50,034)	(50,836)	(49,097)	(49,753)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
plus: Grants/ Donations/ Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
less: Capital Expenditures	(1,720,831)	(355,392)	(682,623)	-	(1,191,119)	-	(1,351,770)	-	-	(2,265,800)	(808,123)	-	(408,292)	-	-	-	-	-	-	-
Ending Balance	**$ -**	**$ 150,606**	**$ -**	**$ 555,129**	**$ -**	**$ 657,076**	**$ -**	**$ 713,773**	**$ 1,468,411**	**$ -**	**$ -**	**$ 842,267**	**$ 1,324,464**	**$ 2,259,276**	**$ 3,246,767**	**$ 4,289,362**	**$ 5,389,589**	**$ 6,550,086**	**$ 7,773,608**	**$ 9,063,027**
652 CAPITAL FUND - Collector																				
Beginning Balance	$ 1,771,986	620,880	758,995	-	-	155,165	-	-	-	-	-	200,636	413,050	637,800	875,465	1,126,653	1,391,997	1,672,161	1,967,834	2,279,738
plus: Sewer Cap Fees - Enterprise	250,000	157,721	164,385	171,330	178,569	186,114	193,977	202,173	210,715	219,618	228,897	238,569	248,648	259,154	270,104	281,516	293,410	305,807	318,728	332,195
plus: Investment Earnings	1,000	1,692	3,795	-	-	1,552	-	-	-	-	-	3,010	6,196	9,567	13,132	16,900	20,880	25,082	29,518	34,196
less: Capitalization Fees Towards Debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
plus: Grants/ Donations/ Loans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
less: Capital Expenditures	(1,402,106)	(21,298)	(927,175)	(171,330)	(23,404)	(342,831)	(193,977)	(202,173)	(210,715)	(219,618)	(28,261)	(29,164)	(30,095)	(31,056)	(32,048)	(33,071)	(34,127)	(35,217)	(36,341)	(37,502)
Ending Balance [a]	**$ 620,880**	**$ 758,995**	**$ -**	**$ -**	**$ 155,165**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 200,636**	**$ 413,050**	**$ 637,800**	**$ 875,465**	**$ 1,126,653**	**$ 1,391,997**	**$ 1,672,161**	**$ 1,967,834**	**$ 2,279,738**	**$ 2,608,627**
653 OPERATING FUND - Wastewater Stormwater																				
Beginning Balance	$ 581,579	582,579	584,166	587,087	590,023	595,923	601,882	610,910	620,074	629,375	638,816	648,398	658,124	667,996	678,016	688,186	698,509	708,987	719,621	730,416
plus: Investment Earnings	1,000	1,588	2,921	2,935	5,900	5,959	9,028	9,164	9,301	9,441	9,582	9,726	9,872	10,020	10,170	10,323	10,478	10,635	10,794	10,956
Ending Balance	**$ 582,579**	**$ 584,166**	**$ 587,087**	**$ 590,023**	**$ 595,923**	**$ 601,882**	**$ 610,910**	**$ 620,074**	**$ 629,375**	**$ 638,816**	**$ 648,398**	**$ 658,124**	**$ 667,996**	**$ 678,016**	**$ 688,186**	**$ 698,509**	**$ 708,987**	**$ 719,621**	**$ 730,416**	**$ 741,372**
650 RESERVE FUND - Contingency																				
Beginning Balance	$ 622,274	622,400	624,096	627,217	630,353	636,656	643,023	652,668	662,458	672,395	682,481	692,718	703,109	713,655	724,360	735,226	746,254	757,448	768,810	780,342
plus: Investment Earnings	126	1,696	3,120	3,136	6,304	6,367	9,645	9,790	9,937	10,086	10,237	10,391	10,547	10,705	10,865	11,028	11,194	11,362	11,532	11,705
Ending Balance	**$ 622,400**	**$ 624,096**	**$ 627,217**	**$ 630,353**	**$ 636,656**	**$ 643,023**	**$ 652,668**	**$ 662,458**	**$ 672,395**	**$ 682,481**	**$ 692,718**	**$ 703,109**	**$ 713,655**	**$ 724,360**	**$ 735,226**	**$ 746,254**	**$ 757,448**	**$ 768,810**	**$ 780,342**	**$ 792,047**
650 RESERVE FUND - Bonds																				
Beginning Balance	$ 907,481	907,600	910,073	2,665,101	2,277,507	3,036,869	3,067,238	3,113,246	3,159,945	3,207,344	5,768,516	5,855,044	5,942,869	6,032,012	5,966,418	6,055,914	5,886,128	5,974,420	6,064,036	6,154,996
plus: Investment Earnings	119	2,473	4,550	13,326	22,775	30,369	46,009	46,699	47,399	48,110	86,528	87,826	89,143	90,480	89,496	90,839	88,292	89,616	90,961	92,325
plus: Reserve Funding from New Debt	-	-	1,750,477	-	736,587	-	-	-	-	2,513,062	-	-	-	-	-	-	-	-	-	-
less: Use of Reserves for Debt Service	-	-	-	(400,920)	-	-	-	-	-	-	-	-	-	(156,075)	-	(260,625)	-	-	-	-
Ending Balance	**$ 907,600**	**$ 910,073**	**$ 2,665,101**	**$ 2,277,507**	**$ 3,036,869**	**$ 3,067,238**	**$ 3,113,246**	**$ 3,159,945**	**$ 3,207,344**	**$ 5,768,516**	**$ 5,855,044**	**$ 5,942,869**	**$ 6,032,012**	**$ 5,966,418**	**$ 6,055,914**	**$ 5,886,128**	**$ 5,974,420**	**$ 6,064,036**	**$ 6,154,996**	**$ 6,247,321**
Minimum Target Balance - Debt Service	*860,634*	*846,206*	*2,576,992*	*2,164,432*	*2,901,019*	*2,900,892*	*2,899,236*	*2,899,236*	*2,899,236*	*5,412,297*	*5,410,676*	*5,410,676*	*5,411,546*	*5,416,801*	*5,416,801*	*5,416,801*	*5,416,801*	*5,416,801*	*5,416,801*	*5,416,801*

[a] These funds will be needed for collector capital projects that are planned for over $10 million in 2033 and 2034

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Total Capitalization Fee - Post Falls

Capitalization Fee - FY 2012/13

Existing System	Treatment	Collection	Pumping	General
Plant Replacement Cost [a]	$ 52,306,976	$ 38,371,085	$ 7,110,593	$ 3,288,683
plus: Construction work in progress	15,690,388	-	-	-
less: Contributed Assets	(4,653,802)	(17,375,976)	-	(190,575)
less: Outstanding debt principal [b]	(4,249,578)	(1,408,515)	(477,034)	(207,845)
less: Depreciation	(23,624,375)	(12,969,237)	(3,722,570)	(591,250)
EXISTING SYSTEM COSTS	$ 35,469,609	$ 6,617,358	$ 2,910,990	$ 2,299,014
plus: General Costs Split Proportionately	1,812,196	338,091	148,727	$ (2,299,014)
less: Existing Capacity [c]	(22,140,380)	(3,411,032)	(1,500,520)	-
TOTAL EXISTING SYSTEM AVAILABLE CAPACITY COSTS	**$ 15,141,426**	**$ 3,544,417**	**$ 1,559,196**	**$ -**

Future System	Treatment	Collection	Pumping	General
Total Capital Improvement Program [d]	$ 80,619,400	$ -	$ 18,686,886	$ -
less: Exisiting Needs	(29,639,245)	-	(5,477,177)	-
TOTAL FUTURE SYSTEM CAPACITY COSTS	**$ 50,980,155**	**$ -**	**$ 13,209,709**	**$ -**

Customer Base	Treatment	Collection	Pumping	General
Buildout Units [e]	31,633	46,351	46,351	-
Existing Connected Capacity [f]	(15,189)	(12,543)	(12,543)	-
FUTURE AVAILABLE CAPACITY	**16,444**	**33,808**	**33,808**	**-**

Capitalization Fee	Treatment	Collection	Pumping	General
Existing System Costs	$ 15,141,426	$ 3,544,417	$ 1,559,196	$ -
Future System Costs	50,980,155	-	13,209,709	-
Total Cost Basis	$ 66,121,580	$ 3,544,417	$ 14,768,905	$ -
Allocable Customer Base	16,444	33,808	33,808	-
Total Capitalization Fee per Capacity Unit by Function	$ 4,021	$ 105	$ 437	$ -
TOTAL CAPITALIZATION FEE				**$ 4,563**

Existing Capacity Fee	*$*	*4,659*
Difference	*$*	*(97)*
Rathdrum (Treatment)	$	4,021
Existing Capacity Fee	$	3,036
Difference	*$*	*985*

[a] Plant replacement cost equals total plant-in-service plus contributed assets inflated to current dollars with ENR CCI
[b] Total existing debt principal outstanding split proportionately between functions based on assets and adjustments
[c] Exisitng capacity is the proportion of the exisitng system that is used by currently connected SUs; based on all customers for treatment related costs (62.4%) and only Post Falls customers for collection and pumping related costs (51.5%)
[d] Total capital costs in current dollars include all projects required to meet future needs
[e] Assumes treatment and general functions are sized to 5.2 MGD capacity; collection and pumping sized to 7.62 MGD capacity. The system capacity is shown in Service Units (SUs) and is calculated based on the definition of 5,000 gallons per month per SU, which equates to 164.38 gallons per day (gpd)
[f] Does not include Rathdrum connections in Collection and Pumping

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Total Capital Improvement Program Costs in Current Dollars

Annual CIP	Treatment	Collection	Pumping	General	Total
2013	$ 4,387,600	$ -	$ 2,112,770	$ -	$ 6,500,370
2014	662,500	-	218,770	-	881,270
2015	29,403,200	-	3,248,780	-	32,651,980
2016	-	-	593,361	-	593,361
2017	11,265,700	-	182,652	-	11,448,352
2018	100,000	-	1,334,804	-	1,434,804
2019	3,730,000	-	938,284	-	4,668,284
2020	-	-	811,098	-	811,098
2021	-	-	1,079,143	-	1,079,143
2022	29,833,000	-	764,920	-	30,597,920
2023	857,400	-	308,548	-	1,165,948
2024	-	-	308,548	-	308,548
2025	280,000	-	308,548	-	588,548
2026	-	-	308,548	-	308,548
2027	-	-	308,548	-	308,548
2028	100,000	-	308,548	-	408,548
2029	-	-	308,548	-	308,548
2030	-	-	308,548	-	308,548
2031	-	-	308,548	-	308,548
2032	-	-	308,548	-	308,548
2033	-	-	3,568,679	-	3,568,679
2034	-	-	748,151	-	748,151
Total	**$ 80,619,400**	**$ -**	**$ 18,686,886**	**$ -**	**$ 99,306,286**

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Plant-In-Service

FY 2012/2013

Plant-In-Service	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012
							9,369
Land							
Sewer Plant	1985	L	Y	t	$ 154,000	4,195	$ 343,925
Lift Station - Ponderosa	1985	L	N	g	12,729	4,195	28,427
Rodkey & Greenferry - Sundance Meadows	1985	L	N	g	10,500	4,195	23,449
EASEMENTS	1990	L	N	g	8,257	4,732	16,348
S. Seltice W. Griffin Way	1994	L	N	g	800,000	5,408	1,385,997
Sewer Plant - Schneidmiller	1995	L	N	g	500,175	5,471	856,481
Easements	1989	L	N	g	8,257	4,615	16,762
Schneidmiller Escrow	1997	L	Y	t	251,259	5,825	404,106
Portion of S-4, Boise Meridian	1997	L	Y	t	531,432	5,825	854,715
3rd Ave Property - Fords Addition to Post Falls	2001	L	N	g	31,965	6,342	47,219
Satchwell Property	2004	L	Y	t	4,708,347	7,115	6,199,751
Satchwell Property	2004	L	Y	t	2,092,849	7,115	2,755,774
11040 W Hayden	2007	L	Y	t	271,473	7,967	319,235
Mazda Property	2008	L	Y	t	3,012,133	8,310	3,395,860
Buildings/Plant							
Instn Piping	1987	20	Y	t	8,419	4,406	17,902
Electrical Panels & Wiring	1987	20	Y	t	15,397	4,406	32,739
Sludge Conveyor System, 20" 7 tons 3 HP	1987	20	Y	t	49,669	4,406	105,613
Polymer System Equipment	1987	20	Y	t	40,055	4,406	85,170
Electrical Power Wiring	1987	20	Y	t	30,576	4,406	65,015
Status Panel, Wiring	1987	20	Y	t	21,734	4,406	46,214
Dewatering Building, CMU Block	1986	30	Y	t	219,016	4,295	477,736
Utility Water System Pump Building	1986	30	Y	t	16,266	4,295	35,481
Drainage Well & Valve Pit	1986	30	Y	t	19,345	4,295	42,197
Sludge Storage Building , Concrete & Steel	1986	30	Y	t	197,674	4,295	431,183
Sludge Dewatering FAC, Walks & Wiring	1986	30	Y	t	88,030	4,295	192,019
(2) INSTN Clarifier Mechanisms	1984	20	Y	t	176,522	4,146	398,883
(2) Scum Sump Pumps	1984	15	Y	t	14,400	4,146	32,539
SEWER PLANT	1984	50	Y	t	2,648,794	4,146	5,985,418
Office Lab Building (CMU Block)	1983	30	Y	t	73,340	4,066	168,985
SEWER PLANT	1983	50	Y	t	934,657	4,066	2,153,577
INSTN Grit Chamber Blowers	1979	20	Y	t	14,712	3,003	45,898
Machanical Building, CMU Block	1979	30	Y	t	32,527	3,003	101,476
Sludge Holding Tank	1979	30	Y	t	65,590	3,003	204,625
Chlorine Contact Chamber	1979	30	Y	t	48,680	3,003	151,870
Secondary Clarifying (2) Units	1979	30	Y	t	196,058	3,003	611,653
Oxidation Ditch (2) Units	1979	30	Y	t	344,086	3,003	1,073,463
UTILITY BUILDING	1979	20	Y	t	83,407	3,003	260,209
FLOW SPLITTER BOX	1979	20	Y	t	13,475	3,003	42,039
AEROBIC DIGESTER #1	1979	20	Y	t	34,402	3,003	107,326
AEROBIC DIGESTER #2	1979	20	Y	t	122,271	3,003	381,455
SLUDGE STORAGE BUILDING	1993	50	Y	t	181,224	5,210	325,851
MAINTENANCE BUILDING	1994	50	Y	t	324,980	5,408	563,027
BELT FILTER PRESS	1995	15	Y	t	344,998	5,471	590,762
BELT FILTER PRESS/FINAL RETAINAGE RELEASE	1996	15	Y	t	9,480	5,622	15,797
NEW HEADWORKS/PHASE II-STAGE II-A	1996	50	Y	t	1,283,871	5,622	2,139,406
PLANT FENCE	1999	20	Y	t	5,673	6,060	8,771
Headworks By Pass	2003	20	Y	t	191,413	6,695	267,866
Reroof Utility Blower Building #1	2005	20	Y	t	17,038	7,446	21,437
Landscaping	2005	30	Y	t	5,859	7,446	7,372
Shop Addition at Wastewater Treatment Plant	2010	30	Y	t	321,562	8,804	342,180
Landscaping	2010	10	Y	t	5,022	8,804	5,344
Machinery, Equipment, Furniture							
PORTABLE GENERATOR W/TRAILER	1992	10	N	g	18,500	4,985	34,769
SAMPLER	1990	20	Y	t	5,725	4,732	11,335
Loader (Bobcat)	1990	15	Y	t	22,500	4,732	44,547
Generator, portable GTS-100 w/ Trailer (Generac)	1990	6	N	g	17,500	4,732	34,648
Flow Splitter Box	1990	30	Y	t	13,475	4,732	26,679
SLUDGE APPLICATOR FOR TRUCK	1989	10	Y	t	21,841	4,615	44,338
COMPUTER/PROGRAMS	1989	5	Y	t	7,048	4,615	14,308
BELT FILTER PRESS	1988	20	Y	t	113,350	4,519	234,993
2 HP Sludge Feed Pumps	1988	20	Y	t	18,319	4,519	37,978
2 HP 400 GPH Sludge Grinders	1988	20	Y	t	19,874	4,519	41,202
INSTN Sludge Blowers	1979	20	Y	t	15,100	3,003	47,108
INSTN Was Pumps	1979	20	Y	t	9,500	3,003	29,638
INSTN Ras Pumps	1979	20	Y	t	11,150	3,003	34,785
(2) INSTN CHlorinators	1979	15	Y	t	70,013	3,003	218,423
Emergency Generator	1979	10	Y	t	45,827	3,003	142,969
Sanitair Air Equipment	1979	20	Y	t	11,736	3,003	36,613
Grit Classifier	1979	20	Y	t	7,833	3,003	24,437
Aeration Rotors & Installation	1979	20	Y	t	131,400	3,003	409,936
INSTN Sanitair Air Equipment (3) Blowers	1979	20	Y	t	14,000	3,003	43,677
(2) Utility Water Pumps	1979	15	Y	t	18,316	3,003	57,141
CAPTAIR DUCTLESS FUMEHOOD	1994	15	Y	t	5,348	5,408	9,265
CHE TRASH PUMP	1997	10	Y	t	9,558	5,825	15,372
MAMMOTH ROTOR REPAIR	1997	10	Y	t	5,139	5,825	8,265
Flask Scrubber	2001	5	Y	t	6,127	6,342	9,051
Liftmore 3200LB Crane No. 3200REL-15	2004	5	N	g	5,685	7,115	7,486
Gator Sewer Cam w/ Skid Kit	2004	5	N	g	6,893	7,115	9,077
John Deere 544J Loader 2005 w/ 12' Plow Blade	2005	15	Y	t	101,355	7,446	127,524
Server & Cameras from A-Tec	2007	10	Y	t	11,953	7,967	14,056
Cummins 50KW Diesel Generator	2007	20	N	g	27,408	7,967	32,230
1988 TORO MOWER 117 GROUNDMASTER	2009	5	N	g	7,000	8,570	7,652

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Plant-In-Service

Plant-In-Service	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012 9,369
System Additions							
(2) 20 HP Submersible Raw Sewage Pumps (Hydromatic)	1986	15	N	p	12,000	4,295	26,175
PIONEER RIDGE LIFT STATION	1994	50	N	p	5,000	5,408	8,662
WIDE RIVER RANCH	1994	50	N	g	24,673	5,408	42,746
INTERCEPTOR LINES	1986	50	N	c	1,444,596	4,295	3,151,076
INTERCEPTORS PHASE II	1986	50	N	c	238,099	4,295	519,362
PHASE II COLLECTORES	1988	50	N	c	698,321	4,519	1,447,733
PHASE III INTERCEPTOR	1988	50	N	c	1,461,598	4,519	3,030,130
PHASE III INTERCEPTORS	1988	50	N	c	127,058	4,519	263,412
AEROBIC DIGESTER	1989	50	Y	t	208,123	4,615	422,497
SLUDGE DEWATERING	1989	50	Y	t	1,065,265	4,615	2,162,527
INTEREST ON SWR BONDS	1989	50	Y	t	63,336	4,615	128,574
EXTENSION MULLAN & COMPTON	1990	5	N	g	9,300	4,732	18,413
SWALE/PARKING LOT	1991	5	N	g	7,510	4,835	14,552
PHASE II COLLECTOR UPGRADE	1991	50	N	c	1,426,016	4,835	2,763,096
VERSATEL SEWER LINE IMPROVEMENTS	1991	50	N	c	5,001	4,835	9,690
PHASE IV COLLECTORS	1993	40	N	c	1,569,549	5,210	2,822,137
PIONEER RIDGE	1993	20	N	g	87,000	5,210	156,431
RIVERSIDE HARBOR	1993	20	N	g	32,584	5,210	58,588
LIFT STATION UPGRADES	1995	15	N	p	501,512	5,471	858,770
WWTP UPGRADE	1997	20	Y	t	3,223,432	5,825	5,184,322
STUDY/DESIGN/BOND ISSUE	1997	10	Y	t	299,848	5,825	482,253
LAB EXTENSION DESIGN	1998	20	Y	t	16,000	5,920	25,319
CMS PHASE II STAGE II-B	1998	20	Y	t	296,706	5,920	469,515
STP PRE-DESIGN	1998	10	Y	t	16,927	5,920	26,786
Pleasantview line	1999	50	N	c	49,951	6,060	77,229
PF Mazda Upgrade	1999	20	N	g	21,733	6,060	33,601
LINE O-1 TO 0-2/D 24"	1999	50	Y	t	111,401	6,060	172,238
UV & STANDBY POWER	2000	20	Y	t	57,375	6,221	86,403
SEWER SYSTEM MASTER PLAN	2001	10	Y	t	207,414	6,342	306,395
UV & STANDBY POWER	2002	20	Y	t	685,776	6,538	982,682
AERATOR FOR AEROBIC DIGESTER #2	2002	20	Y	t	151,516	6,538	217,115
VACTOR DISPOSAL SITE	2002	50	N	g	62,672	6,538	89,806
HIGHWAY 41 SEWER	2002	50	N	c	47,055	6,538	67,427
Sewer System Construction	2003	50	N	c	58,390	6,695	81,712
Sewer System Additions 2004	2004	50	N	c	1,179,943	7,115	1,553,699
Sewer System Additions FY 05	2005	50	N	c	1,981,696	7,446	2,493,359
Park Ridge Apartments	2005	50	N	c	15,663	7,446	19,707
Oxidation Ditch Aeration Project	2005	50	Y	c	27,327	7,446	34,383
Completed Sewer Construction FY 06	2006	50	Y	t	157,136	7,751	189,922
Ditch 2 Aeration	2006	50	Y	t	847,775	7,751	1,024,660
Plant Hydraulic Study	2006	50	Y	t	93,301	7,751	112,768
Sewer System Additions FY 06	2006	50	Y	t	1,570,340	7,751	1,897,985
Rathdrum Prairie Master Plan	2007	50	N	g	68,065	7,967	80,040
4th Avenue Main	2007	50	N	c	1,817,940	7,967	2,137,781
OD Ditch	2007	50	Y	t	71,564	7,967	84,154
Clarifer 3 Upgrade	2007	50	Y	t	90,857	7,967	106,842
4th Ave Force Main	2008	50	N	c	4,500	8,310	5,073
OD Ditch	2008	20	Y	t	57,021	8,310	64,285
Odor Ctl 4th Ave LS Construction Costs	2009	20	N	p	20,377	8,570	22,275
Oversizing	2009	50	N	c	398,725	8,570	435,874
Bebham Dr Sewer Oversizing Montrose 8th Addition	2010	50	N	c	26,342	8,804	28,031
W. Centi Trail Force Main	2010	50	N	c	50,933	8,804	54,199
Rathdrum Prairie WW Study	2010	10	N	g	97,157	8,804	103,387
Lift Station System Additions							
(10) Lift Stations	1990	20	N	p	853,663	4,732	1,690,149
PUMPS & CONTROLLER	1994	3	Y	t	6,019	5,408	10,428
Ohio Match Road Lift Station	1995	20	N	p	85,000	5,471	145,551
Prairie Ridge Ph II - Lift Station	1997	20	N	p	80,000	5,825	128,666
Prairie Meadows Lift Station	2002	20	N	p	110,000	6,538	157,624
The Meadows Lift Station	2002	20	N	p	80,830	6,538	115,825
(3) 30 HP Raw Sewage Pumps (Hydromatic)	1988	15	N	p	19,500	4,519	40,427
(6) Gate Valves (Kennedy)	1988	40	N	p	5,100	4,519	10,573
(3) Raw Sewage Pumps (Hydrowmatic)	1986	15	N	p	15,810	4,295	34,486
(6) Gate Valves	1986	40	N	p	5,100	4,295	11,125
(2) 20 HP Submersible Raw Sewage Pumps (Hydromatic)	1986	15	N	p	11,880	4,295	25,914
20 HP Raw Sewage Pump (Hydro Marley)	1986	15	N	p	6,000	4,295	13,088
20 HP Raw Sewage Pump (Hydro Marley)	1986	15	N	p	6,000	4,295	13,088
(6) Gate Valves	1986	40	N	p	5,100	4,295	11,125
(6) Gate Valves	1984	40	N	p	5,100	4,146	11,524
Generator GTS-200 w/Trailer (Generac)	1984	10	N	p	17,500	4,146	39,544
Generator, Portable Diesel w/Trailer (Kohler)	1984	10	N	p	17,500	4,146	39,544
(2) Raw Sewage Pumps (Hydromatic)	1984	15	N	p	12,000	4,146	27,116
(3) 15 HP Raw Sewage Pumps (Hydromatic)	1984	15	N	p	15,810	4,146	35,725
(2) 20 HP Submersible Raw Sewage Pumps (Hydromatic)	1984	15	N	p	12,000	4,146	27,116
(3) Submersible Raw Sewage Pumps	1984	15	N	p	14,850	4,146	33,556
(6) Gate Valves (Kennedy)	1984	40	N	p	5,100	4,146	11,524
Generator, Diesel (Kohler)	1984	10	N	p	15,000	4,146	33,895
Greensferry Lift Station Upgrade	2009	20	N	p	99,343	8,570	108,599
LIFT STATION UPGRADE	2000	50	N	p	517,031	6,221	778,611
Idahline Lift Station	2010	20	N	p	1,497,373	8,804	1,593,383
Greensferry Lift Station	2011	50	N	p	1,023,222	9,070	1,056,931
Total					**$ 48,784,302**		**$ 78,868,366**

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Plant-In-Service

Plant-In-Service	Function	2012 $
Treatment	t	$ 47,653,174
Collection	c	20,995,109
Pumping	p	7,110,593
General	g	3,098,109
Total		**$ 78,856,985**

Construction Work in Progress	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012 9,369
Construction Work in Progress							
WWTP Upgrade	2009	20	Y	t	5,610,174	8,570	$ 6,132,882
WWTP Upgrade	2010	20	Y	t	6,876,037	8,804	7,316,921
WWTP Upgrade	2011	20	Y	t	2,111,756	9,070	2,181,325
Facilities Plan per EPA Permit	2011	50	Y	t	57,370	9,070	59,260
Total					**$ 14,655,336**		**$ 15,690,388**

Plant-In-Service	Function	2012 $
Treatment	t	$ 15,690,388
Collection	c	-
Pumping	p	-
General	g	-
Total		**$ 15,690,388**

Contributed Capital	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012 9,369
Contributed Capital							
SEWER LINES 1994	1994	50	N	c	256,000	5,408	$ 443,519
SEWER LINES 1993	1992	50	N	c	1,267,640	4,985	2,382,434
SYSTEM ADD	1991	50	N	c	456,000	4,835	883,561
ADDITIONAL CONTRIB PRE 1993	1991	50	Y	t	862,400	4,835	1,671,015
SEWER LINES ADD 1990	1990	50	N	c	272,000	4,732	538,527
SEWER LINES ADD 1991	1990	50	N	c	184,000	4,732	364,298
SEWER LINES ADD 1985	1985	50	N	c	160,000	4,195	357,325
SEWER LINES ADD 1980	1980	50	N	c	60,000	3,237	173,654
SEWER LINES ADD 1979	1979	50	N	c	80,000	3,003	249,580
SEWER LINES ADD 1978	1978	50	N	c	52,000	2,776	175,493
SEWER LINES ADD 1995	1995	50	N	c	1,417,418	5,471	2,427,133
SEWER LINES ADD 1996	1996	50	N	c	645,472	5,622	1,075,596
SEWER LINES ADD 1997	1997	50	N	c	193,186	5,825	310,706
SEWER LINES ADD 1998	1998	50	N	c	870,042	5,920	1,376,777
SEWER LINES ADD 1999	1999	50	N	c	454,692	6,060	703,001
SEWER LINES ADD 2000	2000	50	N	c	293,504	6,221	441,995
SEWER LINES ADD 2001	2001	50	N	c	682,076	6,342	1,007,573
SEWER LINES ADD 2002	2002	50	N	c	1,270,627	6,538	1,820,743
Ford Rock Reservoir	1994	20	N	g	110,000	5,408	190,575
SYSTEM ADDITIONS	1984	50	Y	t	490,456	4,146	1,108,272
SEWER LINE IMPROVEMENTS	1991	50	N	c	23,012	4,835	44,589
EXTENSION-COLLECTORS	1993	40	N	c	20,524	5,210	36,903
EXTENSION-COLLECTORS	1995	40	N	c	92,820	5,471	158,941
SEWER SYSTEM ADDITIONS 2003	2003	50	N	c	879,368	6,695	1,230,601
Sewer System Additions FY 07	2007	50	Y	t	1,594,062	7,967	1,874,515
Sewer System Additions FY 08	2008	50	N	c	385,526	8,310	434,640
Sewer System Additions FY 09	2009	50	N	c	258,880	8,570	283,000
Sewer System Additions FY 10	2010	50	N	c	210,272	8,804	223,754
Sewer System Additions FY 11	2011	50	N	c	224,244	9,070	231,631
Total					**$ 13,766,221**		**$ 22,220,352**

Plant-In-Service	Function	2012 $
Treatment	t	$ 4,653,802
Collection	c	17,375,976
Pumping	p	-
General	g	190,575
Total		**$ 22,220,352**

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Replacement Cost Depreciation

Plant-In-Service	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012
							9,369
Land							
Sewer Plant	1985	L	Y	t	154,000	4,195	$ -
Lift Station - Ponderosa	1985	L	N	g	12,729	4,195	-
Rodkey & Greenferry - Sundance Meadows	1985	L	N	g	10,500	4,195	-
EASEMENTS	1990	L	N	g	8,257	4,732	-
S. Seltice W. Griffin Way	1994	L	N	g	800,000	5,408	-
Sewer Plant - Schneidmiller	1995	L	N	g	500,175	5,471	-
Easements	1989	L	N	g	8,257	4,615	-
Schneidmiller Escrow	1997	L	Y	t	251,259	5,825	-
Portion of S-4, Boise Meridian	1997	L	Y	t	531,432	5,825	-
3rd Ave Property - Fords Addition to Post Falls	2001	L	N	g	31,965	6,342	-
Satchwell Property	2004	L	Y	t	4,708,347	7,115	-
Satchwell Property	2004	L	Y	t	2,092,849	7,115	-
11040 W Hayden	2007	L	Y	t	271,473	7,967	-
Mazda Property	2008	L	Y	t	3,012,133	8,310	-
Buildings/Plant							
Instn Piping	1987	20	Y	t	8,419	4,406	17,902
Electrical Panels & Wiring	1987	20	Y	t	15,397	4,406	32,739
Sludge Conveyor System, 20" 7 tons 3 HP	1987	20	Y	t	49,669	4,406	105,613
Polymer System Equipment	1987	20	Y	t	40,055	4,406	85,170
Electrical Power Wiring	1987	20	Y	t	30,576	4,406	65,015
Status Panel, Wiring	1987	20	Y	t	21,734	4,406	46,214
Dewatering Building, CMU Block	1986	30	Y	t	219,016	4,295	414,038
Utility Water System Pump Building	1986	30	Y	t	16,266	4,295	30,750
Drainage Well & Valve Pit	1986	30	Y	t	19,345	4,295	36,571
Sludge Storage Building , Concrete & Stee	1986	30	Y	t	197,674	4,295	373,692
Sludge Dewatering FAC, Walks & Wiring	1986	30	Y	t	88,030	4,295	166,416
(2) INSTN Clarifier Mechanisms	1984	20	Y	t	176,522	4,146	398,883
(2) Scum Sump Pumps	1984	15	Y	t	14,400	4,146	32,539
SEWER PLANT	1984	50	Y	t	2,648,794	4,146	3,351,834
Office Lab Building (CMU Block)	1983	30	Y	t	73,340	4,066	163,353
SEWER PLANT	1983	50	Y	t	934,657	4,066	1,249,075
INSTN Grit Chamber Blowers	1979	20	Y	t	14,712	3,003	45,898
Machanical Building, CMU Block	1979	30	Y	t	32,527	3,003	101,476
Sludge Holding Tank	1979	30	Y	t	65,590	3,003	204,625
Chlorine Contact Chamber	1979	30	Y	t	48,680	3,003	151,870
Secondary Clarifying (2) Units	1979	30	Y	t	196,058	3,003	611,653
Oxidation Ditch (2) Units	1979	30	Y	t	344,086	3,003	1,073,463
UTILITY BUILDING	1979	20	Y	t	83,407	3,003	260,209
FLOW SPLITTER BOX	1979	20	Y	t	13,475	3,003	42,039
AEROBIC DIGESTER #1	1979	20	Y	t	34,402	3,003	107,326
AEROBIC DIGESTER #2	1979	20	Y	t	122,271	3,003	381,455
SLUDGE STORAGE BUILDING	1993	50	Y	t	181,224	5,210	123,823
MAINTENANCE BUILDING	1994	50	Y	t	324,980	5,408	202,690
BELT FILTER PRESS	1995	15	Y	t	344,998	5,471	590,762
BELT FILTER PRESS/FINAL RETAINAGE RELEASE	1996	15	Y	t	9,480	5,622	15,797
NEW HEADWORKS/PHASE II-STAGE II-A	1996	50	Y	t	1,283,871	5,622	684,610
PLANT FENCE	1999	20	Y	t	5,673	6,060	5,701
Headworks By Pass	2003	20	Y	t	191,413	6,695	120,540
Reroof Utility Blower Building #1	2005	20	Y	t	17,038	7,446	7,503
Landscaping	2005	30	Y	t	5,859	7,446	1,720
Shop Addition at Wastewater Treatment Plan	2010	30	Y	t	321,562	8,804	22,812
Landscaping	2010	10	Y	t	5,022	8,804	1,069
Machinery, Equipment, Furniture							
PORTABLE GENERATOR W/TRAILER	1992	10	N	g	18,500	4,985	34,769
SAMPLER	1990	20	Y	t	5,725	4,732	11,335
Loader (Bobcat)	1990	15	Y	t	22,500	4,732	44,547
Generator, portable GTS-100 w/ Trailer (Generac)	1990	6	N	g	17,500	4,732	34,648
Flow Splitter Box	1990	30	Y	t	13,475	4,732	19,564
SLUDGE APPLICATOR FOR TRUCK	1989	10	Y	t	21,841	4,615	44,338
COMPUTER/PROGRAMS	1989	5	Y	t	7,048	4,615	14,308
BELT FILTER PRESS	1988	20	Y	t	113,350	4,519	234,993
2 HP Sludge Feed Pumps	1988	20	Y	t	18,319	4,519	37,978
2 HP 400 GPH Sludge Grinders	1988	20	Y	t	19,874	4,519	41,202
INSTN Sludge Blowers	1979	20	Y	t	15,100	3,003	47,108
INSTN Was Pumps	1979	20	Y	t	9,500	3,003	29,638
INSTN Ras Pumps	1979	20	Y	t	11,150	3,003	34,785
(2) INSTN CHlorinators	1979	15	Y	t	70,013	3,003	218,423
Emergency Generator	1979	10	Y	t	45,827	3,003	142,969
Sanitair Air Equipment	1979	20	Y	t	11,736	3,003	36,613
Grit Classifier	1979	20	Y	t	7,833	3,003	24,437
Aeration Rotors & Installation	1979	20	Y	t	131,400	3,003	409,936
INSTN Sanitair Air Equipment (3) Blowers	1979	20	Y	t	14,000	3,003	43,677
(2) Utility Water Pumps	1979	15	Y	t	18,316	3,003	57,141
CAPTAIR DUCTLESS FUMEHOOD	1994	15	Y	t	5,348	5,408	9,265
CHE TRASH PUMP	1997	10	Y	t	9,558	5,825	15,372
MAMMOTH ROTOR REPAIR	1997	10	Y	t	5,139	5,825	8,265
Flask Scrubber	2001	5	Y	t	6,127	6,342	9,051
Liftmore 3200LB Crane No. 3200REL-15	2004	5	N	g	5,685	7,115	7,486
Gator Sewer Cam w/ Skid Kit	2004	5	N	g	6,893	7,115	9,077
John Deere 544J Loader 2005 w/ 12' Plow Blade	2005	15	Y	t	101,355	7,446	59,511
Server & Cameras from A-Tec	2007	10	Y	t	11,953	7,967	7,028
Cummins 50KW Diesel Generator	2007	20	N	g	27,408	7,967	8,058
1988 TORO MOWER 117 GROUNDMASTER	2009	5	N	g	7,000	8,570	4,591

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Replacement Cost Depreciation

Plant-In-Service	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012 9,369
System Additions							
(2) 20 HP Submersible Raw Sewage Pumps (Hydromatic	1986	15	N	p	12,000	4,295	26,175
PIONEER RIDGE LIFT STATION	1994	50	N	p	5,000	5,408	3,118
WIDE RIVER RANCH	1994	50	N	g	24,673	5,408	15,389
INTERCEPTOR LINES	1986	50	N	c	1,444,596	4,295	1,638,559
INTERCEPTORS PHASE II	1986	50	N	c	238,099	4,295	270,068
PHASE II COLLECTORES	1988	50	N	c	698,321	4,519	694,912
PHASE III INTERCEPTOR	1988	50	N	c	1,461,598	4,519	1,454,462
PHASE III INTERCEPTORS	1988	50	N	c	127,058	4,519	126,438
AEROBIC DIGESTER	1989	50	Y	t	208,123	4,615	194,349
SLUDGE DEWATERING	1989	50	Y	t	1,065,265	4,615	994,762
INTEREST ON SWR BONDS	1989	50	Y	t	63,336	4,615	59,144
EXTENSION MULLAN & COMPTON	1990	5	N	g	9,300	4,732	18,413
SWALE/PARKING LOT	1991	5	N	g	7,510	4,835	14,552
PHASE II COLLECTOR UPGRADE	1991	50	N	c	1,426,016	4,835	1,160,500
VERSATEL SEWER LINE IMPROVEMENTS	1991	50	N	c	5,001	4,835	4,070
PHASE IV COLLECTORS	1993	40	N	c	1,569,549	5,210	1,340,515
PIONEER RIDGE	1993	20	N	g	87,000	5,210	148,609
RIVERSIDE HARBOR	1993	20	N	g	32,584	5,210	55,658
LIFT STATION UPGRADES	1995	15	N	p	501,512	5,471	858,770
WWTP UPGRADE	1997	20	Y	t	3,223,432	5,825	3,888,241
STUDY/DESIGN/BOND ISSUE	1997	10	Y	t	299,848	5,825	482,253
LAB EXTENSION DESIGN	1998	20	Y	t	16,000	5,920	17,723
CMS PHASE II STAGE II-B	1998	20	Y	t	296,706	5,920	328,661
STP PRE-DESIGN	1998	10	Y	t	16,927	5,920	26,786
Pleasantview line	1999	50	N	c	49,951	6,060	20,080
PF Mazda Upgrade	1999	20	N	g	21,733	6,060	21,841
LINE O-1 TO 0-2/D 24"	1999	50	Y	t	111,401	6,060	44,782
UV & STANDBY POWER	2000	20	Y	t	57,375	6,221	51,842
SEWER SYSTEM MASTER PLAN	2001	10	Y	t	207,414	6,342	306,395
UV & STANDBY POWER	2002	20	Y	t	685,776	6,538	491,341
AERATOR FOR AEROBIC DIGESTER #2	2002	20	Y	t	151,516	6,538	108,557
VACTOR DISPOSAL SITE	2002	50	N	g	62,672	6,538	17,961
HIGHWAY 41 SEWER	2002	50	N	c	47,055	6,538	13,485
Sewer System Construction	2003	50	N	c	58,390	6,695	14,708
Sewer System Additions 2004	2004	50	N	c	1,179,943	7,115	248,592
Sewer System Additions FY 05	2005	50	N	c	1,981,696	7,446	349,070
Park Ridge Apartments	2005	50	N	c	15,663	7,446	2,759
Oxidation Ditch Aeration Projec	2005	50	Y	c	27,327	7,446	4,814
Completed Sewer Construction FY 06	2006	50	Y	t	157,136	7,751	22,791
Ditch 2 Aeration	2006	50	Y	t	847,775	7,751	122,959
Plant Hydraulic Study	2006	50	Y	t	93,301	7,751	13,532
Sewer System Additions FY 06	2006	50	Y	t	1,570,340	7,751	227,758
Rathdrum Prairie Master Plan	2007	50	N	g	68,065	7,967	8,004
4th Avenue Main	2007	50	N	c	1,817,940	7,967	213,778
OD Ditch	2007	50	Y	t	71,564	7,967	8,415
Clarifer 3 Upgrade	2007	50	Y	t	90,857	7,967	10,684
4th Ave Force Main	2008	50	N	c	4,500	8,310	406
OD Ditch	2008	20	Y	t	57,021	8,310	12,857
Odor Ctl 4th Ave LS Construction Costs	2009	20	N	p	20,377	8,570	3,341
Oversizing	2009	50	N	c	398,725	8,570	26,152
Bebham Dr Sewer Oversizing Montrose 8th Additior	2010	50	N	c	26,342	8,804	1,121
W. Centi Trail Force Main	2010	50	N	c	50,933	8,804	2,168
Rathdrum Prairie WW Study	2010	10	N	g	97,157	8,804	20,677
Lift Station System Additions							
(10) Lift Stations	1990	20	N	p	853,663	4,732	1,690,149
PUMPS & CONTROLLER	1994	3	Y	t	6,019	5,408	10,428
Ohio Match Road Lift Station	1995	20	N	p	85,000	5,471	123,718
Prairie Ridge Ph II - Lift Statior	1997	20	N	p	80,000	5,825	96,499
Prairie Meadows Lift Station	2002	20	N	p	110,000	6,538	78,812
The Meadows Lift Station	2002	20	N	p	80,830	6,538	57,913
(3) 30 HP Raw Sewage Pumps (Hydromatic)	1988	15	N	p	19,500	4,519	40,427
(6) Gate Valves (Kennedy)	1988	40	N	p	5,100	4,519	6,344
(3) Raw Sewage Pumps (Hydrowmatic)	1986	15	N	p	15,810	4,295	34,486
(6) Gate Valves	1986	40	N	p	5,100	4,295	7,231
(2) 20 HP Submersible Raw Sewage Pumps (Hydromatic	1986	15	N	p	11,880	4,295	25,914
20 HP Raw Sewage Pump (Hydro Marley)	1986	15	N	p	6,000	4,295	13,088
20 HP Raw Sewage Pump (Hydro Marley)	1986	15	N	p	6,000	4,295	13,088
(6) Gate Valves	1986	40	N	p	5,100	4,295	7,231
(6) Gate Valves	1984	40	N	p	5,100	4,146	8,067
Generator GTS-200 w/Trailer (Generac)	1984	10	N	p	17,500	4,146	39,544
Generator, Portable Diesel w/Trailer (Kohler)	1984	10	N	p	17,500	4,146	39,544
(2) Raw Sewage Pumps (Hydromatic)	1984	15	N	p	12,000	4,146	27,116
(3) 15 HP Raw Sewage Pumps (Hydromatic)	1984	15	N	p	15,810	4,146	35,725
(2) 20 HP Submersible Raw Sewage Pumps (Hydromatic	1984	15	N	p	12,000	4,146	27,116
(3) Submersible Raw Sewage Pumps	1984	15	N	p	14,850	4,146	33,556
(6) Gate Valves (Kennedy)	1984	40	N	p	5,100	4,146	8,067
Generator, Diesel (Kohler)	1984	10	N	p	15,000	4,146	33,895
Greensferry Lift Station Upgrade	2009	20	N	p	99,343	8,570	16,290
LIFT STATION UPGRADE	2000	50	N	p	517,031	6,221	186,867
Idahline Lift Station	2010	20	N	p	1,497,373	8,804	159,338
Greensferry Lift Station	2011	50	N	p	1,023,222	9,070	21,139
Total					**$ 48,784,302**		**$ 32,081,549**

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Replacement Cost Depreciation

Construction Work in Progress	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012 9,369
Construction Work in Progress							
WWTP Upgrade	2009	20	Y	t	5,610,174	8,570	$ 919,932
WWTP Upgrade	2010	20	Y	t	6,876,037	8,804	731,692
WWTP Upgrade	2011	20	Y	t	2,111,756	9,070	109,066
Facilities Plan per EPA Permit	2011	50	Y	t	57,370	9,070	1,185
Total					**$ 14,655,336**		**$ 1,761,876**

Contributed Capital	Year	Useful Life	WWTP	Function	Original Cost	ENR CCI	2012 9,369
Contributed Capital							
SEWER LINES 1994	1994	50	N	c	$ 256,000	5,408	$ 159,667
SEWER LINES 1993	1992	50	N	c	1,267,640	4,985	952,974
SYSTEM ADD	1991	50	N	c	456,000	4,835	371,096
ADDITIONAL CONTRIB PRE 1993	1991	50	Y	t	862,400	4,835	701,826
SEWER LINES ADD 1990	1990	50	N	c	272,000	4,732	236,952
SEWER LINES ADD 1991	1990	50	N	c	184,000	4,732	160,291
SEWER LINES ADD 1985	1985	50	N	c	160,000	4,195	192,956
SEWER LINES ADD 1980	1980	50	N	c	60,000	3,237	111,138
SEWER LINES ADD 1979	1979	50	N	c	80,000	3,003	164,723
SEWER LINES ADD 1978	1978	50	N	c	52,000	2,776	119,335
SEWER LINES ADD 1995	1995	50	N	c	1,417,418	5,471	825,225
SEWER LINES ADD 1996	1996	50	N	c	645,472	5,622	344,191
SEWER LINES ADD 1997	1997	50	N	c	193,186	5,825	93,212
SEWER LINES ADD 1998	1998	50	N	c	870,042	5,920	385,498
SEWER LINES ADD 1999	1999	50	N	c	454,692	6,060	182,780
SEWER LINES ADD 2000	2000	50	N	c	293,504	6,221	106,079
SEWER LINES ADD 2001	2001	50	N	c	682,076	6,342	221,666
SEWER LINES ADD 2002	2002	50	N	c	1,270,627	6,538	364,149
Ford Rock Reservoir	1994	20	N	g	110,000	5,408	171,517
SYSTEM ADDITIONS	1984	50	Y	t	490,456	4,146	620,632
SEWER LINE IMPROVEMENTS	1991	50	N	c	23,012	4,835	18,727
EXTENSION-COLLECTORS	1993	40	N	c	20,524	5,210	17,529
EXTENSION-COLLECTORS	1995	40	N	c	92,820	5,471	67,550
SEWER SYSTEM ADDITIONS 2003	2003	50	N	c	879,368	6,695	221,508
Sewer System Additions FY 07	2007	50	Y	t	1,594,062	7,967	187,451
Sewer System Additions FY 08	2008	50	N	c	385,526	8,310	34,771
Sewer System Additions FY 09	2009	50	N	c	258,880	8,570	16,980
Sewer System Additions FY 10	2010	50	N	c	210,272	8,804	8,950
Sewer System Additions FY 11	2011	50	N	c	224,244	9,070	4,633
Total					**$ 13,766,221**		**$ 7,064,006**

Plant-In-Service	Function	2012 $
Treatment	t	$ 23,624,375
Collection	c	12,969,237
Pumping	p	3,722,570
General	g	591,250
Total		**$ 40,907,431**

City of Post Falls
Sewer Financial Plan and Capitalization Fee Update
Customer Base

Year	Fiscal Year	SU gpd [a]	Rathdrum [b]	Non-Residential SUs [c]	Single Family SUs [d]	Total SUs	Growth [e]	WRF 4.0 - 5.2 MGD Avg. Day Capacity SUs [f]	WRF % Capacity
2012	FY 2011/12	164.38	2,646	3,143	9,400	15,189		24,333	62.4%
2013	FY 2012/13	164.38	2,739	3,253	9,729	15,721	3.50%	24,333	64.6%
2014	FY 2013/14	164.38	2,834	3,367	10,070	16,271	3.50%	24,333	66.9%
2015	FY 2014/15	164.38	2,934	3,485	10,422	16,840	3.50%	24,333	69.2%
2016	FY 2015/16	164.38	3,036	3,607	10,787	17,430	3.50%	24,333	71.6%
2017	FY 2016/17	164.38	3,143	3,733	11,164	18,040	3.50%	24,333	74.1%
2018	FY 2017/18	164.38	3,253	3,864	11,555	18,671	3.50%	24,333	76.7%
2019	FY 2018/19	164.38	3,366	3,999	11,959	19,325	3.50%	31,633	61.1%
2020	FY 2019/20	164.38	3,484	4,139	12,378	20,001	3.50%	31,633	63.2%
2021	FY 2020/21	164.38	3,606	4,284	12,811	20,701	3.50%	31,633	65.4%
2022	FY 2021/22	164.38	3,732	4,434	13,260	21,426	3.50%	31,633	67.7%
2023	FY 2022/23	164.38	3,863	4,589	13,724	22,176	3.50%	31,633	70.1%
2024	FY 2023/24	164.38	3,998	4,749	14,204	22,952	3.50%	31,633	72.6%
2025	FY 2024/25	164.38	4,138	4,916	14,701	23,755	3.50%	31,633	75.1%
2026	FY 2025/26	164.38	4,283	5,088	15,216	24,586	3.50%	31,633	77.7%
2027	FY 2026/27	164.38	4,433	5,266	15,748	25,447	3.50%	31,633	80.4%
2028	FY 2027/28	164.38	4,588	5,450	16,299	26,338	3.50%	31,633	83.3%
2029	FY 2028/29	164.38	4,749	5,641	16,870	27,259	3.50%	31,633	86.2%
2030	FY 2029/30	164.38	4,915	5,838	17,460	28,213	3.50%	31,633	89.2%
2031	FY 2030/31	164.38	5,087	6,042	18,072	29,201	3.50%	31,633	92.3%
2032	FY 2031/32	164.38	5,265	6,254	18,704	30,223	3.50%	31,633	95.5%

[a] City refers to equivalent residential units (ERU) in fee Resolution, but refers to service units (SU) in City Code 13.16.020, which has been used here.
ERU gpd based on 2000 Wastewater Master Plan p. 23 "one ER is defined as sewage flow of 5,000 gallons per month" [5,000 gal x 12 months / 365 days = 164.38 gpd]
[b] The City of Rathdrum is treated as one commercial connection with a current flow of approximately 0.435 mgd, equal to approximately 2,646 ERUs.
[c] From ER Tracking Master:
2615.67 Post Falls
527.37 East Greenacres - different water company, still comes to WWTP
3143.04 Total
[d] 9,400 current residential service units based on Shelly's email 4/23/12
[e] Growth rate from JUB 2012 WRF Facility Plan
[f] Scheduled to increase plant capacity to 5.2MGD in 2019 based on 2013 CIP