City of Cheyenne
Board of Public Utilities

Volume 8 – Wastewater Treatment

Final

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Board of Public Utilities

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Abbreviations and Acronyms

ADF	Average Day Flow
BioP	Biological Phosphorus
BOD	Biological Oxygen Demand
BOD5	5-day Biological Oxygen Demand
BOPU	Board of Public Utilities
CBOD	Carbonaceous Biological Oxygen Demand
CCWRF	Crow Creek Wastewater Reclamation Facility
DCWRF	Dry Creek Wastewater Reclamation Facility
DO	Dissolved Oxygen
EPA	Environmental Protect Agency
F	Fahrenheit
gal	Gallon
gpm	Gallons per Minute
HST	High Speed Turbo
IFAS	Integrated Fixed Film Activated Sludge
IPS	Influent Pump Station
MBBR	Moving Bed Biofilm Reactor
MDF	Maximum Day Flow
mgd	Million Gallons per Day
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter
MLR	Mixed Liquor Return
MLSS	Mixed Liquor Suspended Solids
MMADF	Maximum Month Average Daily Flow
MOP 8	ASCE Manual of Practice Volume 8

MOP 35	ASCE Manual of Practice Volume 35
N	Nitrogen
NCAR	National Center for Atmospheric Research
NH3-N	Ammonia
O&M	Operations and Maintenance
P	Phosphorus
PHF	Peak Hourly Flow
PPD	Pounds per Day
RAS	Return Activated Sludge
RDT	Rotary Drum Thickener
RWTF	Reuse Water Treatment Facility
SALR	Surface Area Loading Rate
SEQ	Storm Equalization Basin
SOR	Surface Overflow Rate
SRT	Solids Retention Time
SVI	Solids Volume Index
SWD	Side Water Depth
TFs	Trickling Filters
TMDL	Total Maximum Daily Limit
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
TT	Tetratech
UV	Ultraviolet Light
UVT	Ultraviolet Light Transmittance
VOL	Volume
WAS	Waste Activated Sludge

WERF	Water Environment Research Foundation
WLR	Weir Loading Rate
WRF	Wastewater Reclamation Facility
WYDEQ	Wyoming Department of Environmental Quality

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8.1 Introduction

The purpose of this Volume of the Master Plan is to characterize the Water Reclamation Facility (WRF) assets of the City of Cheyenne Board of Public Utilities (BOPU), the capacity of assets, and to identify needed and/or recommended improvements to those assets over the planning period. This Volume does not address BOPU's recycled water treatment facilities (RWTF), which are covered in Volume 6.

BOPU owns and operates two WRFs; the Crow Creek WRF (CCWRF) and the Dry Creek WRF (DCWRF). Both WRFs are operated continuously and are generally in good working order; however some improvements will be needed over the planning period. The need for improvements is based on one or more of the following factors:

- Forecasted increases in wastewater flows or waste concentrations (loads)
- A change in regulatory requirements
- Improved operational efficiency or reliability
- Deteriorating infrastructure.

Capacity analyses for the WRF's are based on the configuration of existing facilities taken from record documents provided by BOPU and published design standards. The Wyoming Department of Environmental Quality (WYDEQ) adopted new water quality rules and regulations on May 17th, 2012. These rules and regulations are the primary standard used in preparing the unit process capacity analysis. These standards were not in place when the existing infrastructure was designed. Prior to 2012, the 10 State Standards were most typically used.

This Volume builds on the population and flow projections presented in Volume 2 to recommend a timeline of improvements to meet predicted future capacity demands.

In addition to current and future capacity analyses, this Volume provides a forecast of likely changes in discharge regulations which may require infrastructure improvements. The timing and numerical values of future regulatory limits are very much in question, so the issues raised in this section of the wastewater volume should be revisited on at least an annual basis.

Lastly, this Volume provides recommendations for improvements to the WRFs that would improve operational efficiency, stabilize performance and/or replace aging infrastructure.

Previous Studies and Engineering Documents consulted in preparation of this Volume of the Master Plan included the following:

- 2002 - 2003 Pilot Study Technical Memoranda for Quantifying Performance of the MBBR Process at Design Loading and Operating Conditions
- 2003 Crow Creek and Dry Creek WWTP Improvements Project Final Design Report
- 2003 Final Specifications, Documents, and Plans for BOPU Crow Creek and Dry Creek WWTP Improvements Project
- 2004 Cheyenne BOPU Water and Wastewater Master Plan, Book 3, Volume 10
- 2007 Black & Veatch Local Limits Study
- 2008 Wyoming Nutrient Criteria Development Plan
- 2012 Topical Report RSI-2225: Selenium Total Maximum Daily Load for Crow Creek, Laramie, County, Wyoming
- 2013 Wyoming's Method for Determining Water Quality Condition of Surface Waters and TMDL Prioritization Criteria for 303(d) Listed Waters

8.2 Overview and History of Existing Facilities

The following paragraphs provide an overview of the evolution of the facilities that comprise each of the WRFs.

8.2.1 Overview and History of CCWRF

The CCWRF is located approximately one-half mile southeast of the College Avenue interchange with I-80. The original plant was constructed in the late 1940s to provide secondary treatment for an average flow of 8.0 mgd and handle peak flows up to 12 mgd. The original facilities consisted of pretreatment, including in-channel grit removal and a mechanically cleaned bar screen, two primary clarifiers, two rock media trickling filters (TFs) followed by two secondary clarifiers before discharge to Crow Creek. A distribution channel conveyed degritted and screened wastewater from the pretreatment facilities to the primary clarifiers. A second channel conveyed primary effluent to a concrete structure that splits flow between the two TFs. The TF effluent flowed to two clarifiers for final settling. An anaerobic digester and sludge-drying beds were included with the original facility to stabilize and dry the primary and secondary solids generated at the WRF.

In 1974, BOPU constructed the DCWRF and a new diversion structure located just upstream of the CCWRF. The structure diverted a portion of the flow to the DCWRF via a segment of the Crow Creek Interceptor. Installation of this diversion structure resulted in surcharged pipeline conditions in the Crow Creek Interceptor for approximately 1 mile upstream. Also, the Lexington Line was diverted to the new DCWRF. Other changes at the CCWRF included a recirculation pump station for the TFs to improve performance, chlorination facilities were added, and the depth of the rock media was reduced to 5 feet in the TFs, apparently for unknown reasons. These changes resulted in the CCWRF being de-rated to 4.5 mgd.

In the 1980s, additional air-drying beds were added, though by the late 1980s, all solids stabilization (digestion) and drying activities at CCWRF were discontinued. Since then, primary and secondary solids generated at the CCWRF are pumped to the interceptor and conveyed with raw wastewater to the DCWRF for separation, stabilization, and processing. The air-drying beds at CCWRF are currently used for stabilization and dewatering of grease collected through BOPU's oil and grease mitigation program.

In 2000, the original bar screen equipment at CCWRF was replaced with a new fine screen equipped with a washer/compactor. The original in-channel grit-removal system was replaced by a new vortex grit collection basin. A new grit-washing and dewatering system was also installed. The washed and dewatered screenings and grit discharge to a belt conveyor and are temporarily stored in a dumpster prior to transport to the landfill.

The 50-year old primary clarifier mechanisms and TF distributors were replaced with new units. In 2000, the CCWRF was re-rated to a MM secondary treatment capacity of 6.5 mgd.

CCWRF's chlorine disinfection system installed in the mid-1970s was replaced with new UV disinfection facilities in 1999. The improvements constructed in 2006 were as follows:

- Construction of a new influent pump station (IPS) with a peak/firm capacity of 12 mgd and standby power system.
- Construction of two parallel trains of moving-bed biofilm reactor (MBBR) secondary treatment basins for BOD, ammonia and nitrate treatment.
- Installation of new secondary clarifier mechanisms.
- Installation of new aeration blowers.
- Decommissioning of trickling filters (TFs) and their associated recirculation pump station.
- Replacement of existing secondary disinfection UV equipment with new low pressure high output units.

In 2009 anoxic MBBR treatment basins were added for nitrate treatment. Also, weir/launder covers were added in the secondary clarifiers.

Design and construction of a new headworks/garage/administration facility is anticipated to be completed by mid November 2014. The 2014 project is also anticipated to provide:

- Standby power capability for one aeration blower.
- A fiber optic communication link between DCWRF and CCWRF.
- Repair leaks in the Finished Recycled Water Storage Tanks.

A schematic site plan of the CCWRF is shown on Figure 8-1.

Table 8-1
Summary of the Major Unit Processes at CCWRF

Unit Process	Quantity	Details	Original Installation	Status
Influent Pumps	3	4,250 gpm each	2006	IU
Influent Flow Meter	1	2-ft Parshall flume	1949	IU
Screening	1	6-mm by 25-mm opening(2)(3)	2000	IU
Screenings	1	Agitation wash tank with auger(3)	2000	IU
Grit Removal	1	Pista grit vortex(3)	2000	IU
Grit Classifier/Dewater	1	Grit concentrator with inclined auger Classifier(3)	2000	IU
Primary Clarifiers	2	80 ft diameter, 10.5 ft SWD(4)	1949	IU
Trickling Filters	2	80 ft diameter, 9 ft SWD(5)	1949	NIU
Mixed Liquor Recycle Pumps Pumps	4	VFD Driven, 70 HP 5,000 gpm each	2009	IU
MBBR Basin Trains	2	2 denitrification reactors: Volume each – 19.80 kcf Fill fraction – 45 percent	2009	IU
	4	4 reactors for BOD removal and nitrification: Volume each – 24.65 kcf Fill fraction – 45 percent	2006	IU
Blowers	2	200 hp (2,300 scfm) each	2006	IU
	2	300 hp (3,100 scfm) each	2006	IU
Secondary Clarifiers	2	80 ft diameter, 8 ft SWD	1949(1)	IU
Secondary Scum Pumps	2	5 HP and 310 gpm each	2006	IU
UV Disinfection	1	6 40-lamp modules	2006	IU
Effluent Flow Meter	1	Magnetic Flow Meter	2006	IU
Anaerobic Digester	1	85 ft diameter, 25.5 ft SWD	1949	NIU
Sludge Drying Beds	12	40 ft by 100 ft	1984	IU(6)
	6	70 ft by 80 ft	1949	NIU

[1] New Mechanisms installed in 2006.

[2] Screen opening reduced to ¼-inch in 2006.

[3] Headworks equipment scheduled for replacement in 2014

[4] New Mechanisms installed in 2000.

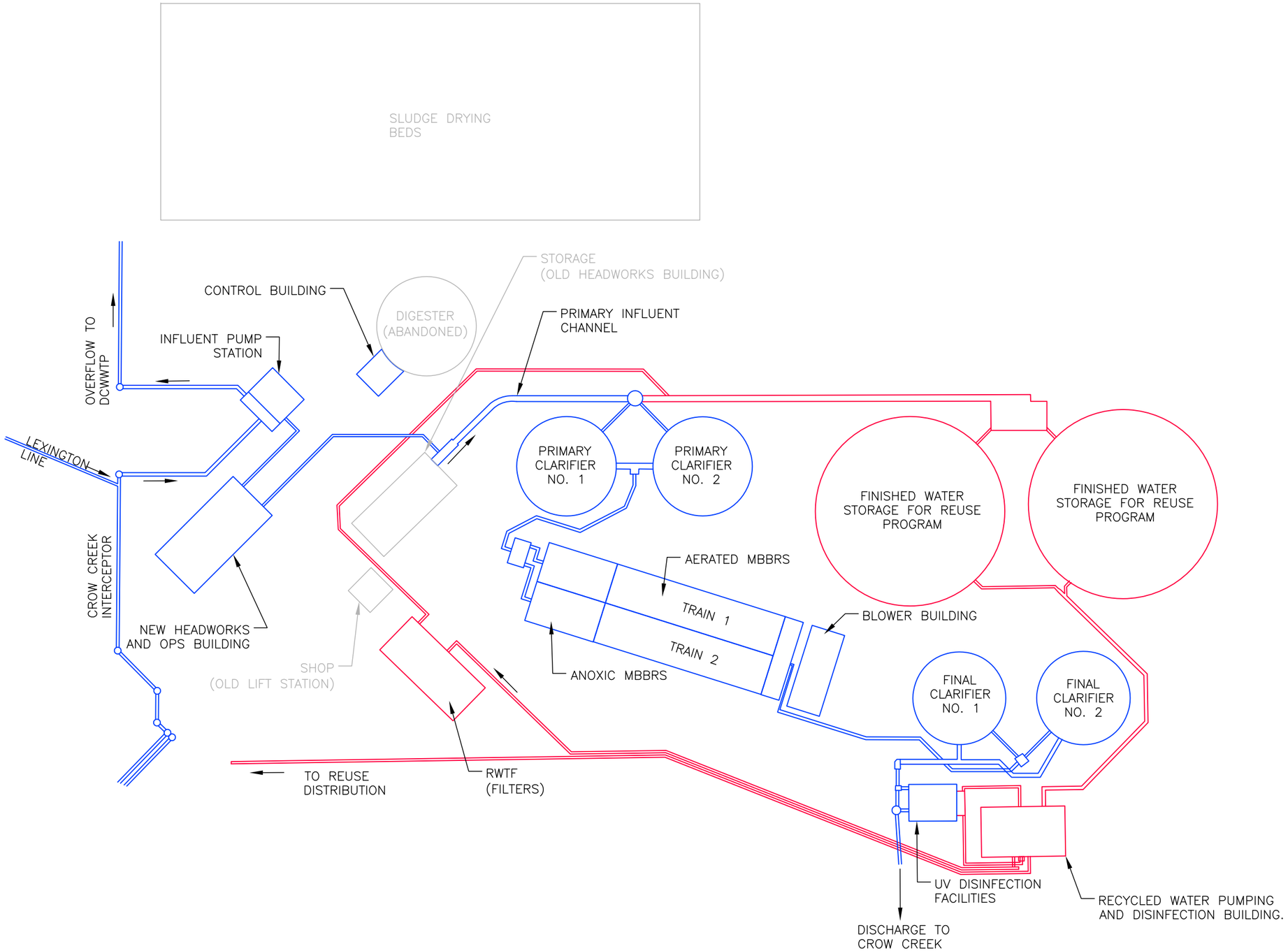
[5] TFs converted to provide storage of reuse water.

[6] Drying beds used for grease processing, not sludge drying.

[7] MBBR Fill Fraction % based on Record Documents for media delivered to site and As-constructed drawings for basin volumes .

IU = Currently In Use

NIU = Not currently In Use



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SITE PLAN CROW CREEK WRF
2013 WATER & WASTEWATER MASTER PLANS
VOLUME 8 – WASTEWATER TREATMENT AND REUSE

LEGEND

MAIN LIQUID STREAM TREATMENT FACILITIES

REUSE PROGRAM FACILITIES

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2013 MASTER PLANS

CROW CREEK IMPROVEMENT PLAN

DATE
JULY 2013

FIGURE
8–1

8.2.2 Overview and History of DCWRF

The DCWRF is located approximately one-half mile southwest of the Campstool Road interchange with I-80. The DCWRF was originally designed to provide 4.5 mgd of secondary treatment and disinfection. The original facilities consisted of an influent screw pump station; pretreatment facilities, including bar screens, grit removal, and comminutors; two primary clarifiers; two activated sludge basins with surface aerators; two secondary clarifiers; chlorine disinfection; and flow equalization basins. Anaerobic digesters and sludge-drying beds were also constructed as part of the project.

Raw wastewater is conveyed to the DCWRF via the cross-over segment of the Crow Creek Interceptor between the two WRFs, as well as by the Dry Creek Interceptor, which combine just upstream of the screw pump wetwell. Screw pumps raise the raw wastewater to an elevation that allows gravity flow through the remainder of the plant.

In 1985, new sludge-drying beds were installed southwest of the digester facilities. In 1989, a new north treatment train was added, consisting of one primary clarifier, a new headworks system with one mechanical bar screen, a standby manual bar screen, a vortex grit basin, a third screw pump, one primary clarifier, one circular aeration basin, one secondary clarifier with return activated sludge and waste activated sludge pump stations, and a second chlorine contact basin.

The 1989 expansion also included a Sludge Processing Building, constructed around two thickening centrifuges, polymer equipment, and paved sludge-drying beds. Primary sludge is fed directly from the bottom of the clarifiers to the digesters. The biological solids from the secondary treatment process are thickened in one of the centrifuges before being fed to the digesters.

The digested sludge was thickened to 5 to 6 percent solids and pumped to the paved drying beds. Using a paddle- bladed auger, the liquid sludge was turned until it was air-dried to the point that it could be transported across site to the older drying beds for storage and supplemental drying prior to beneficial use land application.

In 2006 BOPU implemented a major upgrade and retrofit of the DCWRF. The improvements constructed in 2006 were as follows:

- Hydraulic and process improvements to increase the rated hydraulic and treatment capacity from 7.0 mgd to 10.5 mgd.
- Increased raw wastewater influent pumping capacity at the existing IPS.
- New screening and degritting equipment.

- Added a new primary clarifier and installed a new primary clarifier mechanism on one existing unit.
- Installed new aeration blower equipment.
- Installed two trains of integrated fixed-film activated sludge (IFAS) secondary treatment basins for BOD and ammonia reduction.
- Installed two trains of anoxic secondary treatment basins for nitrate reduction.
- Installed two new secondary clarifiers.
- Demolition of existing 1989 secondary clarifiers.
- Replacement of existing chlorine disinfection system with UV disinfection system.
- Installed a new solids handling facility complete with:
    - Rotary drum thickening equipment with a polymer dosing system to thicken secondary solids prior to anaerobic digestion.
    - High solids centrifuges with a polymer dosing system for dewatering of digested solids.
    - A dewatered solids garage with truck loading facility.

In 2007-2008, a second boiler for heating digester sludge was installed to supplement the equipment.

A schematic site plan of the DCWRF is shown on Figure 8-2.

Table 8-2
Summary of the Major Existing Unit Processes at DCWRF

Unit Process	Quantity	Details	Original Installation	Status
Influent Screw Pumps	2	5,000 gpm each	1974	IU
	1	5,000 gpm	1989	IU
	1	5,000 gpm	2006	IU
Influent Flow Measurement	1	4-ft Parshall flume	1974	IU
Screening	2	0.25-in. opening	2006	IU
Screenings Wash/Compaction	2	Agitation wash tank with auger compaction	2006	IU
Grit Removal	1	16-ft diameter vortex unit	1989(1)	IU
Grit Classifier	1	Grit concentrator with inclined auger classifier	2006	IU
Flow Diversion Pivot Gate (splits flow between north and south primary clarifiers)	1	3'-1" x 3'-6", 150 degree turn	2006	IU
South Primary Clarifier Flow Measurement	1	1.5 ft Parshall flume (fiberglass)	2006	IU
Primary Clarifiers	1	70 ft diameter, 10 ft SWD (north)	1989	IU
	1	70 ft diameter, 10 ft SWD (north)	2006	IU
	2	60 ft diameter, 10 ft SWD (south)	1974	IU
Anoxic/IFAS Trains	2	Anoxic Basin No. 1, Vol = 60.7 kcf	2006	IU
		Anoxic Basin No. 2, Vol = 45.2 kcf	2006	IU
		IFAS Basin No. 1, Vol = 108.0 kcf	2006	IU
		IFAS Basin No. 1 Fill Fraction = 50%	2006	IU
		IFAS Basin No. 2, Vol = 81.0 kcf	2006	IU
		IFAS Basin No. 2 Fill Fraction = 50%	2006	IU
Mixed Liquor Recycle Pumps	4	2,550 gpm each	2006	IU
Secondary Clarifiers	1	80 ft diameter, 14 ft SWD	1989	IU

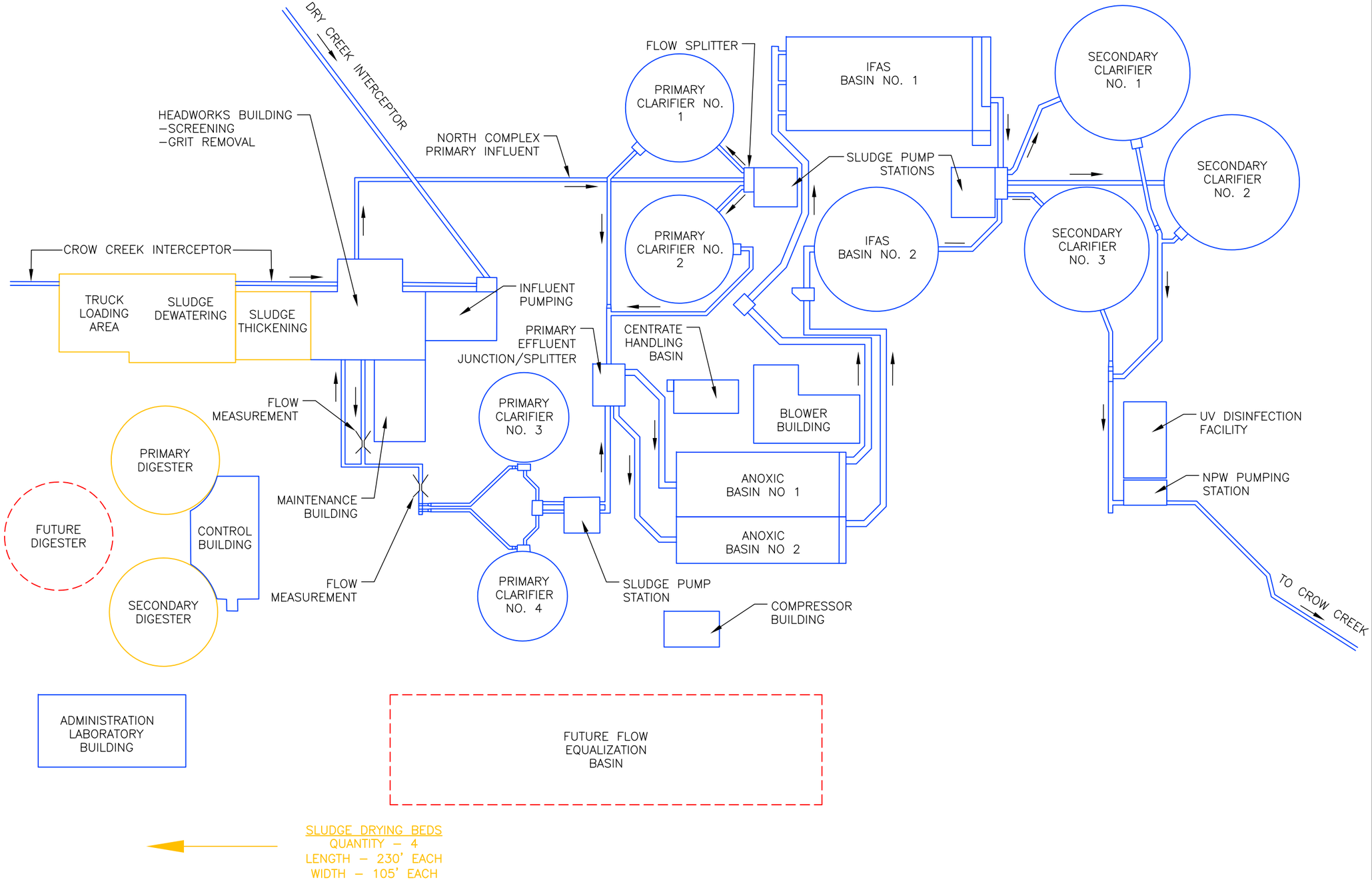
	2	90 ft diameter, 15 ft SWD	2006	IU
Blowers	5	250 hp (3,370 scfm) each	2006	IU
UV Disinfection	2	6 40-lamp modules/channel	2006	IU
WAS Thickening RDTs	2	200-gpm feed rate each	2006	IU
Anaerobic Digesters	2	70 ft diameter, 26 ft SWD	1974	IU
High Solids Centrifuge	2	40HP Westfalia Centrifuge	2006	IU
Sludge Drying Beds	4	105 ft by 230 ft	1985	IU

(1) New Mechanisms installed in 2006.

(2) IFAS Fill Fraction % based on Record Documents for media delivered to site and As-constructed drawings for basin volumes.

IU = Currently In Use

NIU = Not currently In Use



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SITE PLAN DRY CREEK WRF
2013 WATER & WASTEWATER
MASTER PLANS
VOLUME 8 – WASTEWATER
TREATMENT AND REUSE

LEGEND

MAIN LIQUID STREAM TREATMENT FACILITIES

SOLIDS HANDLING FACILITIES

FUTURE FACILITIES

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DRY CREEK IMPROVEMENT PLAN

DATE
JULY 2013

FIGURE
8–2

8.3 Influent Wastewater Analysis and Effluent Water Quality

This section presents an analysis of each of unit process that make up the CCWRF and the DCWRF. The rated capacities of those unit processes are governed by one or both of the following parameters:

- Maximum hydraulic throughput
- The limits of treatment performance for the design loading conditions.

Future projections of wastewater flow and load were made based on statistical analysis of historical flows and loads along with projections of new customers, population growth, wastewater strength, and predicted future regulatory requirements. The existing waste concentrations are not expected to change over time. The following sections describe the methodology of the analysis prior to presenting the findings of the analysis.

8.3.1 Statistical Approach and Effluent Water Quality Requirements

Statistical analysis of influent flows and loads is needed prior to quantitatively determining the probability of a facility achieving a required level of performance. The particular statistical metric used is the "best achievable technology" (BAT) performance metric. This metric is defined as the best performance sustained for a 14-day period and is calculated as the 3.83th percentile rank (14/365 performance) of a three year data set.

Another statistical approach used is the "reliable process" performance which is calculated as the number of exceedances in a five-year period. This limit is further described as monthly performance standards exceeded three times in a five-year period (5 percent of 60 months).

Five years of data were used to evaluate hydraulic and biological capacity at the CCWRF and the DCWRF. A summary of the flow and process data is provided in Appendix 8-A.

8.3.2 Raw Influent Wastewater Characteristics and Analysis

HDR evaluated the influent data and concluded the raw wastewater influent sampler data at both the CCWRF and the DCWRF are not reliable. The data indicates primary clarifier BOD_5 and TSS removals are very high compared to normal industry standards. The BOD_5 removal and TSS removal ranged from 80 to 90 percent. Typical industry values for BOD_5 removal range from 25 to 40 percent and 50 to 70 percent for TSS removal. Instead of utilizing the sampler data, this analysis assumes that the primary clarifiers remove one third of the raw wastewater influent BOD_5 load and 55 percent of the TSS load. These assumptions conform to WYDEQ Volume 11, Section 13(a)(ii) "Design Parameters" section (A) "Performance" of the WYDEQ Water Quality Rules and Regulations. The assumptions are also within typical literature ranges (e.g. Metcalf & Eddy, the ASCE Design of Municipal

Wastewater Treatment Plants Manual of Practice Volume 8 (MOP8), and Ten State Standards).

Using the assumptions presented above, raw influent BOD_5 and TSS loads were back-calculated from the primary clarifier effluent water quality data. The back-calculated data is for information purposes only and is not needed for capacity or performance analysis.

Primary clarifier effluent water quality data is used as the basis of analysis for current and future biological capacity of the secondary treatment systems. Five years of primary clarifier effluent data from CCWRF and DCWRF were normalized using linear regression tools. Limited phosphorus data were available at the time of this analysis. Based on historical concentrations and only a few samples taken over the past five years, the influent total phosphorus concentration is assumed to be 5 mg/L.

Normalized values were compared and checked against typical per capita day contributions of BOD_5, TSS, and NH_3-N. The estimated influent TSS and BOD derived from the primary effluent data puts the population equivalent also at around 34,000 if the per capita contributions for BOD_5 and TSS inside this service area were in the range of 0.17 and 0.15, respectively. This population estimate compares well with the population estimate presented in Volume 2. The final design flows and loads for the CCWRF and the DCWRF were used for hydraulic and biological capacity analysis.

The character of the influent organic load, nitrogen and phosphorus are and will remain in ratios typical of municipal wastewater systems. It is not anticipated that any future users will change the nature of the raw wastewater influent. Furthermore, BOPU pretreatment program assures influent conditions.

8.3.3 WYDEQ Design Standards

WYDEQ provides design and operating requirements for the various wastewater treatment processes that are found in most wastewater treatment facilities. These requirements are used to determine existing capacity and future capacity requirements. Where WYDEQ standards were absent, generally recognized industry standards were used. The following Table 8-3 provides WYDEQ standards and capacity rating requirements per unit process.

Table 8-3
Design Capacity Standards

Unit Process	WYDEQ Capacity Criteria
Influent Screening	Design for Solids Removal at Peak hour flow Maximum Approach Velocity < 3fps
Grit Removal	Design for Grit Removal at Peak hour flow Minimum Grit Handling Capacity of 15cf/MG
Primary Treatment	Minimum Depth > 7ft Average Day Flow SOR > 1,000 gpd/sf Maximum Day Flow SOR > 1,500 gpd/sf Weir Loading Rate Peak Hour Flow > 80,000 gpd/lf
Secondary Treatment MBBR @ CCWRF IFAS @ DCWRF	WYDEQ does not publish standards for MBBR WYDEQ does not publish standards for IFAS
Secondary Clarifiers @ CCWRF	Fixed Film Process: Maximum Day Flow SOR > 800 gpd/sf Peak Hour Flow SOR > 1,200 gpd/sf Weir Loading Rate Maximum Day Flow > 12,000 gpd/lf Weir Loading Rate Peak Hour Flow > 20,000 gpd/lf
Secondary Clarifiers @ DCWRF	Activated Sludge Process: Maximum Day Flow SOR > 600 gpd/sf Peak Hour Flow SOR > 1,200 gpd/sf Solids Loading Rate Maximum Day > 28 ppd/sf Solids Loading Rate Peak Hour Flow > 50 ppd/sf Weir Loading Rate Maximum Day Flow > 12,000 gpd/lf Weir Loading Rate Peak Hour Flow > 20,000 gpd/lf
Disinfection	WYDEQ does not publish standards for UV Disinfection

8.3.4 Summary of Existing Discharge Permit Limits for CCWRF and DCWRF

The current permits for each facility are set to expire on October 31, 2013 at midnight. Correspondence with WYDEQ indicates that, other than a probable selenium limit, no change in the permit is expected at this time. The potential impacts of a selenium limit are presented later in this volume. Table 8-4 and Table 8-5 summarize the current-day (with no change for the future) effluent discharge water quality requirements.

Table 8-4
CCWRF Discharge Permit Limits

Parameter	Monthly Average[(b)]	Weekly Average[(b)]	Daily Maximum[(b)]
Carbonaceous Biochemical Oxygen Demand (CBOD) (mg/L)	25	40	80
CBOD, % Removal	85%	N/A	N/A
E. coli, colonies/100 mL, (Oct. through April)	126	N/A	576
E. coli, colonies/100 mL, (May through September)	630	N/A	630
Total Suspended Solids (TSS), mg/L	30	45	90
TSS, % Removal	85%	N/A	N/A
Total Residual Chlorine, mg/L	N/A	N/A	0.011
Ammonia, total as N, June through October	3.50	N/A	8.75
Ammonia, total as N, mg/L, November through May	5.37	N/A	13.43
pH	pH shall remain between 6.5 and 9.0 (a)		

[(a)] Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

[(b)] Monthly Average, Weekly Average, and Daily Maximum are defined in the WYDEQ permit found in Appendix 8-B.

Table 8-5
DCWRF Discharge Permit Limits

Parameter	Monthly Average[(b)]	Weekly Average[(b)]	Daily Maximum[(b)]
Carbonaceous Biochemical Oxygen Demand (CBOD) (mg/L)	25	40	80
CBOD, % Removal	85%	N/A	N/A
E. coli, colonies/100 mL, (Oct. through April)	126	N/A	576
E. coli, colonies/100 mL, (May through September)	630	N/A	630
Total Suspended Solids (TSS), mg/L	30	45	90
TSS, % Removal	85%	N/A	N/A
Total Residual Chlorine, mg/L	N/A	N/A	0.011
Ammonia, total as N, June through October	3.50	N/A	8.75
Ammonia, total as N, mg/L, November through May	5.37	N/A	13.43
pH	pH shall remain between 6.5 and 9.0 (a)		

[(a)] Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

[(b)] Monthly Average, Weekly Average, and Daily Maximum are defined in the WYDEQ permit found in Appendix 8-B.

8.3.5 CCWRF Flows and Loads

The following table summarizes the current day flow and loading condition observed at the CCWRF:

Table 8-6
CCWRF Current Day Flow and Loads

Parameter	Average Annual	Maximum Month	Maximum Day	Peak Hour
Influent Flow	3.46 mgd[(a)]	4.38 mgd	5.30 mgd	11.1 mgd
Primary Clarifier Effluent Flow	2.92 mgd	3.82 mgd	4.73 mgd	N/A
Primary Carbonaceous Biochemical Oxygen Demand (CBOD)[(b)]	3,426 ppd[(c)]	5,257 ppd	7,103 ppd	N/A
Primary Total Suspended Solids[(b)]	1,761 ppd	2,585 ppd	3,416 ppd	N/A
Primary Ammonia (NH_3-N) [(b)]	564 ppd	770 ppd	978 ppd	N/A
Total Phosphorus (as P) [(d)]	144 ppd	183 ppd	221 ppd	N/A

[(a)] The abbreviation "mgd" represents million gallons per day.

[(b)] Data presented is from measurements taken in the primary clarifier effluent.

[(c)] The abbreviation "ppd" represents pounds per day.

[(d)] Phosphorus data presented is based on observed concentrations from a limited data set in 2012.

Figure 8-3 shows the influent flow data for five years from 2008 to 2012 for the CCWRF. Using linear regression tools, the maximum day facility influent flow was determined to be 5.30 mgd. This flow was used to evaluate preliminary treatment equipment hydraulic capacity as well as primary clarifier hydraulic capacity. The maximum day primary clarifier effluent flow was determined to be 4.73 mgd. This flow was used to evaluate secondary treatment unit process hydraulic and biological capacity. The primary clarifier maximum month loadings presented for CBOD, TSS, NH_3-N, TP are 5,257 ppd, 2,585 ppd, 770 ppd, and 183 ppd, respectively. These loadings were used to evaluate current day biological capacity and to project future capacity.

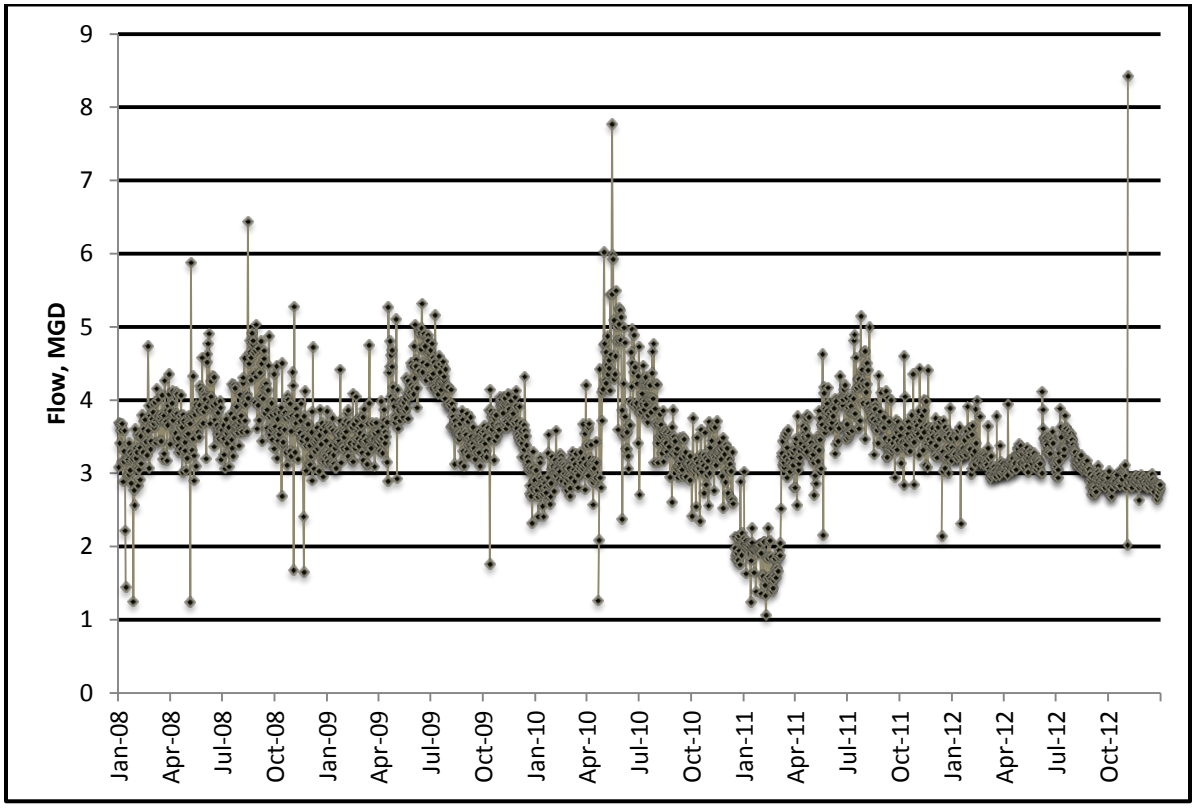


Figure 8-3
Five Years of Influent Flow Data at the CCWRF (2008 – 2012)

Table 8-7 provides a description of the current flow and loads at the DCWRF.

Table 8-7
DCWRF Current Day Flow and Loads

Parameter	Average Annual	Maximum Month	Maximum Day	Peak Hour
Influent Flow	5.50 mgd[(a)]	6.79 mgd	7.46 mgd	21.8 mgd
Primary Clarifier Effluent Flow	5.47 mgd	6.76 mgd	7.43 mgd	N/A
RAS flow (Average % Influent Flow)	39% Q max month			N/A
Primary Carbonaceous Biochemical Oxygen Demand (CBOD)[(b)]	10,043 ppd[(c)]	13,830 ppd	15,794 ppd	N/A
Primary Total Suspended Solids[(b)]	8,519 ppd	14,026 ppd	16,882 ppd	N/A
Primary Ammonia (NH_3-N) [(b)]	1,495 ppd	1,846 ppd	2,028 ppd	N/A
Total Phosphorus (as P) [(d)]	229 ppd	282 ppd	310 ppd	N/A

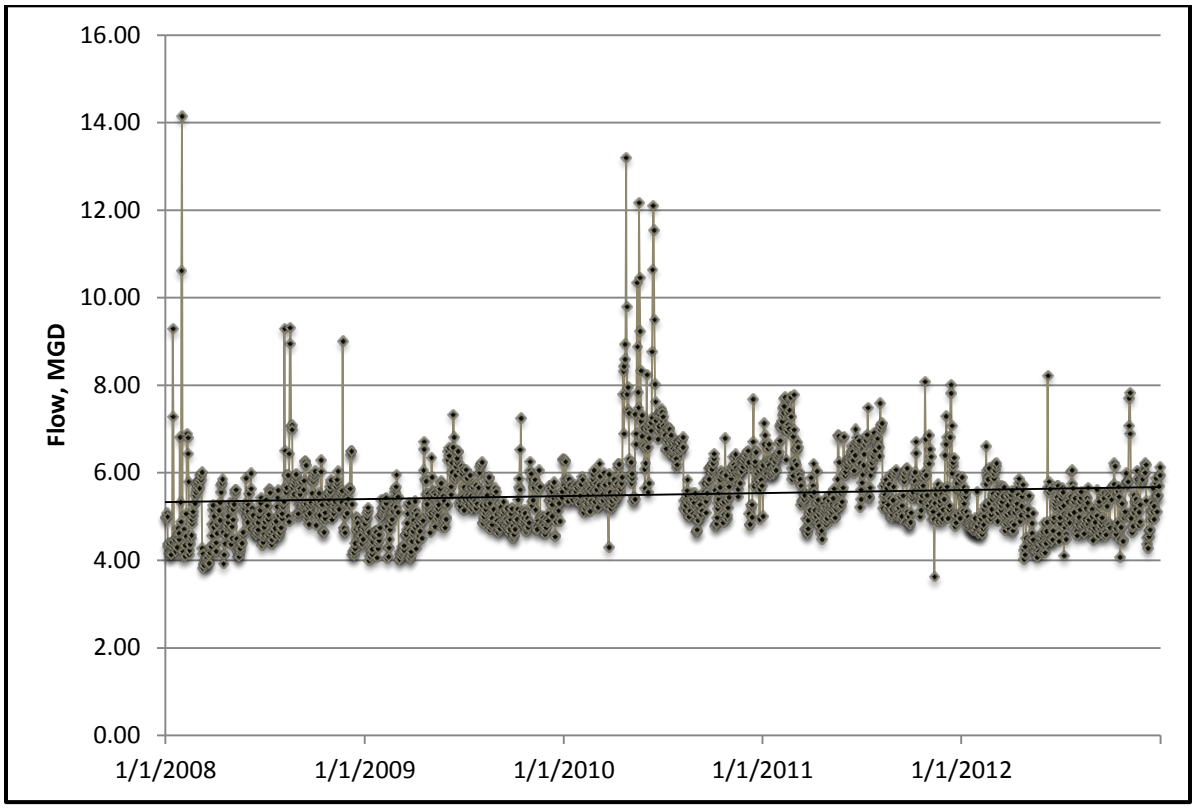
[(a)] The abbreviation “mgd” represents million gallons per day.

[(b)] Data presented is from measurements taken in the primary clarifier effluent.

[(c)] The abbreviation “ppd” represents pounds per day.

[(d)] Phosphorus data presented is based on historic observed concentrations and very limited data from 2012.

The maximum day facility influent flow provided above is 7.46 mgd. This value was determined based on normalized raw influent wastewater flow data. It was also used to evaluate preliminary treatment equipment hydraulic capacity as well as primary clarifier hydraulic capacity. The maximum day facility primary clarifier effluent flow provided above is 7.43 mgd. This value was determined based on normalized primary effluent flow data. This flow was used to evaluate secondary treatment unit process hydraulic and biological capacity. Figure 8-4 shows the raw influent wastewater flow data for five years from 2008 to 2012 for the DCWRF. Flows have remained fairly consistent over the past five years within the 5.0 mgd to 7.0 mgd range as shown in Figure 8-4.



As shown in Table 8-7, the primary clarifier maximum month loadings presented for CBOD, TSS, NH_3-N, TP are 13,830 ppd, 14,026 ppd, 1,846 ppd, and 282 ppd, respectively. These loadings were used to evaluate current day biological capacity and to project future capacity. Future capacity projections were used to make recommendations for future capital improvements projects.

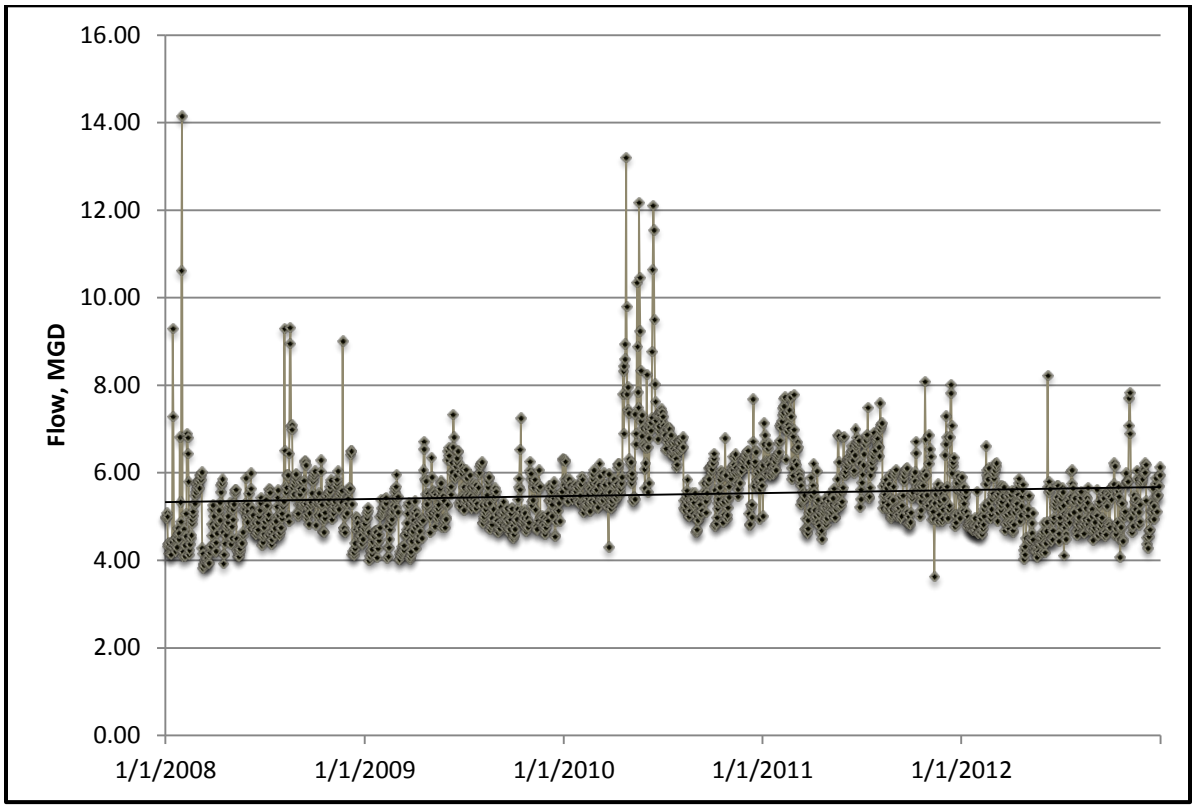


Figure 8-4
Five Years of Influent Flow Data at the DCWRF (2008 – 2012)

8.3.6 Treatment Goals

In order to consistently achieve the level of treatment performance required by the discharge permit, targeted effluent quality levels should be more stringent than the levels required in the permit. The difference between the permit and goal level is often referred to as the compliance cushion. The magnitude of the compliance cushion varies depending upon regulations, standards, and downstream water quality of receiving streams. It is also controlled by the treatment processes incorporated in the treatment plant.

Table 8-8 presents the treatment goals for the CCWRF and the DCWRF.

Table 8-8
Summary of Goal Effluent Quality

Parameter	Value	Note
BOD	<20 mg/L	30-day Average
TSS	<20 mg/L	30-day Average
E-coli	25 #/100ml	7-day Average
Ammonia	3 mg-N/L	30-day Average
Total Inorganic Nitrogen	15 mg-N/L	30-day Average

8.3.7 Process Operating Criteria and Effluent Quality

Figure 8-9 presents a summary of key BOPU operating criteria and the 50th and 95th percentile performance data values. The 50th percentile is the average performance of the facility. The 95th percentile value is considered to be the level of performance a treatment facility can reliably achieve. The 95th percentile correlates to 14 days per year when the facility will not meet 30–day permit values. All other days of the year, the facility will achieve permit requirements.

The MBBR DO concentration in reactors 3-6 ranges from 2.5 mg/L to 4.0 mg/L. The higher DO concentrations tend to be in the last few reactors to promote nitrification. The lower DO concentrations in reactors 3 and 4 facilitate BOD_5 removal. The SALR for BOD and NH_3-N are calculated surface area loading rates based on primary clarifier effluent wastewater characteristics media fill fraction, and available surface area for biofilm growth. These values indicated that the facility operates within the typical design criteria for MBBR BOD_5 and NH_3-N removal the primary and secondary clarifier SORs are within the normal operating range.

Table 8-9
Summary of CCWRF Historical Observed Data

Parameter	50th Value	95th Value
Primary Clarifier SOR	344 gpd/sf	537 gpd/sf
Primary TSS Removal Efficiency(1)	55%	55%
Primary BOD Removal Efficiency(2)	33%	33%
MBBR DO Reactor Nos. 3-6	2.5 mg/L	4.0 mg/L
BOD SALR (Reactors 3 and 4)	4.0 g/m^2/d	5.1 g/m^2/d
NH3-N SALR (Reactors 5 and 6)	0.41 g/m^2/d	0.58 g/m^2/d
Secondary Clarifier SOR	344 gpd/sf	530 gpd/sf

(1) Assumed typical performance across primary clarifiers at the observed SORs.
(2) WYDEQ values for primary clarifier performance.

Table 8-10 shows the effluent quality performance data between the years of 2008 and 2012. The BOD_5, TSS, and NH_3-N effluent concentrations exceed discharge permit standards. The 95th percentile values for the aforementioned wastewater constituents indicate the facility reliably meets discharge permit standards. There were a limited number of samples of phosphorus concentration data; so, it was difficult to perform an accurate and reliable statistical analysis. There is currently no phosphorus effluent discharge permit limit. HDR recommends that the facility begin taking phosphorus samples on the influent and the effluent discharge regularly as phosphorus standards may be implemented in the future. It is also suggested to measure phosphorus in the primary effluent that is conveyed to the secondary treatment process. Monitoring primary clarifier effluent phosphorus concentration data would not only provide a good indicator for primary clarification removal, but also it would provide a design basis for future anaerobic zones for biological phosphorus removal (BioP).

Table 8-10
Summary of CCWRF Maximum Month Effluent Quality

Parameter	50th Percentile	95th Percentile
BOD	4.9 mg/L	9.9 mg/L
TSS	9.5 mg/L	18.7 mg/L
Ammonia	0.3 mg/L	3.7 mg/L
TIN	11.6 mg/L	34.4 mg/L
TP	No data	No data

Table 8-11 summarizes the key process operating criteria for the DCWRF. The typical range of dissolved oxygen (DO) concentration in IFAS Train No. 1 Reactors 1 and 2 is between 2.5 mg/L to 4.0 mg/L. The same range of concentrations is found in IFAS Train No. 2. The higher DO concentrations in the IFAS reactors promote nitrification. Higher DO concentrations are needed to allow for oxygen to penetrate the biofilm to the nitrifiers that are fixed on the media. Anoxic Trains No. 1 and 2 facilitate BOD_5 removal through denitrification. Denitrification is supported by maintaining an environment without oxygen, providing mixing via the floating aerators, and through returning nitrate rich mixed liquor (MLR) from the end of the IFAS aeration reactors to the front of the anoxic reactors.

The SALR for BOD and NH_3-N are calculated based on five years of primary clarifier effluent loading data and the plastic media available surface area. The primary and secondary clarifier SORs are within the normal design and operating range.

Table 8-11
Summary of DCWRF Historical Observed Data

Parameter	50th Value	95th Value
Primary Clarifier SOR Primary TSS Removal Efficiency (1)	385 gpd/sf 55%	685 gpd/sf 55%
Primary BOD Removal Efficiency (2)	33%	33%
IFAS/Anoxic Basin #1,#2 Recycle Ratio (3)	150%, 110%	180%, 160%
IFAS Train 1 Reactors 1 & 2 D.O. Conc. IFAS Train 2 Reactor D.O. Conc.	2.5 mg/L 2.5 mg/L	4.0 mg/L 4.0 mg/L
BOD MLSS Loading	24.5 ppd/kcf	35.5 ppd/kcf
NH3-N SALR	0.29 g/m^2/d	0.59 g/m^2/d
Secondary Clarifier SOR	411 gpd/sf	755 gpd/sf

(1) Assumed typical performance across primary clarifiers at the observed SORs.

(2) WYDEQ values for primary clarifier performance.

(3) Recycle Ratio = (Raw Wastewater Flow + Recycle Flow)/ Raw Wastewater Flow, = (Q+R)/Q.

The performance data shown in Table 8-12 shows the facility is consistently producing effluent water quality better than required by discharge permit. The BOD5 discharge effluent concentration averages around 1.5 mg/L, while the 95th percentile is approximately 4.5 mg/L. The effluent discharge permit requires the facility meets an effluent discharge limit of 25 mg/L on a monthly average basis. The TSS effluent discharge permit requires that the facility meets a limit of 30 mg/L. The table above shows that the facility is

achieving a performance of 3.2 mg/L and a reliable performance of 10.6 mg/L. Ammonia discharge limits from June to October of 3.5 mg/L and 5.37 mg/L from November to May. The facility on average achieves an effluent discharge ammonia performance of 0.15 mg/L and it reliably achieves 3.5 mg/L.

Similar to the CCWRF, there were a limited number of samples of phosphorus concentration data; so, it was difficult to perform an accurate and reliable statistical analysis. There is currently no phosphorus effluent discharge limit. HDR recommends that the facility begin taking phosphorus samples on the influent and the effluent discharge regularly as phosphorus standards may be implemented in the future.

Measurement of phosphorus in the primary effluent that is conveyed to the secondary treatment process is recommended. Monitoring primary clarifier effluent phosphorus concentration data would not only provide a good indicator for primary clarification removal, but also it would provide a design basis for future anaerobic zones for biological phosphorus removal (BioP).

Table 8-12
Summary of DCWRF Maximum Month Effluent Quality

Parameter	50th Percentile	95th Percentile
BOD_5	1.5 mg/L	4.5 mg/L
TSS	3.2 mg/L	10.6 mg/L
Ammonia	0.15 mg/L	3.5 mg/L
TIN	9.32 mg/L	21.96 mg/L
TP	No data	No data

8.4 CCWRF Unit Process Capacity Evaluations

This section presents the current capacity of each of the unit processes at the CCWRF and a projection of the point in time when they will reach rated capacity.

8.4.1 Headworks and Influent Pump Station (IPS)

The CCWRF IPS firm capacity is 12.0 mgd. The IPS is configured such that any flows delivered to the pump station in excess of 12 mgd are bypassed to the downstream DCWRF. The facility peak hour flow based on five years of data is 11.1 mgd. If the peak hour flow ever exceeds12 mgd, the excess flows will be bypassed to the DCWRF.

Based on the growth predictions provided in Volume 2, the CCWRF IPS is expected to receive flows in excess of 12 mgd by year 2023. No improvements are needed at the CCWRF IPS within the near term (10-year) or mid term (20-year) planning periods because excess flows are bypassed to DCWRF.

The CCWRF headworks unit processes are being designed (scheduled for construction to be complete in 2014) to accommodate a peak hour flow of 12.0 mgd. Two 1/4-inch hole step screens will be installed in a new headworks facility. There will also be a new vortex grit chamber constructed and two new wash presses installed. The vortex grit chamber will have a vacuum primed pump to deliver grit to dumpsters. The wash presses will remove approximately 80 percent of the organic matter from the grit. The degritted, washed organic matter will be pumped into the wastewater channel, while the grit will be conveyed and dropped into dumpsters below the operating floor.

8.4.2 Primary Treatment

The existing primary clarifiers at the CCWRF include two 80 feet diameter, 10.5 feet deep clarifiers. Flow is split equally to each unit through a flow splitting manhole. Figure 8-5 shows surface overflow rate (SOR) projections over the next 50 years for the average day flow (ADF) and maximum day flow (MDF). The primary clarifier SOR is defined as the flow rate that overflows the surface area to the secondary treatment process. SOR is the main capacity rating measurement for primary clarifiers.

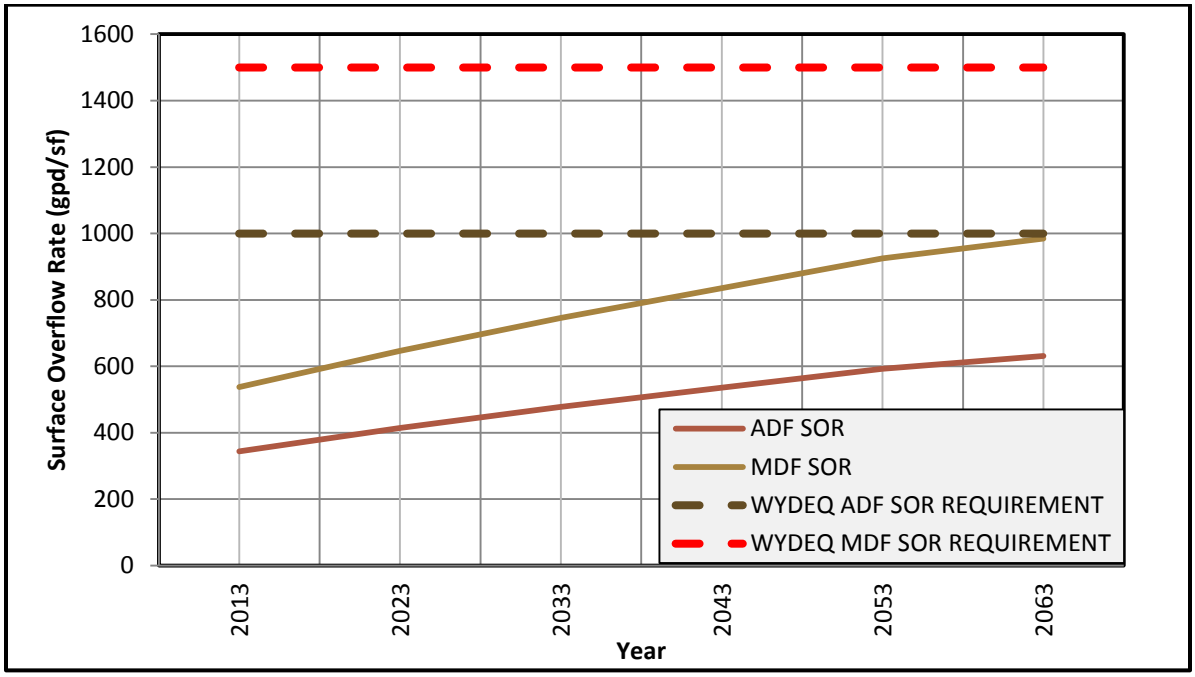


Figure 8-5
CCWRF Primary Clarifier SOR Evaluation

The Wyoming Department of Environmental Quality (WYDEQ) requirements are shown for reference. These criteria are 1,000 gpd/sf for average design flow and 1,500 gpd/sf for maximum day flow. Figure 8-5 clearly illustrates that additional clarifier capacity will not be required in near term, mid term or long term planning periods. The primary clarifier capacity does not limit the facility hydraulically.

Observations of the underflow data provided indicate the primary clarifiers thicken solids to approximately 1 percent solids. Because the clarifiers are achieving adequate performance in the underflow, the pumps should be run at higher flow rate to remove even more BOD and TSS when the facility begins to near its organic rated capacity. Increased BOD and TSS removal will help to assure that capacity downstream of the primary clarifiers can be maximized.

8.4.3 Secondary Treatment

The CCWRF uses the MBBR process for secondary treatment. The wastewater industry in the United States has moved the MBBR technology from a “promising” technology to an

"established" technology in the past decade. The 2010 EPA "Nutrient Control Design Manual" refers to the MBBR process as a proven technology. The MBBR process is followed by two secondary clarifiers and all solids are sent to the DCWRF via the Crow Creek Interceptor for further processing.

Currently WYDEQ does not have published design and performance rating criteria for MBBR. In the absence of WYDEQ standards, the capacity analysis of the CCWRF MBBR is based on the Water Environment Federation (WEF) Manual of Practice 35 (MOP35). Volume 5 of MOP35 provides the basis for design and rating of MBBR treatment systems.

The CCWRF MBBR system is comprised of two trains of reactors in series. Within each train there are two denitrification reactors, followed by two carbonaceous BOD reactors and finally two nitrification reactors. Table 8-13 summarizes the MBBR system and the media volumes and effective surface areas available for loading.

By definition, the hydraulic approach velocity is the sum of the peak flow and internal recycle flows divided by the cross sectional area of the basins containing media. The general range of hydraulic approach velocity is 10 meters per hour (m/hr) to 30 m/hr. Flows in excess of 30 m/hr can cause loss of plastic biofilm carriers or accumulation of trash and fine material on media retention screens. High approach velocities may also cause damage to a media retention screen. Figure 8-6 shows two curves that present different growth rates for projecting hydraulic approach velocity over 50 years for the CCWRF. The curves are compared to the typical upper limit of approach velocity of 30 m/hr, shown in red dashes on the figure.

Table 8-13
CCWRF MBBR Reactor Characteristics

Reactor Designations	Details
Denitrification MBBRs	Reactors No. 1 and No. 2 (East and West) Nitrate Recirculation Ratio = 100 percent
	Media Unit Volume Surface Area = 500 m^2/m^3 Media Fill Fraction = 45 percent *
	Effective Surface Area = 504,000 m^2
Carbonaceous Removal MBBRs	Reactors No. 3 and No. 4 (East and West)
	Media Unit Volume Surface Area = 500 m^2/m^3 Media Fill Fraction = 45 percent *
	Effective Surface Area = 628,000 m^2
High-rate Nitrification MBBRs	Reactors No. 5 and No.6 (East and West)
	Media Unit Volume Surface Area = 500 m^2/m^3 Media Fill Fraction = 45 percent *
	Effective Surface Area = 628,000 m^2

* MBBR Fill Fraction % based on Record Documents for media delivered to site and As-constructed drawings for basin volumes.

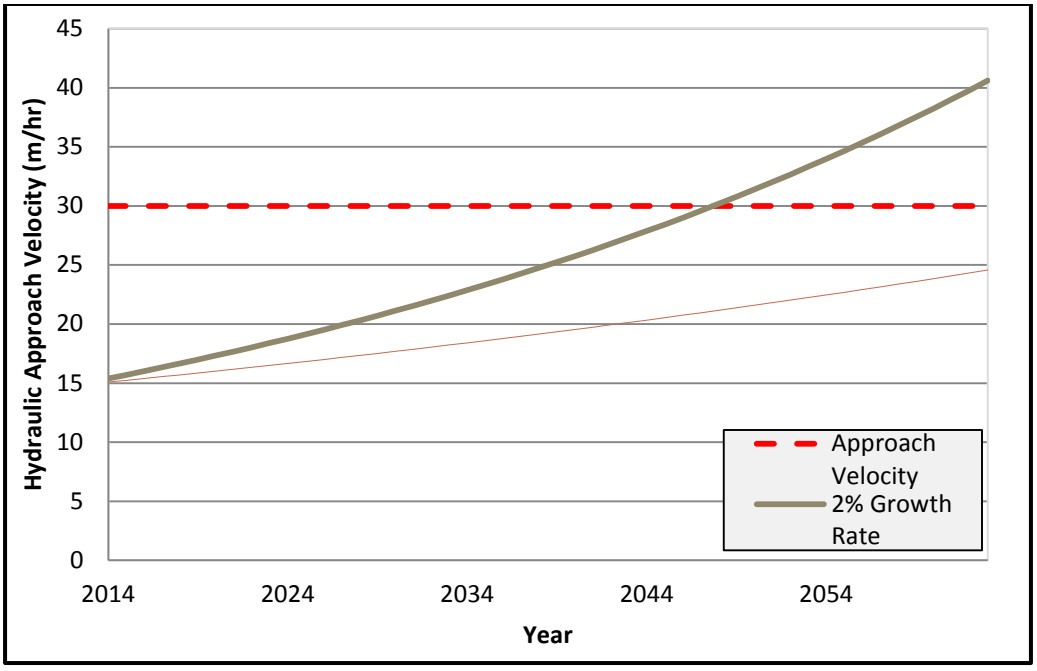


Figure 8-6
CCWRF Hydraulic Approach Velocity Projection

The upper curve shown in Figure 8-6 projects hydraulic flow growth by 2 percent. The last five years have shown very minimal growth in flows at the CCWRF. If the hydraulic approach velocity increases by 1 percent each year, then the MBBR process would not be hydraulically limited until year 2048. When special users are added such as NCAR or Microsoft in the future, the curves should be reevaluated. The anticipated flows from those facilities will not cause hydraulic limitations at the CCWRF within the near term planning period of 20 years.

The CCWRF biological process was designed to be a carbonaceous removal MBBR followed by a high-rate nitrification MBBR. Capacity ratings for MBBR are controlled by loading rates on the media. Table 8-14 is provided in MOP35 and it shows the typical design parameters for loading rate for BOD and ammonia. The typical design parameters for nitrate and BOD removal rate in the anoxic zones are also presented. The removal rate is the loading of nitrate or BOD to the plastic media carriers per day that is biologically transformed to carbon dioxide and dinitrogen gas. The denitrification zones were sized with the removal rate presented in the table above.

Table 8-14
MBBR Typical Nutrient Design Loading Rates

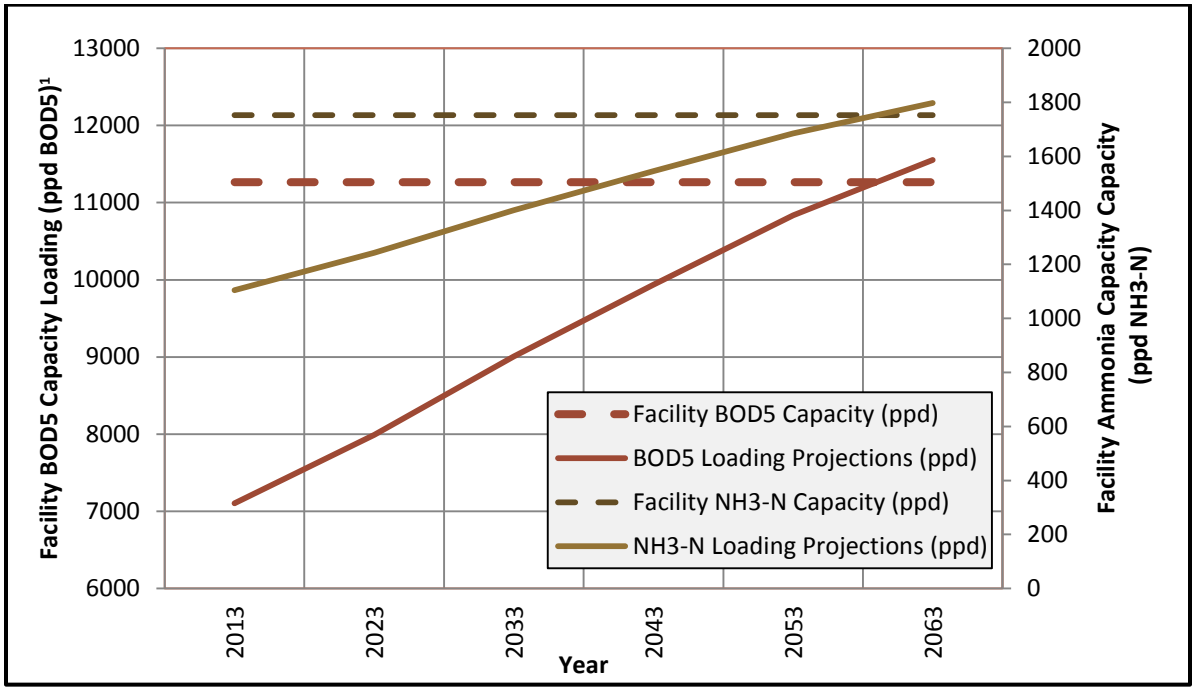
Reactor Designations	Details
Denitrification MBBRs	Nitrate Removal Rate = 0.7 $g/m^2/d$ BOD Removal Rate = 2.0 $g/m^2/d$
Carbonaceous Removal MBBRs	BOD Loading Rate = 5.5 $g/m^2/d$
High-rate Nitrification MBBRs	BOD Loading Rate = <0.8 $g/m^2/d$ NH3-N Loading Rate = 1.3 $g/m^2/d$

The current BOD loading rate to the carbonaceous removal MBBRs is 1.3 $g/m^2/d$. This value is well below the design guideline of 5.5 $g/m^2/d$ which is consistent with values provided in MOP8, MOP 35, and data from over 600 installations around the world. The capacity loading rate at 7.5 mgd is 2.0 $g/m^2/d$, which is below the typical referenced in the literature.

The current NH3-N loading rate to the nitrification basins is 0.8 $g/m^2/d$. The 1.3 $g/m^2/d$ design guideline is an established number provided in MOP8, MOP 35, and data from over 600 installations around the world. The capacity loading rate at 7.5 mgd is 1.3 $g/m^2/d$, which is consistent with the typical observed maximum value provided in MOP8, MOP 35,

and data from over 600 installations around the world. The capacities were calculated from current day observed data and loading projections.

Figure 8-7 provides a visual representation of future biological treatment capacity. No capacity related improvements are needed at the MBBR within the near term (10-year) or mid term (20-year) planning periods. BOPU may want to consider increasing biological capacity by adding reactor volume and media in the long term planning at year 2058. The current rated capacity is 6.5 mgd, although the facility could be rerated to 7.5 mgd. BOPU should consider applying for a rerate through WYDEQ.



[1]Assumes 100% Recycle and 1 g/(m^2·day) BOD_5 removal in Anoxic Basins and a BOD_5 loading rate of 5.5 g/(m^2·day) in Basins 3 and 4.

Figure 8-7
CCWRF BOD_5 and NH_3-N Capacity Analysis

8.4.4 Secondary Clarifiers

The State of Wyoming requires the SOR for secondary clarifiers be less than 800 gpd/sf at average design flow and 1,200 gpd/sf at peak hour flow. Figure 8-8 provides current performance and future performance projections for hydraulic and organic capacity. The curve for peak hour flow is based on the assumed shaving of peak flow to DCWRF when the facility flow reaches 12 mgd. The dashed lines in the figure represent WYDEQ design criteria for average surface overflow rate and peak hour surface overflow rate. These limits

agree with commonly accepted literature sources (i.e. Metcalf & Eddy Wastewater Treatment Design Guide, 10 State Standards, and Manual of Practices, Volume 8, Book 2).

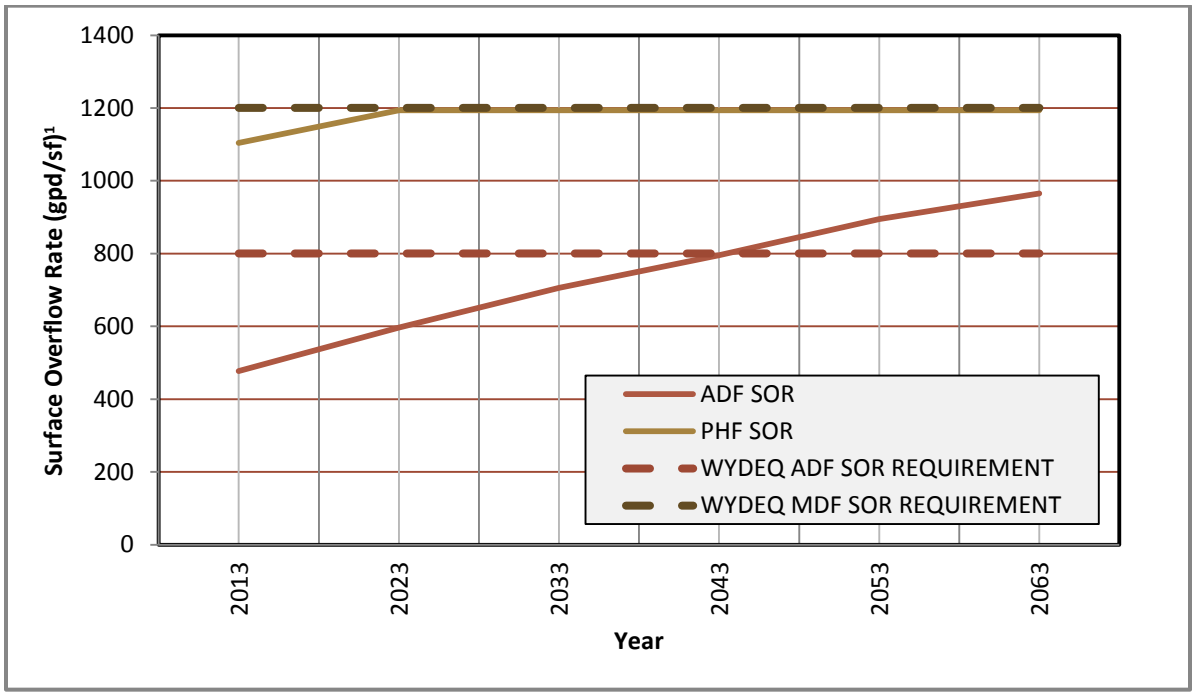


Figure 8-8
CCWRF Secondary Clarifier SOR Evaluation

The peak hour surface overflow rate (SOR) shows the facility is limited by hydraulic capacity at its peak hour flow of 12 mgd. This limitation is expected to occur in year 2023 based on flow projections provided in Volume 2. This limitation is not cause for concern because excess flows are conveyed to the DCWRF. The average surface overflow rate limitation occurs in thirty years. To summarize hydraulic capacity of the secondary clarifier capacity, the CCWRF will not require additional surface area for the foreseeable future.

Another generally recognized secondary clarifier rating parameter, solids loading rate (SLR), examines unit solids capacity. However, WYDEQ does not have a standard for SLR for fixed film processes. There is no SLR standard in the industry for MBBR secondary clarifiers because they have very small loading rates in comparison to conventional activated sludge secondary clarifiers.

The weir overflow rate, similar to SOR, indicates hydraulic unit capacity. The weir overflow rate (WOR), also sometimes referred to as the weir loading rate, is measured by dividing the average design flow by the weir perimeter length and by dividing the peak hour flow by the weir perimeter length. WYDEQ has standards of 12,000 gpd/lf for average design flow

and 20,000 gpd/lf for peak hour flow. The weir length for both secondary clarifiers was summed and then used to determine hydraulic overflow capacity using the maximum day flow and the peak hour flow. Figure 8-9 presents projections of these calculations to year 2063. The dashed lines in the graph represent WYDEQ ADF WOR and PHF WOR requirements. The facility is not hydraulically limited by WOR in the near, mid, or long term.

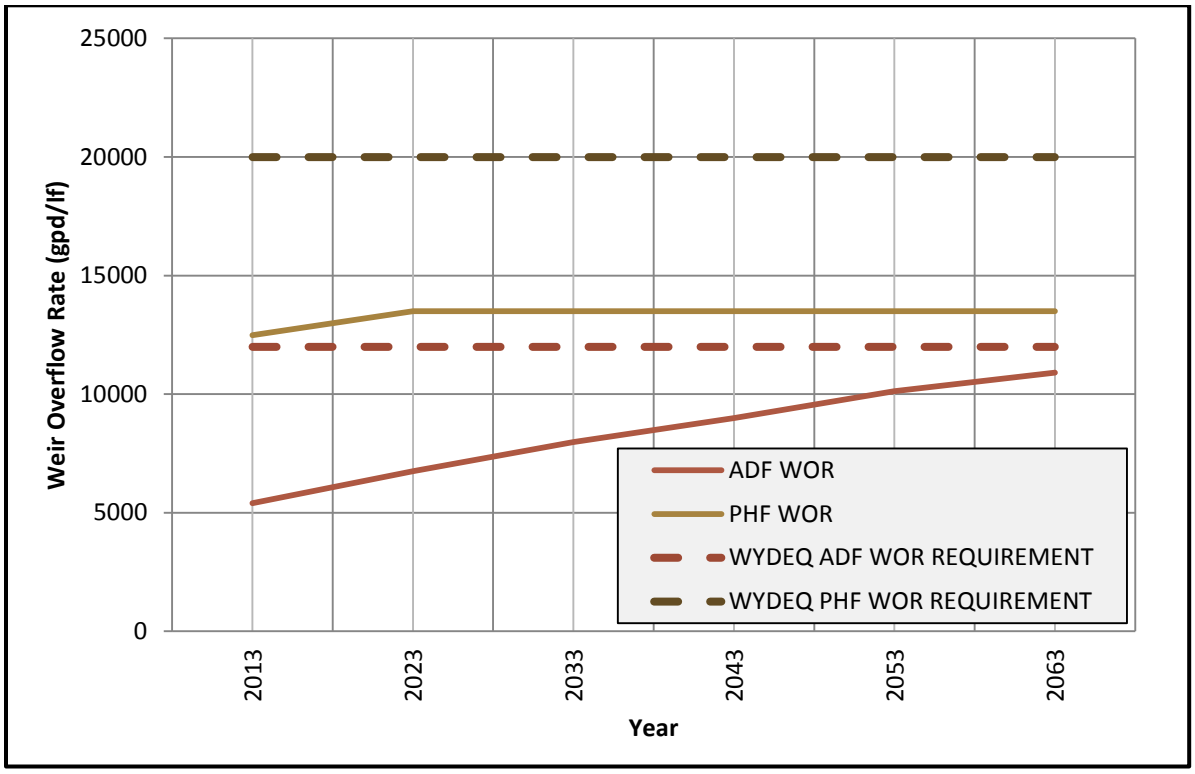


Figure 8-9
CCWRF Secondary Clarifier WOR Evaluation

8.4.5 Disinfection

WYDEQ does not have standards for ultraviolet (UV) disinfection at this time, but according to other commonly accepted wastewater design literature such as Ten State Standards and WEF MOP8, UV capacity is based on dose, UV transmittance (UVT), and peak hourly flow.

The current observed operational UVT values average around 66 percent for CCWRF, based on recent data taken over a two week period in May 2013. Based on the collected UVT data and vendor modeling using a 60 percent UVT and a dose of 30 mJ/cm^2, the CCWRF has a disinfection capacity of 13.2 mgd. Since all peak flows above 12.0 mgd are diverted to the DCWRF, no capacity related improvements are needed for UV disinfection within the near term (10-year) or mid term (20-year) or long term (50 year planning periods).

8.4.6 Summary of Unit Process Capacity Evaluations

Figure 8-10 provides a summary of maximum day flow and peak hour flow capacity for unit processes at the CCWRF. WYDEQ has standards for average day and maximum day for primary clarifiers. The facility is not hydraulically limited by primary clarification. Biological capacity limits the facility hydraulic capacity to 7.5 mgd. Further evaluation through stress testing or modeling could prove the hydraulic capacity is 8.0 mgd. The secondary clarifier SOR and WOR at peak hour flows are also limiting; however, any peak flows above 12.0 mgd are currently sent to the DCWRF.

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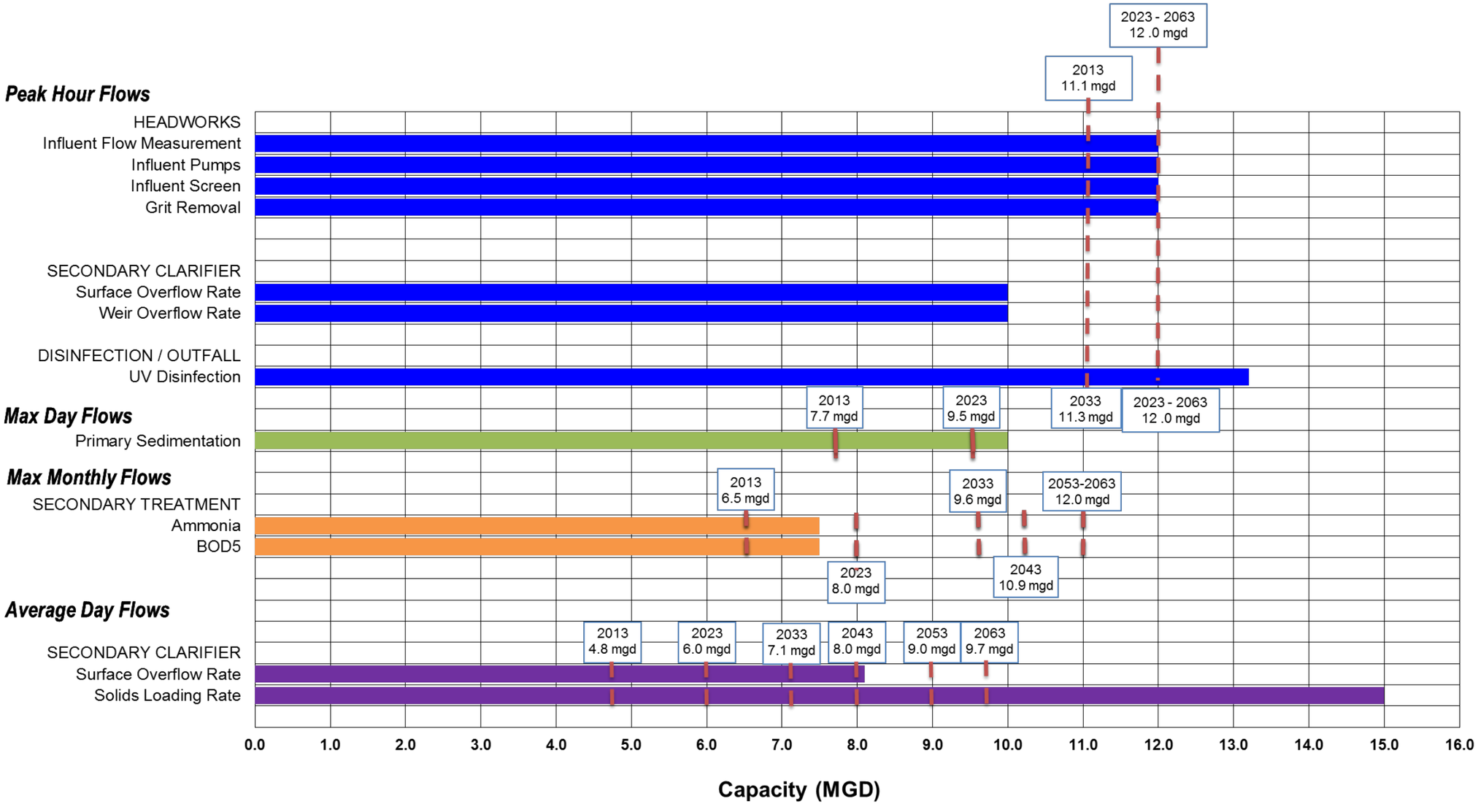

Figure 8-10
CCWRF Hydraulic Unit Capacity Summary

8.4.7 Recommendation

The CCWRF is currently rated at 6.5 mgd. Based on the analysis and conclusions presented in the previous sections, HDR recommends BOPU petition the WYDEQ to rerate the CCWRF for 7.5 mgd MMF capacity. This recommendation assumes influent characteristics remain similar to present day concentrations. It should be noted that a substantial shift in influent quality due to a new industrial contributor could change the calculated capacity rating of 7.5 mgd, 11,263 pounds of organic load (BOD_5) per day, and 1,752 pounds of ammonia per day.

No capacity related improvements are recommended for the CCWRF within the near term (10-year) or mid term (20-year) planning periods. BOPU should continue to monitor and evaluate the effectiveness of bypassing flows in excess of 12 mgd to the DCWRF. Future master planning efforts should evaluate the cost effectiveness of expanding both the WRFs or focusing all expansion efforts only on the DCWRF.

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8.5 DCWRF Unit Process Capacity Evaluations

This section presents the current capacity of each of the unit processes at the DCWRF and a projection of the point in time when they will reach rated capacity.

8.5.1 Influent Pumping Station, Storm Equalization Basin, and existing Headworks

The existing influent pumping station provides the DCWRF with the capacity to handle the design peak hydraulic flow of 21.5 mgd. Any peak flows greater than 21.5 mgd collect in the WRF wetwell for short periods of time. If enough excess volume is collected, the wetwell spills over to the storm equalization (SEQ) basins which have 1.16 million gallons of available volume for storage of overflows. The SEQ basin water level matches the level in the influent wetwell. Since the SEQ basin is earth lined, its use is limited to emergency flows only. The SEQ basin is sized large enough that it will never overflow.

The influent pumps are controlled with one lead pump on to accommodate base flows. The three additional pumps act as lag pumps and turn on one at a time as flows increase.

Two self-cleaning, stair type screening units and two screenings wash/press systems, were installed in 2006. The stair screens remove debris (screenings) from the influent wastewater channel and then transport the collected screenings out of the channel into a dedicated wash/press unit. Each self-cleaning screen is rated for the peak hour hydraulic flow of 21.5 mgd.

A grit removal system consisting of a single vortex type grit removal unit, coupled with a cyclone style grit separator, is provided down stream of the screening units. The grit removal system is rated for the peak hour hydraulic flow of 21.5 mgd.

Based on the flow data provided, the current peak hour hydraulic flow is 21.8 mgd. Based on BOPU flow data, BOPU will need to consider installing a new screen and grit removal system in parallel to the existing systems to accommodate the future peak hourly flows.

In lieu of new screening and de-gritting facilities, HDR recommends BOPU install Flow Equalization tanks to trim the current and future peak hour hydraulic flow to 21.5 mgd. A more detailed discussion of flow equalization is provided later in the discussion of the secondary clarifier capacity.

Flow equalization would prolong the unit hydraulic capacity of the influent pumps, screens, and de-gritting system until approximately 2040.

8.5.2 Primary Treatment

As discussed previously in the CCWRF primary clarifier evaluation, primary clarifier hydraulic capacity is determined by examining SOR. Figure 8-11 provides projections of hydraulic capacity to year 2063 and shows the WYDEQ standards for average day flow and maximum day flow. These parameters are used for design, but can also be used to examine unit hydraulic capacity.

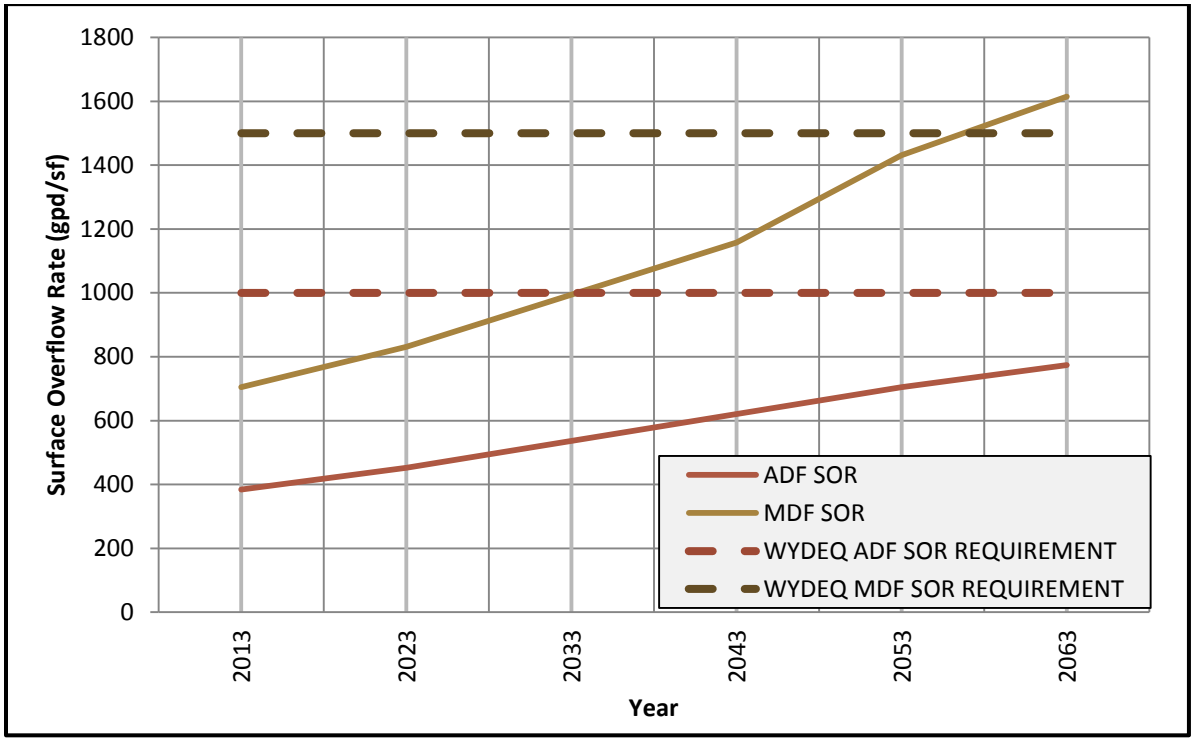

Figure 8-11
DCWRF Primary Clarifier SOR Evaluation

Based on the flow projections from Volume 2, the primary clarifiers are not limited on an average day basis. However, the primary clarifiers will become limited by hydraulic unit capacity in approximately 44 years as shown in Figure 8-11. The curve for maximum day flow does not follow the same curvature or pattern as the average day flow. This is an important observation because it shows the impacts that CCWRF overflows will have on the primary clarifier capacity at the DCWRF.

8.5.3 Secondary Treatment

The DCWRF currently uses the Integrated Fixed Film Activated Sludge (IFAS) process for secondary treatment. The wastewater industry in the United States has moved the IFAS technology from a "promising" technology to an "established" technology in the past decade. The 2010 EPA "Nutrient Control Design Manual" refers to the IFAS process as a proven technology. One key difference between the IFAS process and the MBBR process is that the IFAS process has a return flow stream of activated sludge (RAS) that is pumped back from the secondary clarifiers to the head of the biological treatment process; thus the IFAS process utilizes both a suspended biomass and a fixed film biomass for waste treatment. This allows the IFAS process to use smaller basin volumes than either activated sludge or MBBR processes.

Three clarifiers follow the IFAS process and they return on average about 40 percent of the influent flow (as RAS) to the biological process by combining it with primary effluent. The IFAS system operated at a MLSS concentration of 2200 to 2400 mg/L after commissioning the plant. Over time, the operators have realized they can achieve similar performance at lower RAS rates and have thus adjusted the flows. The flow adjustment has resulted in a drop in average MLSS to approximately 1,800 to 2000 mg/L over the past three years.

Dissolved oxygen concentrations are generally maintained at 4.5 to 5.0 mg/L in the aerobic zones. The system total SRT is approximately 10 days, which is also the planned target SRT of the facility. The average SVI in the clarifiers is between 250 to 260. This average value indicates that SRT could be lowered to improve settling. To lower SRT, the facility would need to waste more solids. By increasing the wasting rate, the solids would essentially concentrate and thus settle better in the bottom of the secondary clarifiers. Based on IFAS calculations, it appears the total SRT of the system could be lowered to 5.0 days to achieve a lower SVI without harming treatment performance.

IFAS Basins were briefly described in the improvements summary provided earlier in this Volume. In general, the DCWRF IFAS system is comprised of two IFAS basins operated in parallel. Within each IFAS basin there are two reactors in series, each containing plastic biofilm carrier elements. Each IFAS basin is linked to an upstream un-aerated treatment tank (Anoxic Basin) for nitrate removal and future phosphorus reduction. The Anoxic Basins do not contain any plastic biofilm carrier elements and utilize only suspended biomass for treatment.

Table 8-15 summarizes the key parameters of the secondary treatment system at the DCWRF. The design media unit volume surface areas for plastic carriers are provided along with the total design reactor media fill fraction for carbonaceous organic removal

reactors and nitrification reactors. These design parameters are used to calculate and estimate treatment loading rates.

Table 8-15
IFAS Design Parameters

Reactor Designations	Details
Denitrification	Anoxic Basin No. 1 and No. 2 (North and South) Nitrate Recirculation Ratio = 100 percent
Anoxic Volumes	North Train volume = 58 kcf South Train Volume = 40.5 kcf
IFAS North Train	North IFAS Basins No. 1 and 2 Volume = 58 kcf each Total Combined Volume = 116 kcf
Media Design	Media Unit Volume Surface Area = 500 m^2/m^3 Media Fill Fraction = 50 percent *
Media Design	Effective Surface Area = 701,567 m^2
IFAS South Train	South IFAS Basins No. 1 and 2 Volume = 58 kcf each Total Combined Volume = 116 kcf
Media Design	Media Unit Volume Surface Area = 500 m^2/m^3 Media Fill Fraction = 50 percent *
Media Design	Effective Surface Area = 701,567 m^2

* IFAS Fill Fraction % based on Record Documents for media delivered to site and As-constructed drawings for basin volumes.

The typical practice in analyzing the IFAS process is to separate the carbonaceous organic removal process from the nitrogen removal process. Separating out the two processes allows for optimal performance of each treatment step. This balancing act is performed by selecting appropriate fractions of media to optimize nitrifier growth, while recycling enough activated sludge to keep an inventory of suspended mass large enough to efficiently remove carbonaceous organic material.

Adjusting the balance is achieved by adjusting solids retention time, wasting rates, dissolved oxygen concentration, mixing energy, and other controllable parameters. Selecting the plastic media surface area is one way to select how much biomass will grow and thus predict how much nitrogen can be removed.

Another parameter that is important is hydraulic approach velocity. For an IFAS system it is calculated similar to an MBBR system with the exception that there is a return activated sludge flow included in the numerator. The summation of flows (PHF + RAS + MLR) entering the biological basins is divided by the cross sectional area (SWD x basin width) of the biological basins. Some manipulation of the internal mixed liquor can be implemented once the hydraulic capacity reaches 30 m/hr; however, doing so reduces the nitrate load to the anoxic zones. Less nitrate could result in decreased BOD_5 removal. Decreased BOD_5 removal can result in a higher BOD_5 loading to the nitrification MBBR basins, which can cause decreased ammonia removal performance. Any changes to the recycle of nitrates to reduce the hydraulic approach velocity should be closely evaluated to assure the facility will meet discharge permit limits.

Figure 8-12 shows the projected hydraulic approach velocity curves based on 2 percent and 1 percent flow capacity growth rates over the next 50 years. The 2 percent growth rate curve hits the 30 m/hr capacity limitation at year 2034, while the 1 percent growth rate curve hits capacity at year 2050. Since growth is not anticipated to average above 2 percent (see Volume 2 flow capacity development discussion), the DCWRF IFAS system is estimated to require additional volume in 2034.

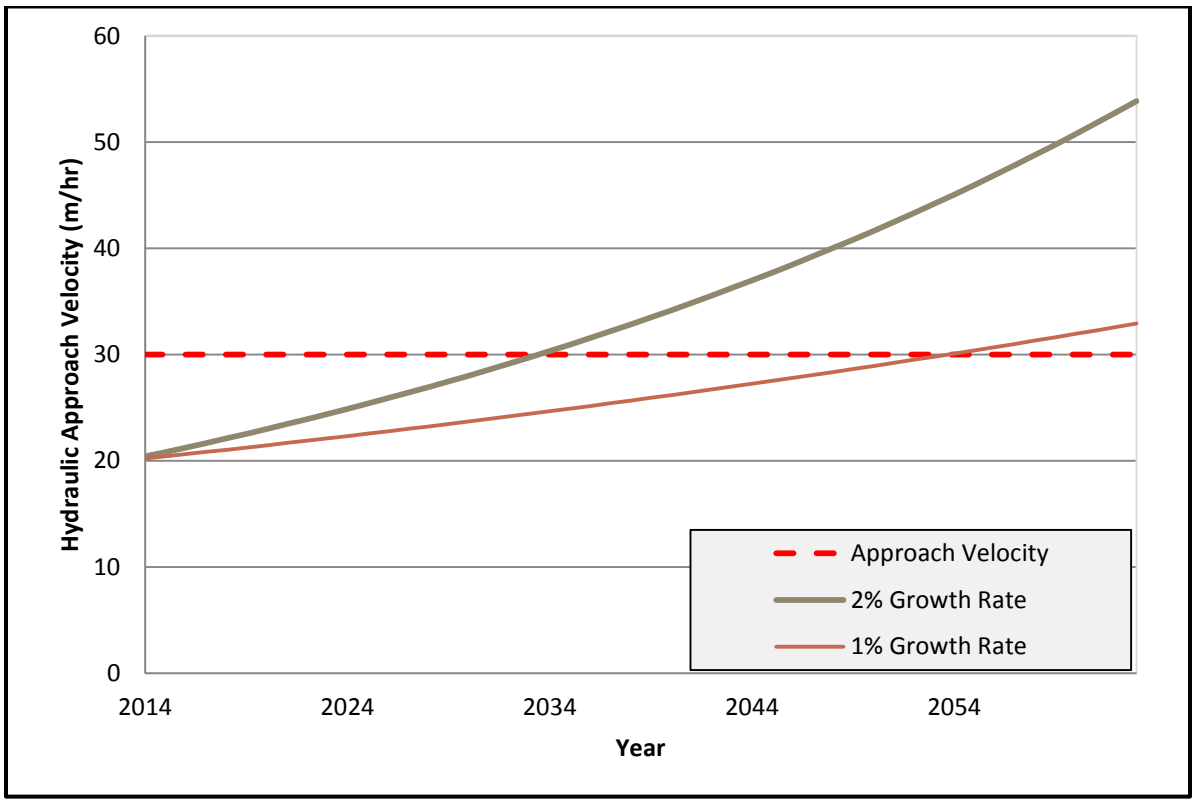

Figure 8-12
DCWRF IFAS Hydraulic Approach Velocity Projection

Figure 8-13 shows what the hydraulic approach velocity would be with flow equalization. Flow equalization makes it possible to delay improvements targeting the hydraulic approach velocity to approximately 2048 and perhaps even further, if the growth rate over the next fifty years is less than 2 percent.

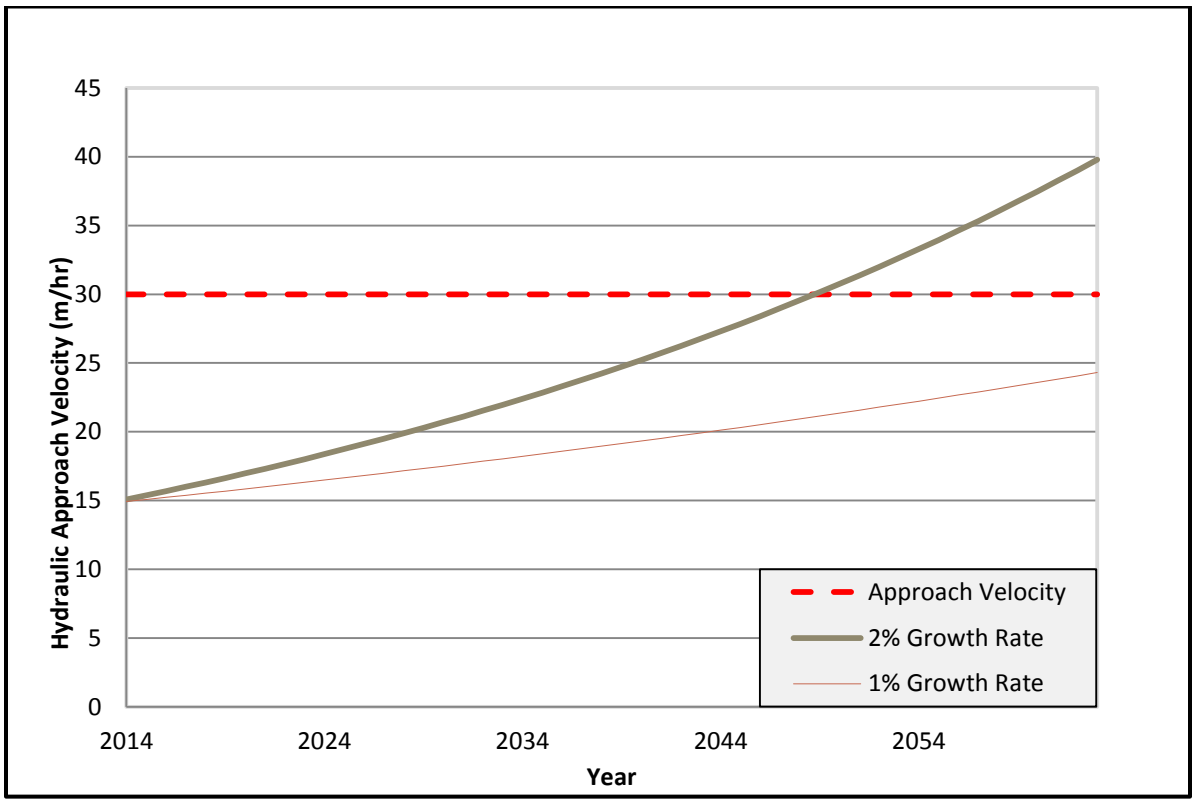

Figure 8-13
IFAS BOD and Ammonia Capacity Projections

The hydraulic approach velocity is not the only process parameter that must be examined. The performance of an IFAS process depends on maintaining a balance between many different parameters that can be controlled and optimized. Performance data is summarized in charts and graphs provided in Appendix 8-A.

Solids retention time (SRT) is generally selected to limit heterotrophic attachment to the media, which use BOD as a food source, and allowing for nitrifying biofilms to develop on the media. BOD oxidation is achieved by heterotrophic bacteria found in the bulk liquid, while ammonia oxidation is carried out by autotrophic bacteria that attach to the floating media in the IFAS system. Optimal performance is achieved by maintaining an SRT long enough to limit heterotrophic biofilm development (i.e. keeping the heterotrophs in the suspended mass), but short enough that nitrifiers are retained on the media biofilm attachment surface. The overall mixed liquor concentration is thus a summation of the heterotophic mass found in the bulk liquid and the nitrifying mass attached to the media. SRT changes can be made by controlling recycle flows and waste flows.

The DCWRF observed effluent discharge data show that the facility produces an effluent concentration of BOD of less than 5 mg/L, an effluent ammonia concentration of less than 3.5 mg/L, and an effluent TSS concentration of less that 10.6 mg/L. A summary of operational data indicates the facility operates at an SRT of 10 days. If the SRT were decreased to 5 days, the MLSS inventory would increase to approximately 3600 mg/L from an average of 1900 mg/L in the winter time. The hydraulic approach velocity is a limiting factor in IFAS design because once the standard limit of 30 m/hr is reached, BOD_5 removal capacity in the anoxic zones begins to decrease. If less BOD_5 is removed in the anoxic zones, the IFAS reactors downstream will have a higher BOD_5 loading. A higher BOD_5 loading can lead to increased growth of BOD_5 loving bacteria on the media, which reduces the amount of ammonia loving bacteria. Also penetration of dissolved oxygen through the biofilm is decreased. Although hydraulic approach velocity can be reduced by reducing the mixed liquor flow back to anoxic zones, denitrifying bacteria depend on nitrate from the mixed liquor. With less nitrate for the denitrifying bacteria, less BOD_5 will be removed. The only option once the hydraulic approach velocity is reached is to add volume. Media could be added up to a 60% fill fraction, but piloting is recommended to assure the IFAS system can meet performance requirements.

The analysis of the IFAS system biological capacity takes into account process adjustments versus leaving the system operating under current conditions. The analysis also assumes that the capacity of the existing aeration system remains unchanged. Figure 8-14 provides a graphical representation of IFAS system biological capacity for removal of BOD_5 and ammonia.

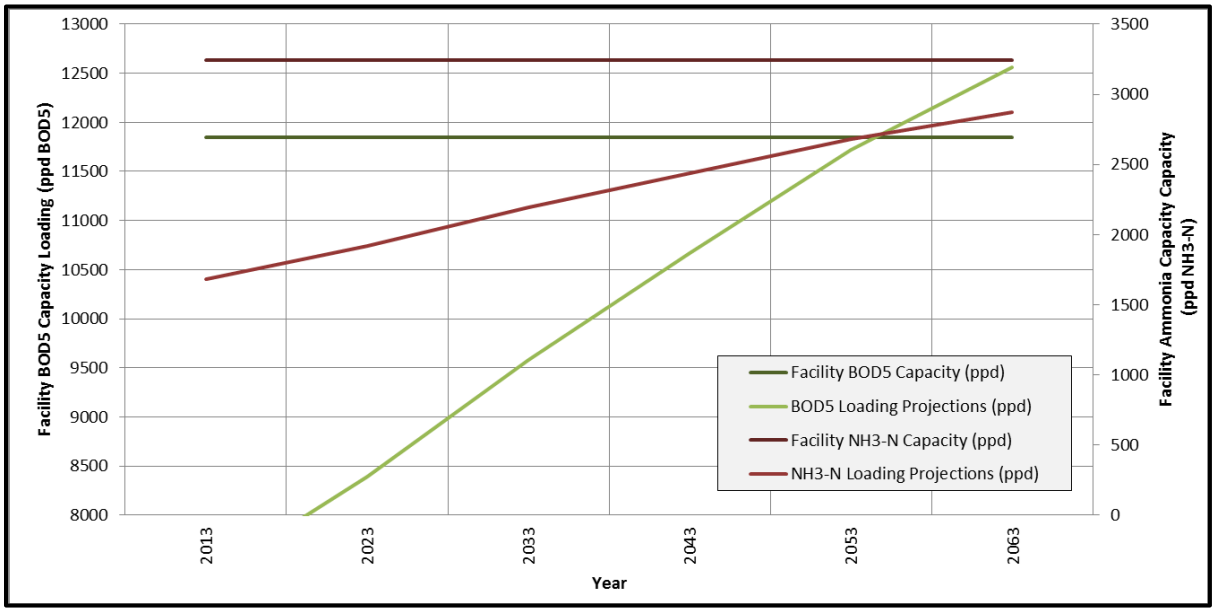

Figure 8-14
IFAS BOD and Ammonia Capacity Projections

No biological capacity related improvements are needed at the IFAS within the near term (10-year) or mid term (20-year). The facility is limited by available volume. Hydraulic approach velocity will require a decrease in mixed liquor return flow. A general rule of thumb for mixed liquor return of nitrates is that if the mixed liquor return flow is 100% of the average day flow, 50% of the nitrates produced in the IFAS zones is recycled to the anoxic zones. If the mixed liquor return flow is decreased, then denitrification will be affected since denitrifiers need nitrate as an electron acceptor.

8.5.4 Hydraulic Profile through Secondary Treatment System

A review of the hydraulic profile through the DCWRF reveals limited elevation change from primary clarifier weirs to the secondary clarifier weirs. This limits the hydraulic throughput of the secondary treatment system to a peak hour flow of 21.5 mgd. Given the ratio of peak hour to maximum month flows depicted earlier in this Volume, the DCWRF cannot be rerated beyond its current 10.5 MMF due to hydraulic constraints. If flow equalization is implemented as described in the Secondary Clarifier Section, the DCWRF may be a candidate for re-rating at that time. Depending upon the configuration of the flow equalization system, a rerating to a MMF of 12 mgd may be possible.

8.5.5 Secondary Clarifiers

As previously mentioned in the CCWRF discussion, secondary clarifiers are designed based on criteria set for by the WYDEQ for surface overflow rate, solids loading rate, and weir overflow rate. The following figures provide a visual perspective of current day capacity with projections to the year 2063. Figure 8-15 and Figure 8-16 show the secondary clarifier surface overflow rates without flow equalization and with flow equalization, respectively.

WYDEQ's standards are newly developed and were not in place when the DCWRF clarifiers were constructed in 2006. WYDEQ's design standard for PHF SOR is very conservative compared to the 10 State standards, WEF MOP and other published design guides.

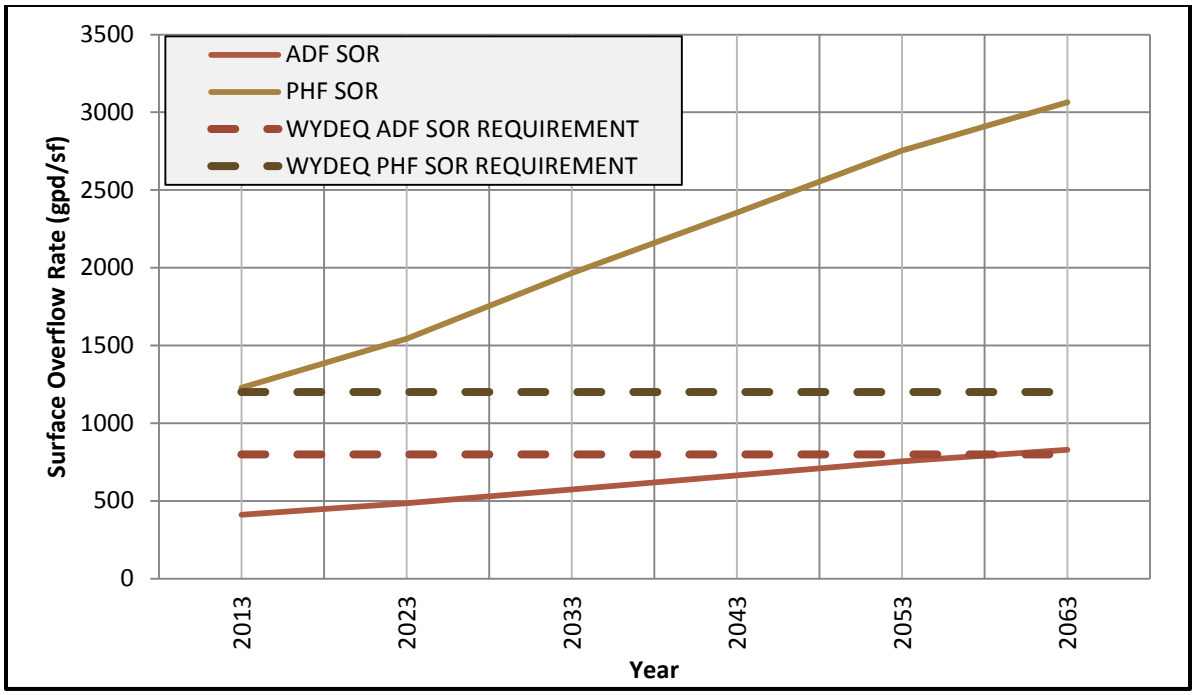

Figure 8-15
DCWRF Secondary Clarifier SOR Evaluation without EQ

Figure 8-15 shows that based on WYDEQ criteria for SOR, a new 80-foot diameter secondary clarifier is needed right away. The peak hourly flow criteria are being exceeded even today. If a secondary clarifier is installed today, then another will be needed in 10 years for a total of two new clarifiers within the 20 year planning period. The total estimated cost (including engineering and contingencies) of each new secondary clarifier is estimated at $2.2 million in 2013 dollars.

However, with such low observed solids loading rates and examining other design standards (WEF MOP8, 10 state standards, and Metcalf & Eddy), the SOR limit could be raised to 1,600 gpd/sf rather than WYDEQ limit of 1,200 gpd/sf without compromising effluent quality. If the limit of 1,600 gpd/sf was established, a new secondary clarifier would not be required until 2025. Changing the SOR standard would require a variance be obtained from WDEQ which they may not be willing to grant. Prior to submitting a variance request to WYDEQ, BOPU should conduct a clarifier capacity analysis for the DCWRF. Given the settling properties that could be attained by operating the SRT lower, and the depth of these clarifiers, a dynamic state point analysis would likely show that these clarifiers could manage peak SORs of 1,800 gpd/sqft without running into clarifier overload or clarifier failure conditions. At 1,800 gpd/sqft, new secondary clarifiers would not be needed until approximately 2033.

Should WYDEQ deny the variance request, a cost effective alternate solution to delay adding secondary clarifiers would be to add flow equalization at the DCWRF. This would shave the peak hour flows and thus the secondary clarifiers SOR would be decreased. Instead of using 21.8 mgd for the peak hour, an equalization tank sized at approximately 300,000 gallons could be added to the process train. This size was determined based on five years of hourly flow data and identifying the magnitude and frequency of design storm events. The peak hour was determined by isolating data anomalies through linear regression analysis.

The new flow equalization basin would be a cast in place concrete tank constructed in the vicinity of the existing emergency storm ponds. The total estimated cost (including engineering and contingencies) for a new flow equalization basin sized as described above is estimated at $1.6 million in 2013 dollars.

This volume will effectively allow the DCWRF to delay the need to add a new secondary clarifier until after the end of the mid term (20 year) planning period, or around 2035.

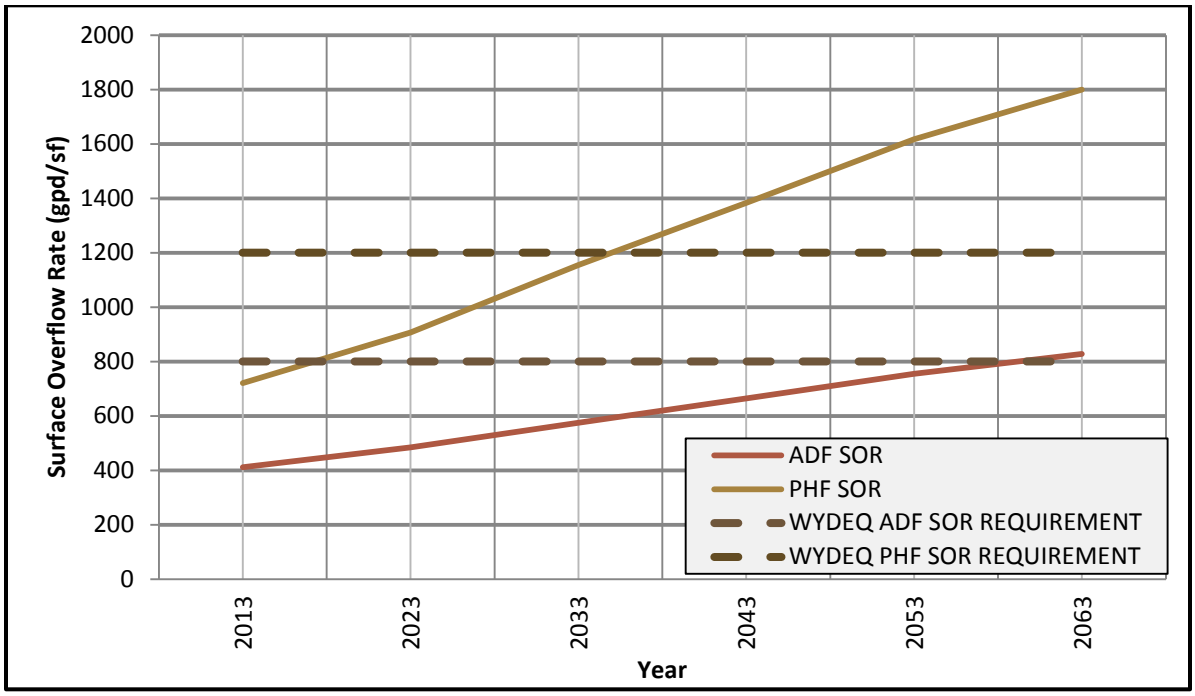

Figure 8-16
DCWRF Secondary Clarifier SOR Evaluation with EQ

Figure 8-16 shows the impact on SOR limitations by adding a flow equalization volume of approximately 300,000 gallons. The solids loading rate parameter was previously described in the secondary clarifier unit process evaluation for CCWRF. There are no WYDEQ standards for solids loading rate for fixed film clarifiers. Thus this analysis does not include verifiable parameters.

Figure 8-17 shows weir overflow rate projections which indicate that a secondary clarifier would be needed right away if no flow equalization is provided.

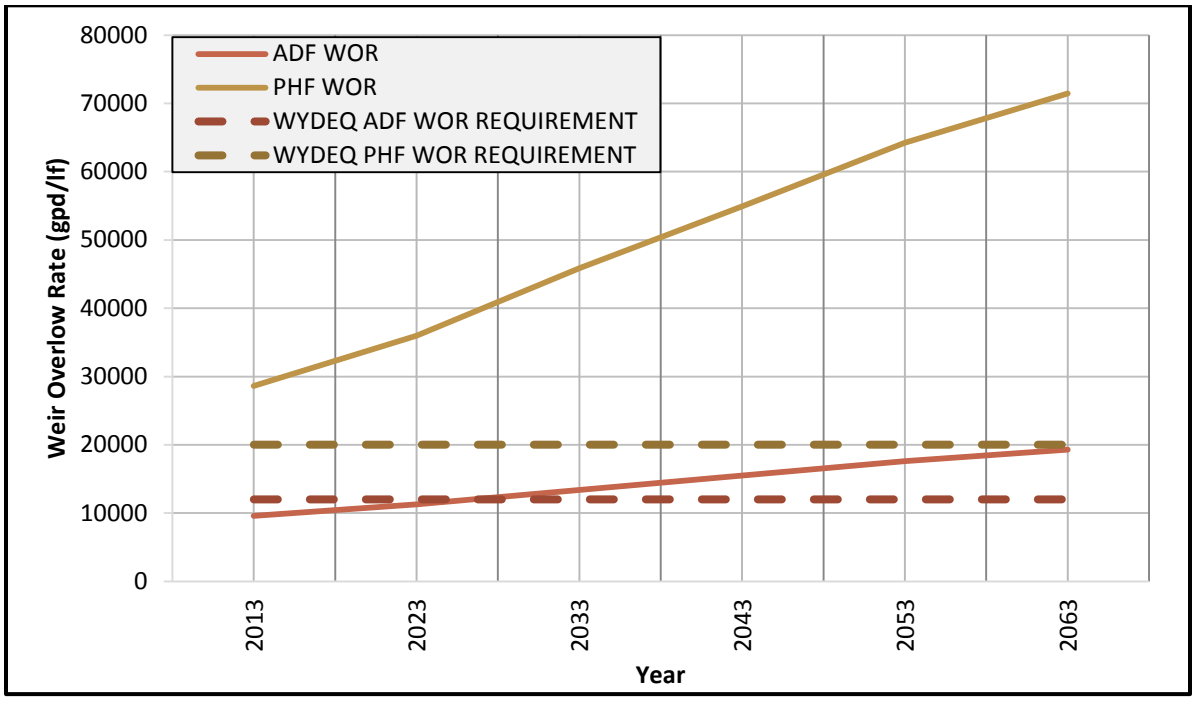

Figure 8-17
DCWRF Secondary Clarifier WOR Evaluation

A summary comparison of WYDEQ standards for the weir loading rate (or weir overflow rate, WOR) to other commonly accepted literature sources for secondary clarifier design is provided here:

1. **<u>WYDEQ Standards</u>**

   Design Flow – 12,000 gpd/sf (launder and weir at outer wall)

   PHF – 20,000 gpd/lf (launder and weir at outer wall)

2. **<u>Ten State Standards</u>**

   Design Flow – 20,000 gpd/lf

   PHF – 30,000 gpd/lf

3. **<u>MOP8 (page 14-426)</u>**

   Small tanks - PHF 20,000 gpd/lf

   Large tanks - PHF 30,000 gpd/lf

4. **Metcalf & Eddy (2004 edition)**

   Small tanks - PHF 10,000 gpd/lf

   Large tanks - PHF 30,000 gpd/lf

Although the standards vary somewhat, it does appear that WYDEQ's peak hour WOR limits are significantly more conservative than other commonly accepted design standards. Figure 8-18 shows WOR curves taking into consideration equalization upstream. Figure 8-18 indicates that a secondary clarifier (or an approved WDEQ variance) would be needed by 2020 to meet WYDEQ standards. If the standard is revised to 30,000 gpd/lf, a secondary clarifier would not be required until 2045. If flow equalization was added, a secondary clarifier would not be required within the 50 year planning period.

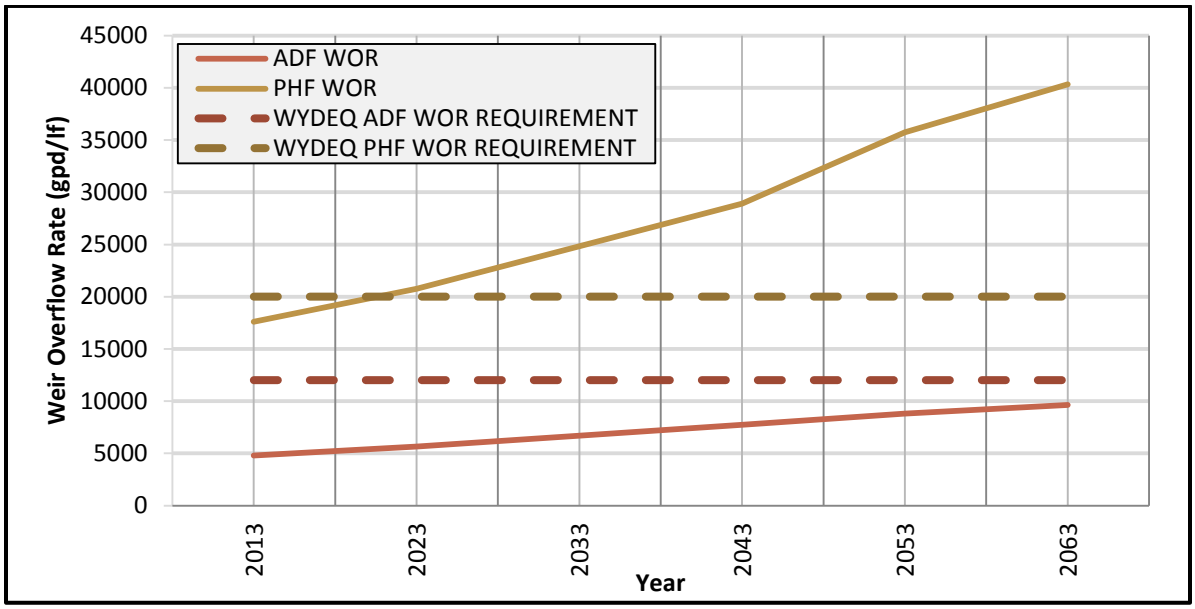

Figure 8-18
DCWRF Secondary Clarifier WOR Evaluation with Flow EQ

8.5.6 Disinfection

WYDEQ does not have standards for ultraviolet (UV) disinfection at this time, but according to other commonly accepted wastewater design literature such as Ten State Standards and WEF MOP8, UV capacity is based on dose, UV transmittance (UVT), and peak hourly flow.

The current observed operational ultraviolet light transmittance (UVT) values average around 69.5% for DCWRF. Based on vendor modeling, DCWRF has a disinfection

capacity of 26.2 mgd using a design UVT of 66% and a dose of 30 mJ/cm^2. As shown in the Volume 2 flow projections, DCWRF will experience flows of approximately 27.4 mgd by the year 2023.

Flow equalization is strongly recommended to mitigate capacity impacts from peak hourly flow. The life of the existing UV system could be extended to year 2050 if flow equalization is implemented. The other option would be to construct an additional channel with new modules. This project would need to take place before 2020 if no equalization is implemented.

8.5.7 Summary of Unit Process Capacity Evaluations

Figure 8-19 shows the existing capacity for unit processes at DCWRF as well as projected capacity needs in the near term, mid term and long term. Figure 8-20 shows the capacity for DCWRF treatment units considering attenuation of peak flows with flow equalization.

All headworks processes (pumping, screening, and de-gritting) and the secondary clarifier process are showing an immediate capacity deficiency relating to peak hour flows. This is counter to operational observations and process performance data. One possible explanation to the apparent discrepancy in calculated verse observed capacity is the belief that influent flows are not being measured accurately.

The flow measurement device is located down stream of the influent screens. As the screen face accumulates solids, the water level upstream of the screen rises. When the screen cycles and the solids are removed, a raised water surface “wave” moves downstream and is seen at the flow measurement device. During storm events, the flow measurement device would mistakenly measure this ”wave” as a high flow.

As noted in the Recommendations Section, at least 2 years of accurate flow metering data should be collected and analyzed before BOPU would initiate expanding unit processes to handle peak hour flows.

The DCWRF is currently limited by biological capacity and secondary treatment capacity. Flow equalization would lessen the flows to maximum day flows; thus needs for expansion projects could be delayed as shown in Figure 8-20.

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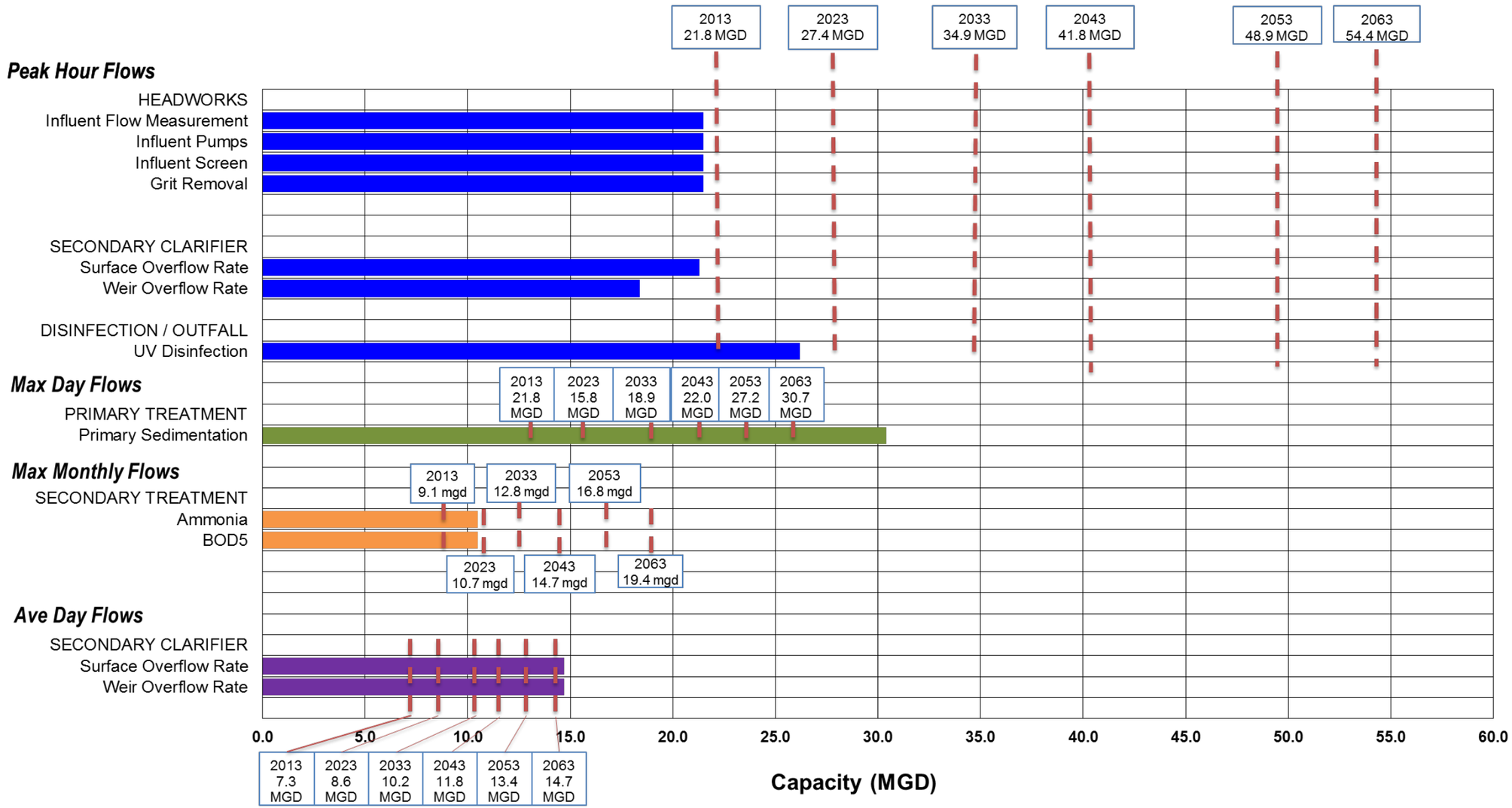

Figure 8-19: DCWRF Unit Hydraulic Capacity

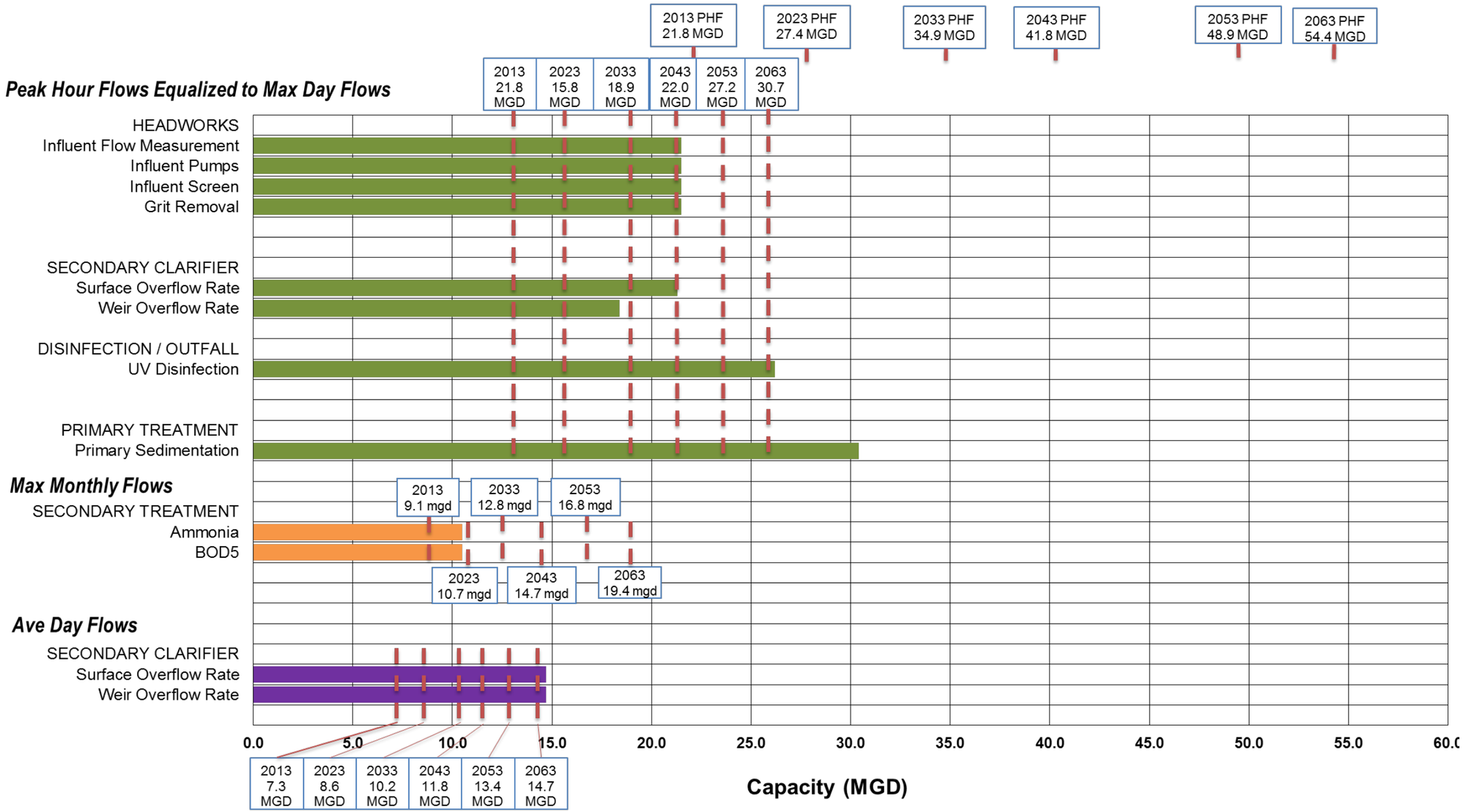

Figure 8-20: DCWRF Capacity with Equalized Peak Flow to Max Day Flow

8.5.8 Recommendations

The DCWRF is currently rated at a maximum monthly average flow of 10.5 mgd. Because of the hydraulic limitations presented earlier in this section, petitioning WYDEQ to re-rate the DCWRF beyond its current 10.5 rating is not recommended.

Several unit processes are showing an immediate capacity deficiency for handling peak hour flows. It is possible that the peak hour flow data is inaccurate. BOPU should initiate a project to relocate the influent flow measurement point upstream of the influent screens. Once this project is complete, at least 2 years of flow data should be collected and analyzed before initiating any projects geared toward expanding capacity to handle peak hour flows.

Prior to the next discharge permit renewal for the DCWRF, BOPU should request a variance from WDEQ for secondary clarifier peak flow SOR up to 1,800 gpm/sf. In support of that variance request, it is recommended that BOPU conduct the following:

- Operate the IFAS system at a lower total SRT for a period of at least one year
- Conduct a stress test on the secondary clarifiers to demonstrate adequate performance at higher SOR
- Support the stress testing with a dynamic statepoint analysis of the clarifier capacity.

Unless WYDEQ relaxes its design criteria for secondary clarifier rating, HDR recommends BOPU design and construct a flow equalization basin in the near term planning period

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8.6 Wastewater Digester Capacity Analysis

8.6.1 DCWRF Digester Capacity

Digester capacity is evaluated using two criteria: Sludge retention time (SRT) and solids loading rate (SLR). Depending on the configuration of the digestion system and the design standards used, one of the two criteria is usually exceeded before the other and becomes the controlling criteria.

8.6.2 SRT Evaluation

WYDEQ requires a minimum SRT of 15 days for mixed primary anaerobic digesters and EPA also uses this value as their "default" criteria regarding compliance with Class B sludge stabilization requirements. WYDEQ considers SRT to be equal to the liquid retention time when waste activated sludge is digested in the primary digester.

The current SRT in the primary digester averages approximately 20 days. Based on historic digester loading rates primary digester will not meet the minimum 15 day SRT when system-wide maximum month flows (CCWRF plus DCWRF) reach 15 mgd. Based on flow projections this will occur in the 15 to 20 year time frame. The solids loading rate will increase due to reuse and future total-N and total-P treatment facilities.

8.6.3 SLR Evaluation

The digesters on average receive a volatile solids loading rate of 0.244 lb/cf/day. WYDEQ requires additional digester capacity once the loading reaches or exceeds 0.300 lb VSS/cf/day. This value corresponds with the 83 percentile value based on 5 years of BOPU reported data. This value indicates the digesters are at capacity now since typical design practice for anaerobic digestion is to design for maximum month conditions or the 91.8 percentile value. For this evaluation, SLR is the controlling criteria and the digestion system is not within the statistical parameters for achieving the SLR standard value. Capacity related improvements to the digester system are required in the near term to bring the system in line with the SLR criteria.

The most straight forward approach to increasing digester capacity involves converting the existing secondary digester to primary digestion, and constructing a new secondary digester. This may or may not be the most cost effective approach, however. Sludge

pretreatment processes can sometimes reduce the SLR enough to significantly defer a digester capacity expansion.

8.6.4 Sludge Pretreatment

Several technologies are available for pretreatment of sludge prior to digestion. The main goal of the process is to lower the SLR by destroying cell walls in the waste activated sludge (WAS) so that readily degradable organics will be available prior to entering the digester, thereby increasing the efficiency of digestion, volatile solids destruction, gas production, and dewaterability. Technologies vary but most are based on providing physical (e.g. temperature, pressure) and/or chemical stress to the WAS. The following commercially available technologies are discussed below:

- OpenCEL process
- MicroSludge process
- Kruger DLD process

OpenCEL

OpenCEL uses a patented focused pulse technology to impart high voltage electricity to WAS as it passes through two electrodes. The skid-mounted unit is relatively small, and can be installed relatively easily on an existing pipeline. A schematic of the process is shown on Figure 8-21.

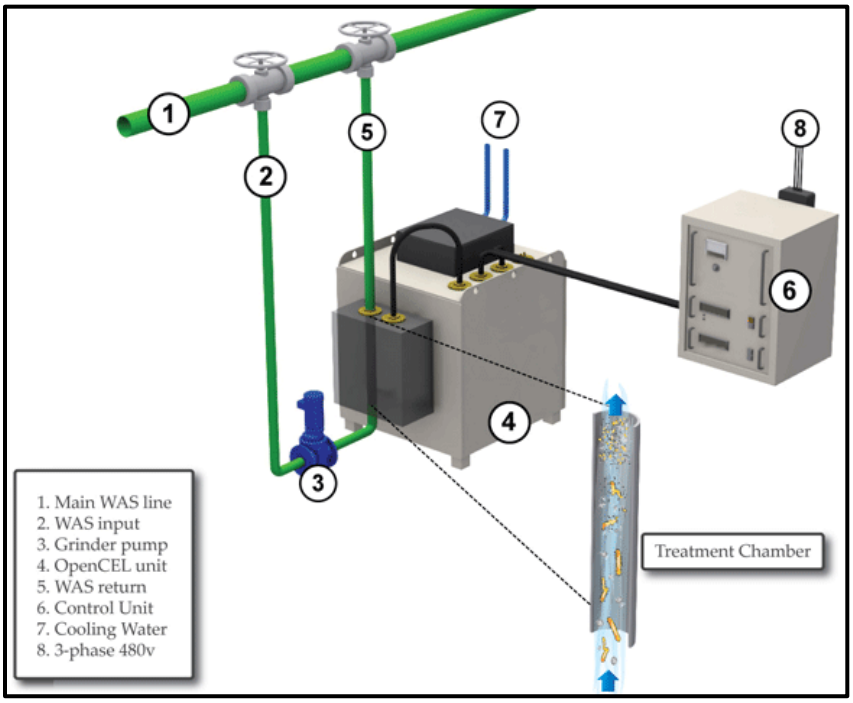

Figure 8-21
OpenCEL Schematic (courtesy of OpenCEL)

MicroSludge

MicroSludge uses one or more high pressure homogenizers to pre-treat sludge prior to anaerobic or aerobic digestion. Homogenizers have been used for decades in the food, dairy, cosmetic, chemical, biotech, and pharmaceutical industries. The process requires fine screening and chemical conditioning with caustic solution prior to homogenization. The skid-mounted unit is relatively small. A photo of the MicroSludge reactor is shown on Figure 8-22.

Figure 8-22
MicroSludge Reactor

Kruger DLD

The Kruger DLD (Digestion - Lysis - Digestion) has a different process configuration than other sludge disintegration processes. The DLD process uses Kruger's Exelys continuous thermal hydrolysis technology. The process requires two-stage digestion, intermediate dewatering, and an alternative heat exchange process for the second-stage digester. A schematic of the process is shown on Figure 8-23.

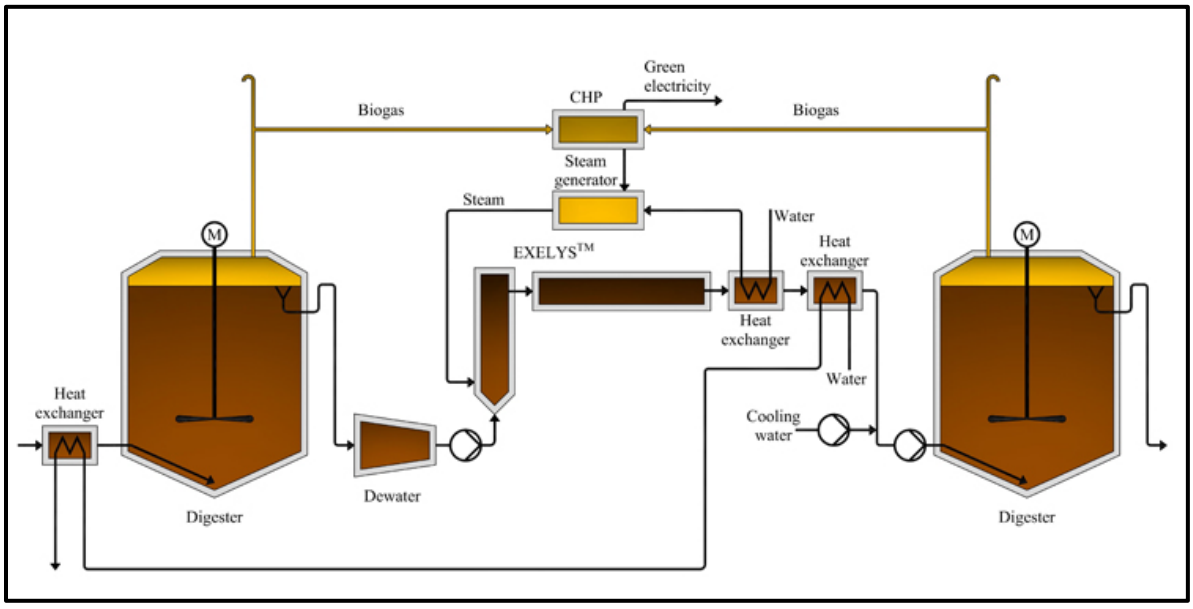

Figure 8-23
Kruger DLD Reactor

8.6.5 Digester Capacity Recommendation

BOPU is not currently meeting WYDEQ standard for digester SLR. To meet this standard, BOPU will need to either construct a new digester or implement a sludge pretreatment process. Depending upon the performance of the sludge pretreatment process, BOPU may or may not be able to delay construction of a new digester.

HDR recommends that BOPU commission an engineering study in the near term to determine the costs and benefits of sludge pretreatment. The study would begin with bench scale testing sludge samples sent to the various manufactures and conceptual equipment layouts to gauge feasibility and capital costs for retrofit of each. For the equipment configuration found to be the most feasible and cost effective, full scale pilot testing is recommended prior to commencing design and construction of a sludge pretreatment process. Full scale pilot testing is key to assessing performance of sludge pretreatment technologies and gaining a full accounting of life-cycle costs for operations, maintenance and reduced SLR.

In the future when BioP is implemented, HDR also recommends that BOPU consider feeding ferric chloride to the digested sludge or raw wastewater to precipitate biologically removed phosphorus in the WAS that is re-released in the anaerobic digesters.

8.6.6 Biogas Utilization Alternatives

The existing facility utilizes anaerobic sludge digestion for solids reduction and stabilization. A by-product of anaerobic digestion is the generation of digester gas, which is currently blended with natural gas and utilized for digester heating by BOPU. This section identifies and evaluates alternative uses of the digester gas.

Currently, digester gas (either exclusively or blended with natural gas) is burned in boilers at the site to heat the digesters in the summer and winter seasons. Any excess gas not used in the boilers is flared on the west side of the facility. BOPU would like to utilize the excess digester gas to reduce the plant's energy consumption. Project currently underway plans to use a portion of the biogas produced each year to produce electricity that will be used in a server computing process. To accomplish this, a process will be installed to clean biogas so a fuel cell can convert the gas to electricity. BOPU would like to understand the options for utilizing future excess biogas in a similar manner so a number of alternatives are identified and evaluated in the following sections. Factors which affect the selection of biogas utilization alternatives include:

- Volume of available digester gas
- Value of the reduced utility energy purchases or gas sale
- Digester gas cleanup and pressure requirements
- Capital and O&M costs of each alternative
- Possible waste heat recovery and utilization

These factors are evaluated to find alternatives that reduce the plant's consumption of energy.

Existing Biogas Production and Composition

Digester gas utilization projects should be based and evaluated on the current or near term-average digester gas production and not the design year-maximum month production. Using the design year-maximum month gas production value will cause the digester gas utilization project to be oversized for a significant portion of the project life. Digester gas projects that are oversized often cannot be operated for many years due to insufficient digester gas production. However, design of the gas handling system, the size and number

of digesters, and the digester heating capacity should be based on the design year, maximum month values.

The total digester gas production is measured by a flow meter. This flow meter is sized to read a maximum of 130 scfm, but it has read above this rate many times. Capturing accurate actual digester biogas production is key to sizing new biogas utilization alternatives. Metering the entire gas flow is also a new requirement by the WYDEQ. This meter should be replaced with a thermal dispersion type flow meter sized appropriately, which has the best success for digester gas applications. These flow meters typically cost approximately $6,000 for this size application in 2013 dollars.

The gas production reported by the plant gas flow meters is higher than expected for the plant influent flow. As a check, the gas production based on the volatile solids destroyed by the digesters was calculated. Table 8-16 shows the digester gas production from the flow meter readings and the calculated method.

Table 8-16
Digester Gas Production

Production Based On:	Gas Production (cfd)
Digester Gas Flow Meter	270,483
Volatile Solids Destruction	243,669

The digester gas flow meter value is the average of 2010 and 2012 values. The volatile solids destruction value was determined from the average of the 2010 and 2012 solids data. The volatile solids destruction method assumed 15 cf of gas produced per pound of volatile solids destroyed, which is the average of the range of values published by WERF (12-18 cf/lb). With a slight variance between the metered gas production values and the calculated values an average gas production was used for the economic evaluation, equating to roughly 257,000 cfd.

The quality of biogas also impacts the volume of biogas that can be utilized for energy. Pipeline gas is comprised of 80 – 98 percent methane. The greater the methane volume, the higher the heating value of the gas. On average, biogas produced at the Dry Creek Facility between 2010 and 2012 contained roughly 38 percent carbon dioxide. The amount of carbon dioxide, which is the primary contaminant, and other trace amounts of

containments such as H_2S, siloxanes, water vapor and sometimes halogens reduce the amount of methane in the biogas. When tested, some digester gas samples are found to also contain various amounts of nitrogen and oxygen, often with a 4 to 1 ratio. This indicates that air was in the sample, sometimes caused by inadequate purging of the sample container. Figure 8-24 shows a typical breakdown of anaerobic digester gas. Typical values for anaerobic digestion according to WERF range between 50 and 70 percent methane. With a composition of roughly 38 percent carbon dioxide and 2 percent other trace containments, the digester gas is comprised of 60 percent methane on average.

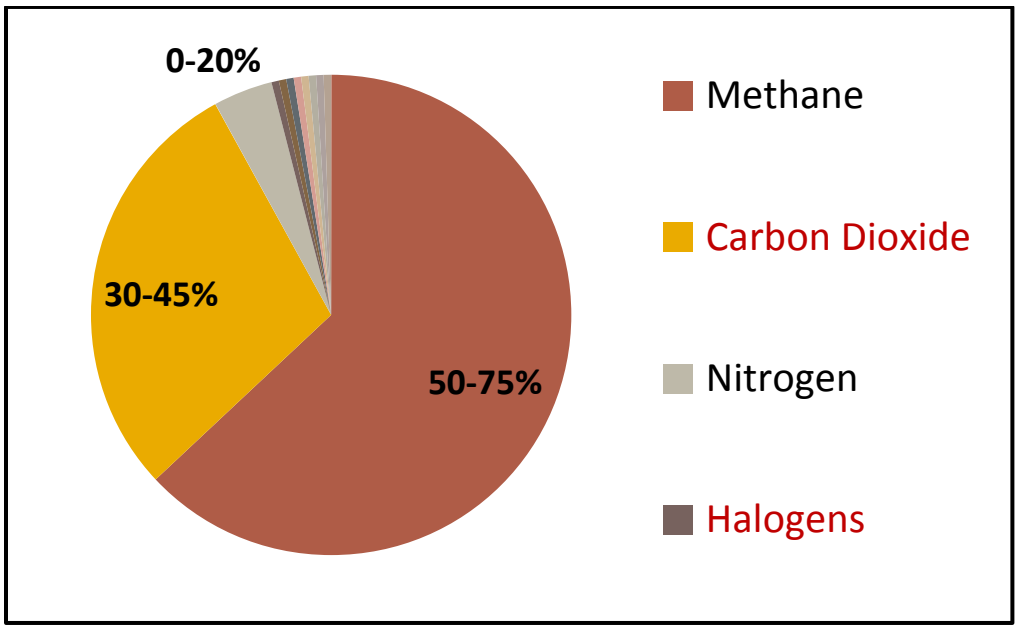

Figure 8-24
Typical Composition of Biogas Produced by Anaerobic Digestion (AWERF)

Biogas with a composition of 60 percent methane has a heating value that is approximately 578 btus/ cu ft. Compared to pipeline quality natural gas, which has an average heating value of 1035 btus/ cu ft, the gas produced at the Dry Creek Facility only provides approximately half the heating value.

Existing Biogas System

The primary anaerobic digester has a volume of 1.05 MG. The fixed cover on the digester collects biogas to send to one of the two heat exchangers where it is mixed with natural gas. Excess biogas is then sent to the flare.

The digester gas is saturated with water vapor at the digester operating temperatures when it enters the digester gas piping system. Since the conveyance piping system is often cooler than the operating digester temperature, liquid water condenses as the gas travels through the piping system. Condensate traps and drip traps safely remove the liquid water from the gas piping system. The existing biogas process currently includes drip traps, flame arrestors and pressure regulation valves on the pipeline, but neither a conditioning system nor additional storage system is currently in place.

Biogas Utilization Alternatives

A large percentage of wastewater plants with anaerobic digesters have heat exchangers and/or hot water or steam boilers that utilize digester gas as a fuel to heat the digesters and the digester building. Using digester biogas in the heat exchangers is considered the base case alternative for the Dry Creek Facility alternative evaluation. All costs and savings for the alternatives are relative to the base case alternative. One alternative which would not require an investment into gas conditioning and storage equipment is to sell the raw biogas to a neighboring facility for their use. All other possible alternatives will require some form of gas conditioning and storage upgrades. The alternatives considered include:

- Heating the facility buildings with a steam boiler
- Sale to the local gas utility or industrial neighbor
- Use for cogeneration technology; engine-generators, microturbines, and fuel cells
- High pressure gas for vehicle fueling
- Use to power solids drying equipment

Gas Cleanup Requirements

Removing the gas contaminants is required before the gas can be beneficially used in all cases except direct sale. Biogas is conditioned to reduce wear and tear on the equipment components and to increase its heating value. The level of digester gas conditioning required is determined by the digester gas utilization alternative.

The only conditioning aspect currently in place at the facility is the removal of some water vapor with drip traps. The H_2S level in the raw digester gas has been measured as over 1,000 ppm and as high as 1,300 – 1,900 ppm. This level will have to be greatly reduced before the gas may be utilized in any of the alternatives.

Table 8-17 shows the allowable level of H_2S, CO_2 and siloxane contaminants by some selected technologies.

Table 8-17
Digester Gas Containment Limits by Technology

Technology	H_2S (ppm)	Siloxane (lb/cu ft) x 10^{-6}	CO_2
Gas Heater/ Boiler	1,000		None
Engine/ Generators	885 - 1000	2	Varies*
Micro turbines	-	0.002 – 0.004	None
Fuel Cells	0.8	0.04	< 3%
Pipeline Gas	<16	~0	< 8%

[(a)] Volume of allowable CO2 varies greatly between manufacturers and model numbers.

The technology that requires the least amount of conditioning, with the exception of selling the raw biogas, is the heat exchanger or boiler alternative. This alternative only requires the removal of sulfur compounds, including H_2S. When H_2S comes in contact with moisture, it turns into sulfuric acid which corrodes equipment over time causing an increase in maintenance costs. New heat exchanger and boiler technologies are more tolerant to acid corrosion. However, it is still good practice reduce H_2S below 1,000 ppm to prevent excess wear and tear.

Turbine technology has advanced in the last several years, but it still requires fairly clean biogas. New microturbine technologies rotate at very high speeds requiring the gas to be completely free of liquid water. This speed is also impacted by the minor build up of siloxanes on the blades that can have the potential to knock the turbine out of balance and cause harmonic issues. Similar to microturbines, combustion engines ranging from generators to vehicles also experience sensitivities to the buildup of siloxanes due to excess silicone deposits in the cylinders.

Fuel cells and microturbines require a higher level of gas treatment than other technologies and the most successful systems include multiple levels of gas cleaning. The fuel cell stack is the most expensive component of a fuel cell system and will be quickly rendered inoperable with even slightly contaminated digester gas. To provide suitable biogas, at least one additional polishing stage is necessary. Many manufacturers utilize a deep chilling (-40 Deg F) method to condense the siloxane out of the digester gas. Unfortunately this method is not suitable for cold weather climates like Cheyenne because the equipment has a tendency to freeze. Along with high capital and operation costs, these package units do not typically meet the economic requirements for small cogeneration systems. However,

Marcab, which is one of the primary suppliers of iron sponge systems in the US, recently introduced a packaged gas conditioning system for H_2S and siloxane removal. The Marcab system uses a simpler, non-refrigeration, approach for drying the gas, which results in a lower installed cost and lower operating cost.

Sale of the biogas offsite requires varying levels of gas cleanup depending upon the end user and their gas use application. Some plants sell the gas untreated, but at a discount to the cost of natural gas, and allow the purchaser to treat the gas, if needed. Sale as bio-natural gas to the local utility requires removal of the CO_2 as well as the H_2S, siloxanes, and water. Sale of biogas cleaned to natural gas standards to a gas utility can sometimes bring a premium, especially if the utility is required to utilize a percentage of renewable energy. Guild Associates recently introduced a package system which cleans the biogas to pipeline quality with minimal maintenance. The Guild systems are well proven to deliver pipeline quality gas and remove water, CO_2, siloxanes and H_2S contaminants present in the biogas in a single processing step to produce high purity methane for pipeline sales.

Gas Conditioning Technologies

There are many different technologies available to clean or condition biogas for the end use application. These technologies range from passive media adsorption processes to biological and chemical treatments. Some of these technologies are listed in Table 8-18.

Table 8-18
Digester Gas Conditioning Technologies

Technology	Constituent Removal
Drying (Compression)	H_2O
Adsorption (Iron Sponge and carbon filters)	H_2S
Biological	H_2S & Sulphur
Pressure Swing Adsorption	CO_2 & H_2S
Caustic Guard Beds	Halogens (i.e. Chlorides)
Activated Carbon	Siloxanes
Chillers	Quartz & Siloxanes

There are many manufacturers that provide full conditioning package units specifically designed to condition anaerobically digested gas for particular applications. The most popular gas clean up technology for cogeneration systems has been H_2S removal by an iron sponge system, often referred to as a polishing process, followed by refrigeration, and drying. There are many manufacturers that produce skids that include some version of this entire process and these skids have been installed all over the Untied States.

Biogas Availability

The average monthly digester and building heating loads are important because they allow determination of the excess biogas that would be available for other uses or the required waste heat recovery for a cogeneration system under various operating scenarios. Figure 8-25 shows the amount of metered biogas that is sent to the flare. Currently, an average of 0.272 MBtu is sent to the flare, which equates to 189 scfm. The predicted demand of 75 scfm from the Microsoft's future fuel cell leaves 114 scfm available for a power generation system with no heat recovery upgrades.

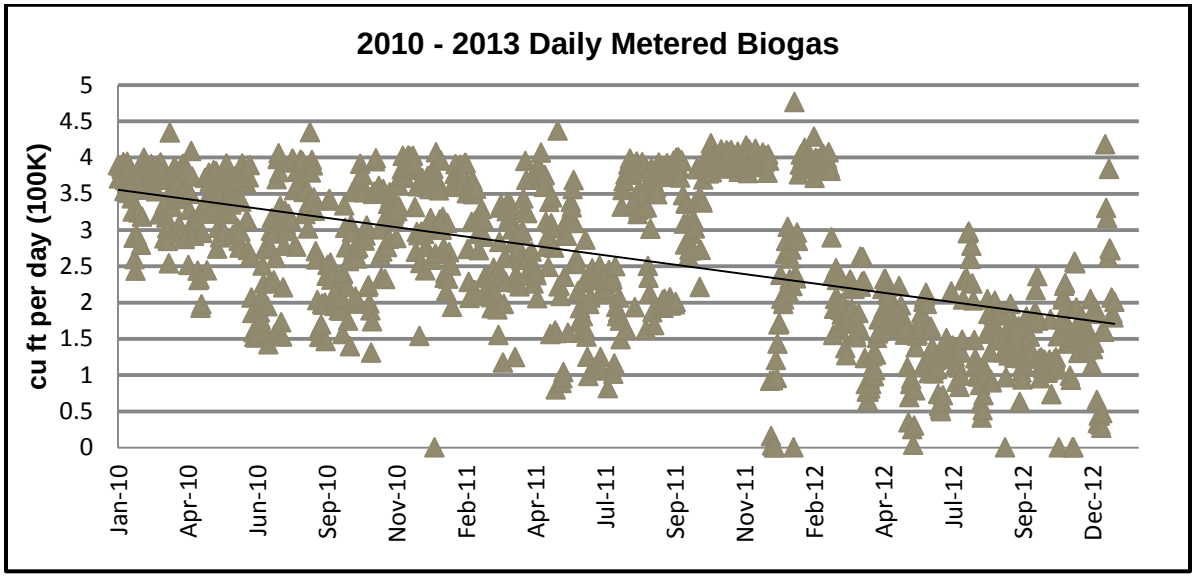

Figure 8-25
Daily Biogas Available

Heat recovery frees a volume of biogas that is now used to heat the digesters so it may be used in a cogeneration system. Since the meter only accounts for the biogas sent to the flare, the system has to be looked at as a whole to estimate the amount of biogas available

for a new cogeneration system, including digester heating requirements, cogeneration heat recovery efficiency, digester capacity and efficiency.

The digester heating load consists of the tank heat loss and the heat required by the raw feed sludge to maintain the digester operating temperature, which is a minimum of 95 Deg F according to the new WYDEQ rules. The digester heating load varies throughout the year following the average air and influent wastewater temperatures. The tank heat loss was determined separately for the roof, walls above ground, walls below ground, and the floor.

The digester sludge is heated to 100 Deg F so some tank heat loss occurs every month and there is always a significant raw sludge heating load. Using the average monthly air temperature data, average monthly plant influent temperature, the average monthly digester heating loads were determined and are shown on Figure 8-26.

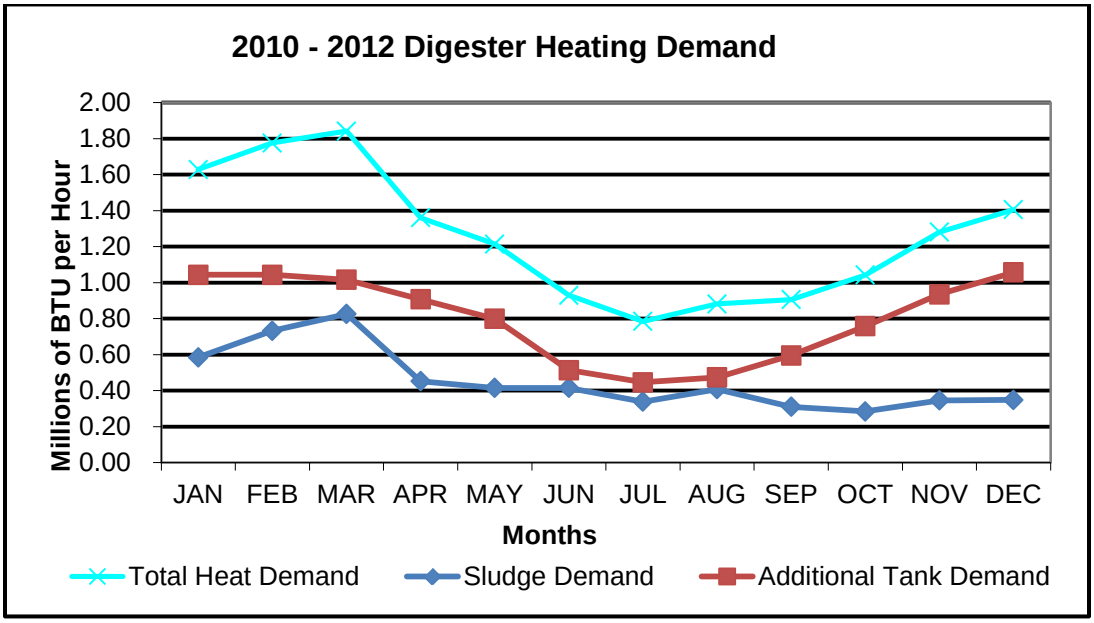

Figure 8-26
Digester Heat Loads

The total calculated monthly digester heat loads are compared to the digester and future Microsoft project demand in Figure 8-27 and show the excess gas available. An average of 100 scfm is available to apply to one of the alternatives, if cogeneration is not implemented.

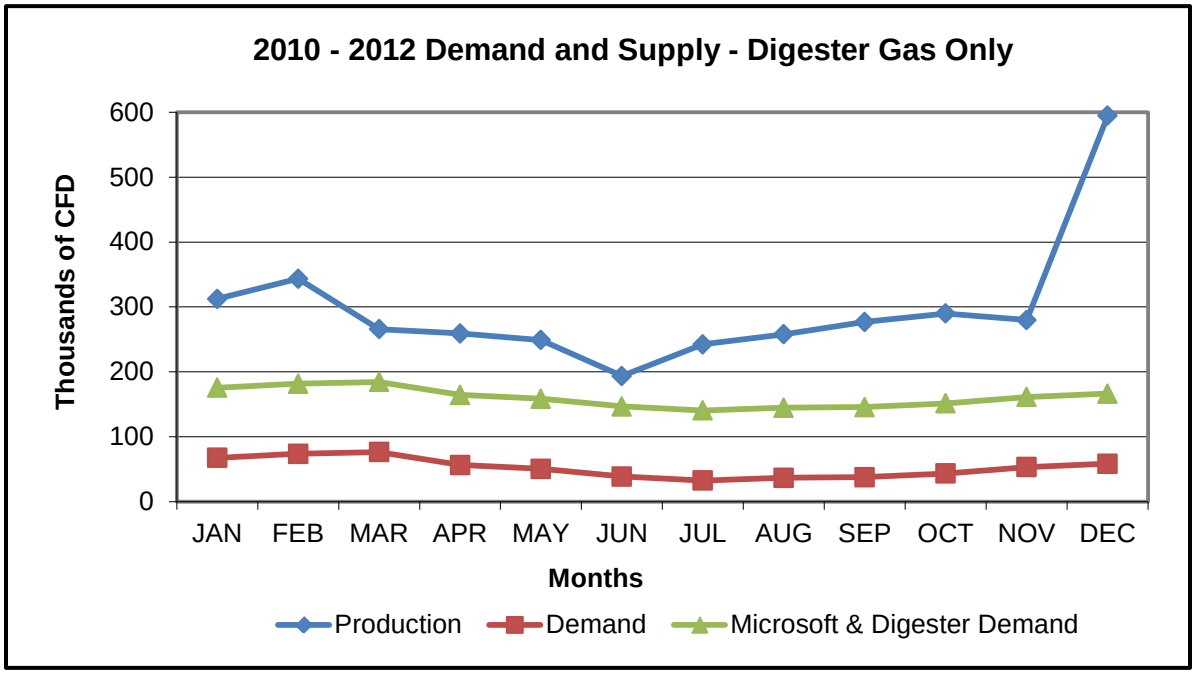

Figure 8-27
Calculated Vs Measured Heat Exchanger Digester Gas Utilization

Projected Biogas Generation and Heating Requirements

Biogas generation is primarily dependent upon the volatile solids fed to the digesters and digester capacity. The wastewater volatile solids feed rate is primarily dependent upon the plant influent flow and loads and the upstream wastewater processes, but can be augmented by feeding volatile solids from a non-wastewater source such as food waste and/or waste grease from restaurant grease traps.

Changing the secondary digester into a primary digester to meet WYDEQ's requirements for volatile solids loading will also aid in the increase in volatile solids destruction, and overall digester efficiency. Decreasing the digester SRT time could also increase the digester efficiency. Since there are many factors that contribute to an increase in biogas production, decreasing SRT and increasing volatile solids destruction does not always directly result in an increase in biogas production making the increased future loads and

digester efficiency hard to quantify. Other changes such as the addition of FOG to the digesters could have a dramatic increase in biogas production, which would have a significant impact on the biogas utilization project selection or project economics. However, due to the historical digester issues with scum, fat and grease, this is not the most optimal option.

Digester and Building Heating Considerations

With a limited amount of excess biogas available for alternative technologies due to the existing heat exchanger process, heat recovery is an important factor to consider. Waste heat from the power generation technology is typically used to assist in heating the digesters and buildings. However, the power generation efficiency and waste heat recovery efficiency varies by manufacturer and technology. Fuel cells have the highest efficiency but the amount of waste heat recovery is relatively low, and the heat recovery temperature is also low. Microturbines have low power generation efficiency, low heat recovery, and low heat recovery temperature. The low heat recovery temperature of the fuel cells and microturbines reduce the amount of digester gas available for power generation. Table 8-19 provides the power generation and waste heat recovery efficiencies of the power generation technologies. With such a small amount of biogas available, all of the financial analysis was conducted assuming a heat recovery system would be installed.

Table 8-19
Cogeneration Power and Heat Efficiencies

Technology	Power Efficiency	Heat Efficiency	Heat Recovery Temperature
Micro turbines	28%	25%	Low
Engine-Generators- jacket water only	36%	30%	High
Engine-Generators jacket water and exhaust heat exchanger	36%	45%	High
Engine Generator w/ no jacket	30%	0%	High
Fuel Cell	45%	25%	Low
Hot Water Boiler	-	80%	None

Existing Heat Exchangers and Future Fuel Cell

Figure 8-28 shows how the current digester gas production would be allocated between the existing heat exchanger with different heat recovery alternatives (none, jacket water, jacket water plus exhaust heat recovery) and still meet the heating load. The calculated demand assumes that the new primary digester is online and the new fuel cell provided by Microsoft has an average demand of 75 scfm.

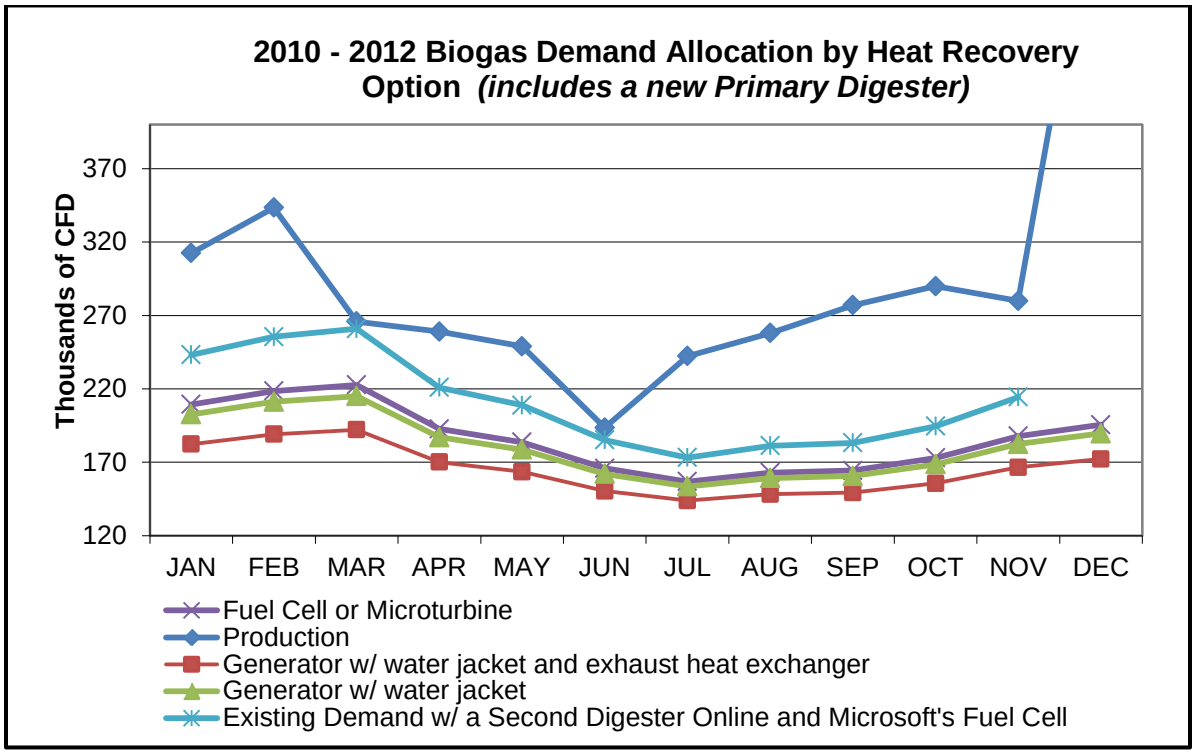

Figure 8-28
Potential Biogas Utilization

For the existing heat exchangers, all the gas would be utilized by the heat exchangers during March and June. If the heat exchangers were retrofitted to accept exhaust heat and a generator was installed, there would be enough biogas available to run the fuel cell and the generator. With no heat recovery (as is), the heat exchanger and fuel cell demand will limit the option of installing another cogeneration alternative without installing a gas storage system.

With a waste heat recovery retrofit and a digester gas storage system it should be possible to run the existing heat exchanger system and fuel cell all year round. However, when the

second digester is placed online, this will be limited to the months of July through February without additional gas storage. In general, digester gas storage is expensive and hard to economically justify for small applications.

Boiler Alternative

Instead of creating electricity, another option to utilize the excess biogas production would be to provide heat to the existing buildings with a steam boiler system. Like the existing heat exchanger system, this alternative requires minimal gas conditioning to be utilized. This option would require a complete overall to the existing HVAC system to replace it with radiant heat. Due to the cost of conditioning the biogas by removing H_2S and boosting the very low pressures to meet steam boiler inlet pressure requirements along with the capital cost of the equipment and piping associated with the HVAC system modifications, this alternative is not viable at this time.

Pipeline Alternatives

Enriching the biogas to pipeline specifications raises the gas to its highest value, and would enable BOPU to supply gas to a utility service pipeline. There are many manufacturers in the U.S. that provide a complete system on a skid. In the past these systems were not usually available for smaller applications such as the one at the DCWRF, but with recent governmental focus on renewable energy alternatives this is changing. Guild currently provides these systems to facilities in the U.S. where biogas is compressed to 60-100 psig, before being introduced to a pressure swing absorption system (PSA). This system removes the water, CO_2, siloxanes and H_2S, to yield a product gas meeting pipeline specifications. This type of system is typically used for flow rates above 500,000 scfm which is greater than the Dry Creek facility can produce. However, it is a technology which continues to become more economical and should be evaluated again in the future. Figure 8-29 provides a photo of the Guild system.

Figure 8-29
Guild Cleaning and Conditioning System

These systems are still very expensive to purchase and to maintain because they are built to clean and condition biogas composition to pipeline standards. Guild and other manufacturers have programs in which the reclamation facility provides the biogas and the manufacturer provides the equipment and the revenue from the sales of pipeline gas are shared. BOPU would have little to no capital investment. Alternately, systems are also offered for purchase.

As government policies push towards the use of more renewable fuels, large utilities in states which require a portion of the utility's energy to be from renewable fuels are paying a significant premium for digester gas cleaned to natural gas standards. They are buying this renewable fuel even when the source is located out of their state. Whether they physically consume the gas or not, the net effect is the same, which is to reduce fossil fuel consumed, so it counts towards their renewable fuel requirement.

Due to current biogas production and limits in technology, this pipeline quality digester gas sale is not economically feasible for BOPU at this time. However, as States adopt their own versions of the Federal Renewal Portfolio Standard (RPS), which typically mandates the use of a percentage of renewable fuel sources, the gas clean up technology will continue to evolve to meet the new requirements. BOPU may want to make contact with Cheyenne

Light Fuel and Power or another local utility to track the changes being made by current governing bodies as they apply added pressure on local utilities to take advantage of renewable sources.

Raw Digester Gas Sale

Digester gas sale alternatives can also include the sale of raw biogas or minimally cleaned biogas. Raw or minimally cleaned digester gas is sold to nearby industries at several wastewater plants in the US. Many of these plants are in areas with high energy demands and increasing taxes on natural gas such California. The advantage of selling raw or minimally cleaned digester gas has low capital and O&M project costs and relatively high net revenue. Because of the relatively low utility power cost in the State of Wyoming and the relatively high capital and O&M cost of a cogeneration system, digester gas has a higher net value if sold as a raw fuel than used to generate power. When sold as raw gas, it is typically discounted 40 percent below the cost of natural gas, on a BTU basis. To be economically feasible the cost of natural gas in the region has to be high enough to offset the capital cost of installing the required piping and infrastructure needed to transport the biogas to a neighboring facility. Due to the low cost of natural gas in Wyoming and the Dry Creek facility's remote location, this option is currently not economically feasible.

Digester Gas Use for Vehicle Fuel

Use of the digester gas as vehicle fuel requires the gas be first cleaned to natural gas standards, and then compressed to approximately 3,000 psig. This alternative also requires a large capital investment in the infrastructure required to utilize the gas, including gas storage, fueling stations, and natural gas fueled vehicles. BOPU does not produce a sufficient amount of digester gas to supply the smallest available conditioning system. Selling the conditioned gas to a local utility is a more economical and operationally feasible option over constructing a vehicle fueling station.

Digester Gas for Biosolids Drying

Use of the digester gas for biosolids drying has the potential to beneficially use the digester gas to reduce the cost of solids disposal. Currently, future changes in biosolids regulations in Wyoming requiring Class A biosolids for land application are not expected. Dryers are complicated systems with high capital costs. Although the biogas conditioning system required to operate a dryer is minimal, the dryer system itself is an operationally complex industrial system that is not passive and requires serious expertise to minimize the risk of fire and other dangers. Due to these factors, drying systems are typically only installed in large municipalities and industrial facilities around the country. BOPU has land available and current biosolids requirements that allow for land application of biosolids at a minimal

cost. High capital and operation costs and insufficient digester gas production to operate a solids drying facility make this alternative unrealistic.

Cogeneration Alternatives

A pilot study is currently being implemented to utilize a portion of the biogas in fuel cells. This study is under design and will most likely include the removal of sulfur, water, and particles with an iron sponge, activated carbon filters, dryer, chiller, compressor and storage. The conditioned biogas is sent to a fuel cell to produce electricity. There are current plans for the heat lost by the future fuel cell and its conditioning system to be recovered and used to heat the existing digester. This heat recovery would increase the volume of biogas available for use to fuel another cogeneration alternative.

Capital Costs

Utilizing the current digester and the future fuel cell biogas demand, the capital cost for the largest power generator for each cogeneration alternative was estimated. The size and costs are included in Table 8-20 for both the existing digester scenario and the addition of the second digester heat demand.

Table 8-20
Cogeneration Alternative Capital Costs

Alternative Description	Estimated Capital Cost					
	Existing Digester Alternative			Additional Primary Digester Alternative		
	Total Cost (2013 Dollars)	*Name Plate (kw)*	*Cost per kw (2013 Dollars)*	*Total Cost (2013 Dollars)*	*Name Plate (kw)*	*Cost per kw (2013 Dollars)*
Engine/Generator	$ 1,400,000	100	$ 14,000	$ 900,000	50	$ 18,000
Microturbine	$ 1,500,000	225	$ 6,667	$ 1,000,000	125	$ 8,000
Fuel Cell	$ 1,700,000	275	$ 6,182	$ 1,300,000	175	$ 7,000

Engine-generator installations at wastewater facilities are by far the most common type of cogeneration systems using digester gas. Note that there is a limit to operating engine generators at only partial load, while microturbines and fuel cells are more flexible. Engine generator manufacturers recommend not operating engines below 75 percent capacity. With the fluctuation in available biogas from summer to winter, the engine generator was sized so that it continuously exceeds the 75 percent capacity. To meet the plant's average

flow meter digester gas production, the engine-generator was sized for 100 kW output with one digester in service and 50 kW with two digesters in service. The varying nature of digester gas production and the lack of gas storage, make this cogeneration option less appealing than other cogeneration technologies because of the significant reduction in power generation. Engine-generators do have the highest capital cost per kW produced, but they require less gas conditioning so it is also important to consider O&M costs for each alternative.

Operational Costs

Fuel cells have the highest digester gas conditioning O&M cost because they require a higher level of gas cleaning. Also the fuel cell power stack life is only about 5 years. The O&M cost for the fuel cell alternative reflects the periodic cost of the power stack replacement.

The cogeneration alternatives include fuel cells, microturbines, and engine generators. All cogeneration systems require significant O&M costs for both the power generation unit and the digester gas conditioning system. The O&M costs are usually stated as a cost per kWh of power generated and are shown in Table 8-21. These O&M costs were developed over time from the actual operating costs of several digester gas cogeneration systems. In general, the O&M costs for engines and microturbines are about double what the equipment manufacturer's state in their literature. The O&M costs for the fuel cells were obtained from the maintenance contract from a fuel cell supplier.

Table 8-21
Cogeneration O&M Costs

Alternative Description	O&M Costs ($/ kwh)
Engine/Generator	$ 0.04
Microturbine	$ 0.08
Fuel Cell	$ 0.06

Engine-generators have the least O&M costs out of all of the alternatives. However, these costs vary depending on manufacturers. Manufacturers are now offering equipment with higher tolerances for biogas constituents such a H_2S, which reduces the operational costs

by reducing the amount of adsorptive media spent on removal. The O&M cost provided is an average between manufacturers of this new equipment.

Microturbines also have a higher total O&M cost than engines. The turbine component must be completely rebuilt after 5 years of operation and the entire package replaced after 10 years. In comparison, the life of an engine generator is approximately 20 years of operation. Microturbines also require a higher level of gas conditioning than engines which is reflected in the higher gas conditioning O&M cost.

Fuel cells have the highest digester gas conditioning O&M cost because they require a higher level of gas cleaning. Also the fuel cell power stack life is only about 5 years. The O&M cost for the fuel cell alternative reflects the periodic cost of the power stack replacement.

The base load utility cost of power for the Dry Creek plant is $0.09/kWh, so the net savings per kWh of power generated is the difference between base load cost and the total O&M cost for each alternative. These savings are provided in Table 8-22.

Table 8-22
O&M Net Savings

Alternative Description	Net Savings ($/ kwh)
Engine/Generator	$ 0.05
Microturbine	$ 0.01
Fuel Cell	$ 0.04

Note that the actual average utility power cost may be higher but this cost reflects the varying plant electrical power use and demand, which is usually higher during the on-peak periods. A cogeneration system only reduces the plant base load, therefore the savings are determined from the base load utility costs, not the actual average utility power costs.

The net savings for the microturbine option it is relatively low. Very few natural gas fueled microturbine installations exist in the US, compared to engine generators, and even fewer installations successfully operate on digester gas. The microturbine manufacturers claim that inadequate gas conditioning was the cause of the system failures in the past and they

claim that the issue has been now resolved. Due to the poor power generation and waste heat recovery efficiencies, and high total O&M costs, microturbines are not recommended.

Recommendations

With the cost of natural gas low, the cogeneration alternatives do not provide a positive or even neutral 10 or 20 year NPV. As the demand for renewable energy increases around the world these technologies will improve and become more cost efficient lending themselves to a more optimistic outlook.

With the multiple variables presented in this section, BOPU should take this opportunity to complete an audit on the future fuel cell pilot so a more detailed evaluation may be conducted regarding the feasibility of biogas utilization at the DCWRF. If the biogas is clean enough and the future fuel cell conditioning system is easy to expand, it may be advantageous to install a second fuel cell.

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8.7 Regulatory Forecast

In addition to increasing wastewater flows and loads, BOPU will need to plan for expected new regulatory requirements. The following sections provide planning guidance for achieving compliance with predicted future regulatory requirements.

8.7.1 Selenium Management to Meet Future Discharge Limit

In November 2012, Wyoming Department of Environmental Quality issued a draft document defining the Total Maximum Daily Load (TMDL) for selenium for the segment of Crow Creek that includes the discharge location for CCWRF. This document sets the effective discharge limit for selenium at 5 μg/L, a value that is expected to be included in the next discharge permit for CCWRF.

To understand BOPU position with respect to selenium levels in the CCWRF effluent, available selenium data from CCWRF were evaluated. The values provided by BOPU are expressed in lbs/day. Using this data and the effluent flow measurements in mgd, calculated values of selenium in μg/L were developed. These data points are shown as green bars on Figure 8-30, along with the discharge limit of 5 μg/L. Because there are only 16 sample results for 2012, the data provide just a snapshot of the impacts of the selenium limit. Exceedance of the 5 μg/L limit may be a frequent occurrence at CCWRF.

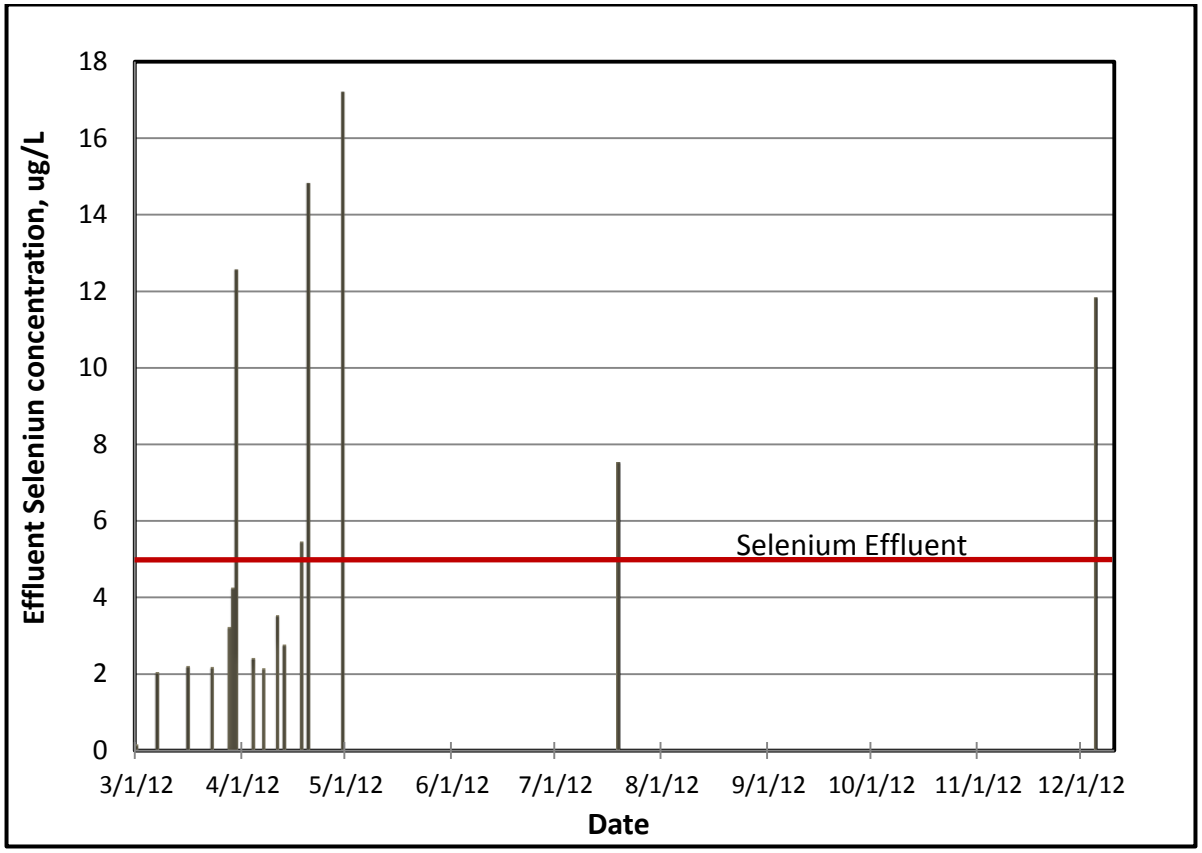

Figure 8-30
Effluent Selenium Concentration at CCWRF

Major geologic sources of selenium are black shale, phosphate rocks and coal. Release of selenium from these sources generally occurs through human activity, primarily mining, fossil fuel combustion, oil refining and discharge of drainage water from irrigated agriculture. Thus, the likely current source of selenium in the CCWRF influent is the discharge from the Frontier refinery, although this should be verified with sampling. Potential additional selenium could be discharged by the future Black Hills Power generation facility.

Selenium typically exists in water in dissolved and suspended particle forms. Selenium is generally found in the elemental state (Se(O)) or as selenite (Se(IV)) or selenate (Se(VI)) in water, but the oxidation state is dependent on both pH and redox potential. Oxidized inorganic forms of selenium (such as SeO_4^{2-}, SeO_3^{2-}, H_2SeO) exist as highly soluble oxyanions in aqueous systems. Neither selenite or selenate anions react with common cations such as calcium or magnesium, so they tend to stay in solution. Because selenite is more reactive than selenate, many treatment processes depend on the reduction of

selenate to selenite. Biological systems can catalyze the reduction of selenium under normal environmental conditions, although temperature, pH, moisture, concentration and speciation of selenium, and the addition of a carbon source all affect these reactions.

Treatment technologies that have been developed to remove selenium from water can be categorized into three major groups: physical treatment (e.g., reverse osmosis, nanofiltration, ion exchange); chemical treatment (e.g., iron precipitation); and biological treatment (e.g., bioreactors, wetlands). Selection of the appropriate treatment technology depends on the amount of water being treated, the chemical and biological composition of that water, the flow characteristics of the contaminated stream, and the concentration and speciation of selenium to be removed.

Recommendations for Selenium Management

Determination of the best approach for removing selenium requires BOPU to complete a study somewhat similar to the evaluation completed several years ago for removal of manganese. The objectives of the selenium study should be to evaluate the source(s) of selenium, determine where treatment should take place, and propose treatment options for pilot testing. Follow-up work includes setting up and operating the pilot test and evaluating the results to determine the selected treatment technology. Design and construction of the new treatment process would follow evaluation of the pilot test. The major steps to be included in the study are as follows.

(1) Characterize the Contaminant Stream

The source of selenium in the CCWRF influent should be identified and quantified by sampling twice a week at the refinery discharge and at the CCWRF influent over a year. Speciation of the selenium in the discharge from the refinery would be useful in the course of this sampling. Additional water quality parameters should be measured on the same samples, including pH, temperature, sulfate, alkalinity, total organic carbon.

When the new Black Hills power station comes on line, sampling of that process stream should be undertaken either by the power station or by BOPU to determine selenium occurrence in that process train.

(2) Evaluate Treatment Options

Treatment for removal of selenium should be accomplished on the lowest flow volume possible to minimize treatment costs. Thus, the treatment should occur on the discharge from the refinery (or any future discharge containing selenium) rather than on the total wastewater plant flow.

Determination of the appropriate treatment will require a complete evaluation of water quality parameters and selenium concentration to identify potential treatment options. Selenium removal to 5 μg/L will be challenging to accomplish because the applicable treatment processes have variable removal rates. Treatment processes must be evaluated for their ability to meet the discharge limit within the initial concentration, flow and flow regime (batch or continuous) conditions. Pilot testing of selected treatment options will be necessary to ensure that the process can reduce selenium to less than 5 μg/L.

(3) Pilot Test Treatment Options

Once the treatment options are identified, pilot testing of the most likely options should proceed. The number of options tested should arise from the information collected in the study, discussions between members of the study team and BOPU, and cost. The duration of pilot testing will depend on the process and will impact the cost of the testing program. Membranes and preciptative processes can be proven in relatively short periods of time (1 to 2 months), but biological processes that require the development of an appropriate biological substrate could require piloting for as long as a year and adsorptive processes could have a long duration if the objective is to determine the point of exhaustion of the adsorptive media.

(4) Evaluate Pilot Results and Select Treatment

Evaluation of pilot testing results includes a review of all operating data to ensure that the process can meet the designated treatment goals. Operational conditions are reviewed to determine the impact of the process on available operator work time. Comparative capital and O&M costs of the pilot tested processes are typically incorporated into the decision regarding final treatment selection, along with operational information gained from the pilot testing.

Selenium Evaluation Study

The study scope should include an evaluation of one year of sampling data, summary and evaluation of treatment options, with detailed consideration of the pros and cons of options with respect to the measured water quality and waste stream flows, and recommendations for pilot technologies. Development of a pilot test plan and preparation for procurement of pilot equipment should also be included.

The work required for procuring, setting up, and operating the pilot units with follow-up data analysis is in addition to the initial study cost. The time required to procure, set up, operate

and evaluate the pilot units cannot be determined until the initial study is complete, so providing a cost estimate for that work is not feasible at this time.

8.7.2 Nutrient Standards

Through the Clean Water Act, the EPA is pressuring all states to implement nutrient limits into all discharge permits. The two nutrient compounds specifically targeted are total nitrogen (TN) and total phosphorus (TP). The target effluent concentrations of TN and TP suggested by EPA are extremely low and would be very costly to comply with in terms of capital construction costs as well as operating cost.

Wyoming's neighboring states (Colorado, Utah, Montana) all began developing site-specific nutrient standard development programs over the last ten years in an effort to persuade EPA to accept less stringent effluent nutrient limits. These programs have been successful in the short term, however EPA has not abandoned the low target levels.

WYDEQ does not currently have established numeric criteria for TN and TP, however they are starting to develop a program for establishing site-specific numeric nutrient standards.

Background

In 2001, EPA recommended nutrient criteria (μg/L) for streams and rivers for the various designated eco-regions of Wyoming, including TP limits ranging from 10.0 to 67.0 micrograms per liter and TN limits ranging from 120.0 to 880.0 μg/L. Standards for chlorophyll a range from 1.9 to 3.4 micrograms per liter. Cheyenne falls within eco-region IV, for which EPA is recommending TN limits of 440 μg/L and TP limits of 20 μg/L.

WYDEQ's Approach

WYDEQ has begun the process of developing site specific nutrient standards to comply with EPA's mandate. The State of Wyoming intends to develop nutrient criteria for different water body types in the following order:

1. Lakes and reservoirs
2. Streams and Rivers
3. Wetlands

Both of BOPU's WRFs discharge into a stream.

Schedule for Nutrient Limit Development

In 2007/2008, WYDEQ published a document in collaboration with Tetra-Tech (TT) that features a schedule for studying nutrient impacts, developing nutrient standards, and ultimately drafting numeric nutrient discharge standards. The following schedule was produced by WYDEQ (Ref: 2008 Wyoming Nutrient Criteria Plan) and TT in response to EPA's mandate for nutrient criteria. Note that the schedule milestones for dischargers to lakes and reservoirs are different than the schedule for dischargers to streams and rivers:

Table 8-23
Schedule and Milestones for Streams and Rivers

2008-2010	Inventory of existing lake and reservoir data
	Data compilation into an integrated database
	Ongoing sampling of streams and rivers
2011	Continue sampling of streams and rivers
	Analysis of existing data
	Design and implementation of supplemental data collection
2012	Continue sampling of streams and rivers
	Evaluation of other stream and river classes (large rivers)
	Design and implementation, if needed, of sampling program for other stream and river classes
2013	Continue sampling of streams and rivers
2014	Develop proposed nutrient criteria for wadeable streams and rivers
2015	Stakeholder review of lake and reservoir nutrient criteria

Current Status

Discussions with WYDEQ have revealed that this schedule is not being followed and that the state is at least five years behind. Very little analysis of streams and rivers has been conducted. Currently, the state is set to initiate the proposed sampling plan of lakes and reservoirs this summer. However, WYDEQ has set lakes and reservoirs as a higher priority than streams and rivers and an updated schedule for sampling streams and rivers has not been established, but is assumed to be at least 2 years away.

Potential Time Line for new Nutrient Standards

If the State were to begin sampling of streams and rivers in 2015, draft standards would not be developed to the stage that stakeholders (BOPU and others) could review and assess their impact until approximately 2022. It is reasonable to expect that the stakeholder review process would take at least 2 years before numeric standards for nutrients began to find their way into new discharge permits. Based on that time line, the earliest BOPU should expect to see a nutrient limit in a discharge permit is 2029.

When new discharge limits are incorporated into permit renewals, it is typical for utilities to request (and for the State to grant) a compliance schedule to allow for design and construction of the needed improvements. HDR recommends that BOPU seek a compliance schedule of at least 5 years to allow for design and construction of nutrient related improvements.

EPA has become frustrated with Wyoming's lack of nutrient standards progress compared to neighboring states. It is possible that the EPA could take action against Wyoming to force quicker action. However, forecasting legal actions by EPA is beyond the scope of this volume.

Level of Nutrient Removal Required vs. Future Treatment Infrastructure Needs

If the WYDEQ is not successful in reducing the final nutrient effluent concentration levels from that suggested by EPA, some form of tertiary filter to remove phosphorus along with nitrate polishing will be required at both WRFs. The type and configuration of the filter process and advanced nitrate removal process will be dependent on the type of limit (monthly average, daily max, etc.) and the exact numeric standard. The total capital cost would be anticipated to be in the range of $40 to $60 million. Without additional data, further refinement of the cost is not possible.

However, if WYDEQ is successful in establishing nutrient limits similar to those being established in neighboring states, only minor operational changes and capital improvements would be needed, on the order of $100,000 or less. A description of the improvements required to achieve a TP limit of 1.5 μg/L and a TN limit of 15 μg/L are presented below:

(1) CCWRF

- Achieve TP < 1.5 μg/L through chemically enhanced settling in both the Primary and Secondary Clarifiers
    - Plumb the existing alum feed system to facilitate alum addition to all clarifiers

  - Polish effluent as needed by running flow through the Recycled Water Treatment Facility (RWTF). Analysis assumes the RWTF will be expanded to its build-out capacity of 12 mgd by the time nutrient standards are enforced.

- Achieve TN < 1.5 μg/L through operation of the MBBR system as currently configured. Operators will need to closely monitor DO content in Reactor 6 and throttle valves as needed to prevent excess DO in this reactor from inhibiting denitrification in Reactors 1 and 2.

(2) DCWRF

- Achieve TP < 1.5 μg/L through operating the IFAS and Anoxic treatment basins in Biological Phosphorus Removal mode. See description of modification needed to operate in this mode presented in Section 8.8 of this volume.

- Achieve TN < 1.5 μg/L through operation of the IFAS and Anoxic treatment systems as currently configured. Operators will need to closely monitor DO content in Reactor 2 of both IFAS basins and throttle valves as needed to prevent excess DO in this reactor from inhibiting denitrification in the Anoxic Basins.

As the above paragraphs demonstrate, the potential impacts of nutrient standards to BOPU are extreme. HDR recommends that BOPU take an active role in the development of the new nutrient standards by meeting with WYDEQ at least twice per year and attending all workshops offered by WYDEQ.

8.8 Operational and Efficiency Improvement Needs

In the course of evaluating the existing WRF facilities several areas were identified for infrastructure improvement that would increase operational performance, efficiency, or both.

8.8.1 High Speed Turbo (HST) Blower Retrofit

Both the CCWRF and DCWRF utilize multi-stage centrifugal blowers to supply process air to the MBBR and IFAS treatment processes. The CCWRF Blower building has 4 blower units sized to deliver the maximum air demand when the plant is running at capacity and one blower is out of service. Two of the existing units are 200 horsepower units (hp units) and the other two are 300 hp units. The DCWRF Blower building has 5 blower units sized to deliver the maximum air demand when the plant is running at capacity and one blower is out of service. All five units are 250 hp units.

Ideally the aeration system would ramp its air delivery up and down as the flow and load concentration changes over the course of the day. The existing blower controls are set up to perform in this manner; however the existing blower equipment has limited turn down capability. As a result, the aeration systems are typically delivering more air (and using more energy) than is needed at night and during other low flow periods.

In recent years a new type of aeration blower technology, high speed turbo (HST), has come into the market which not only operates more efficiently than the existing multistage units, but can also be turned down to lower flow ranges than the existing multistage. HDR performed an analysis to determine if it would be cost effective to replace one of the existing multistage blowers at each plant with a new HST unit. The following paragraphs present the results of that analysis.

Blower Energy Consumption Analysis

The energy use of an existing 300 hp blower at the CCWRF and two existing 250 hp blowers at the DCWRF site were compared to the energy use of HST blowers with similar airflow characteristics. The annual energy cost savings and several related cash flow metrics were calculated for each site.

A simplified diurnal plant flow curve based on historic plant operating data was used to determine energy savings.

Blower operation at CCWRF was modeled with an existing blower operating at a low air output in the early morning hours and a higher air output for the remainder of the day. The new HST blower was modeled operating at two different air outputs during a 24-hour period

reflecting enhanced turn-down capability: one for low-flow conditions, and one for high-flow conditions.

Blower operation at DCWRF was modeled with one existing blower operating during the first half of the day and two blowers operating during the second half of the day. The new HST blowers were similarly modeled with one blower operating during the first half of the day and two blowers operating during the second half of the day. In cases where two blowers are operating, the scfm airflow and horsepowers used are the sum of the two operating blowers.

Figures Figure 8-31 and Figure 8-32 show the airflow rates used for analysis at each site.

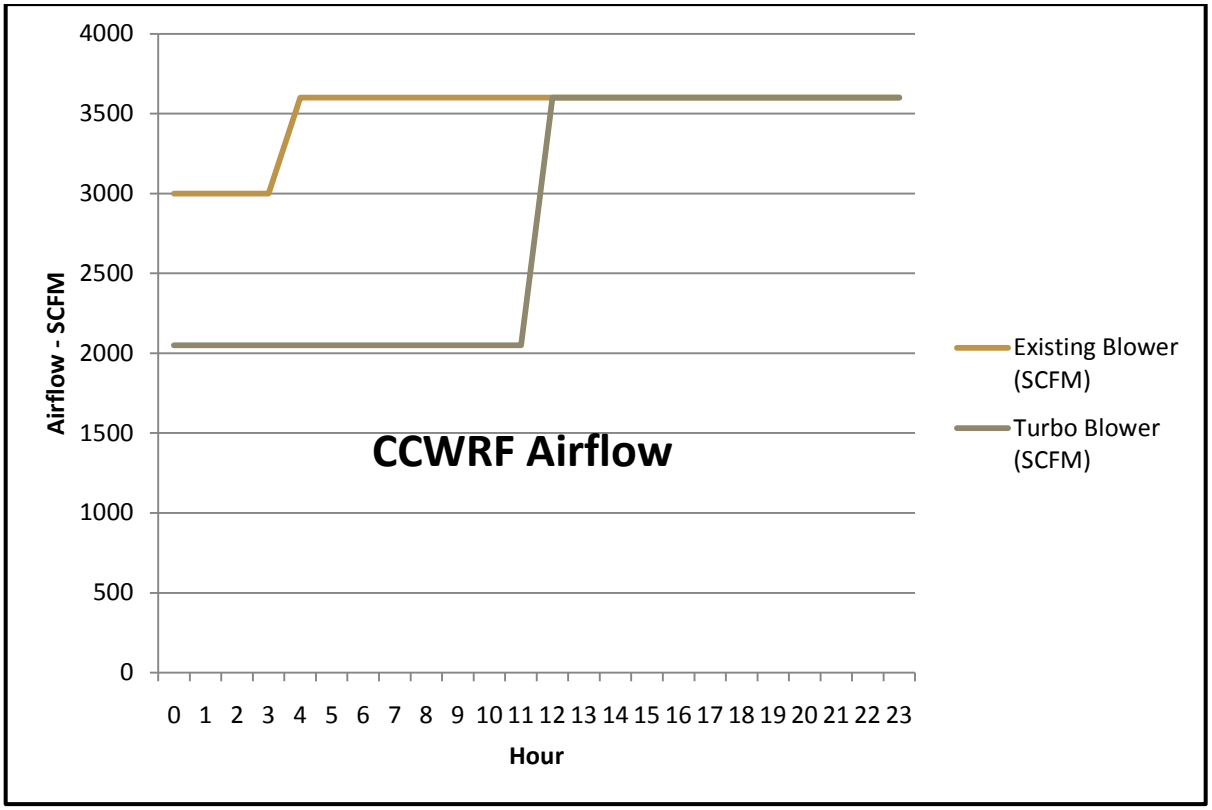

Figure 8-31
Modeled Airflows at CCWRF

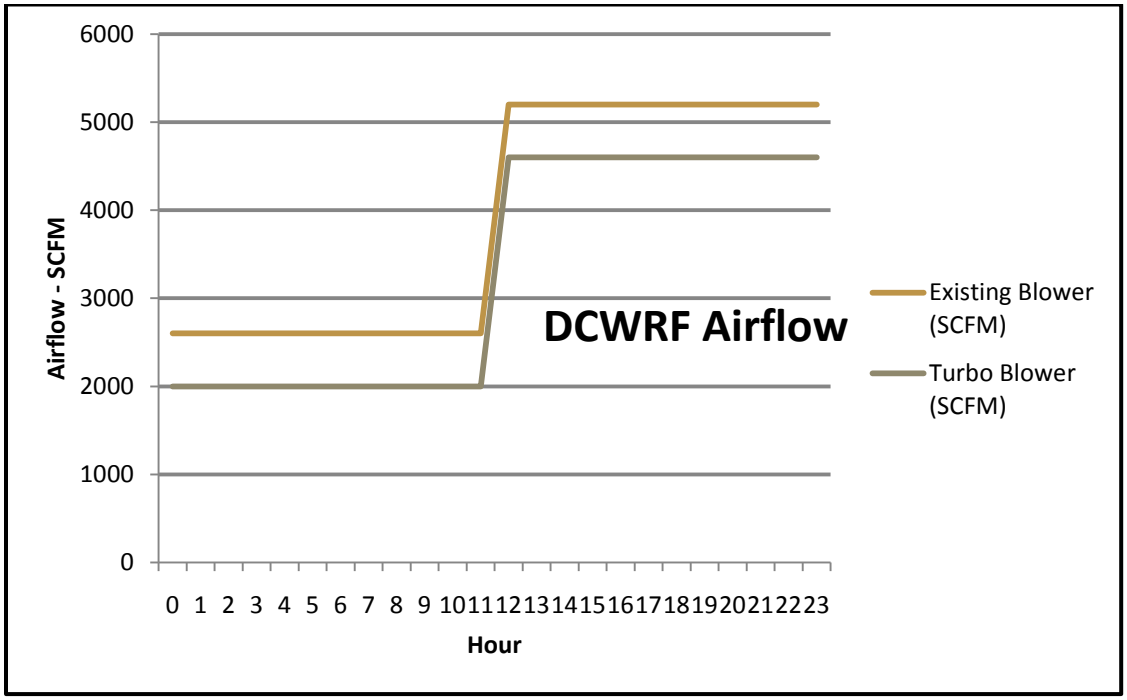

Figure 8-32
Modeled Airflows at DCWRF

Table 8-24 and Table 8-25 contain the parameters used in the analyses:

Table 8-24
CCWRF Blower Energy Consumption Parameters

Existing Multistage Centrifugal Blower	300 hp (brake hp), 95.5% motor efficiency Low Flow Operation: 3000 scfm / 271 hp High Flow Operation: 3600 scfm / 311 hp
New High-Speed Turbo Blower	250 hp package (wire-to-water) Low Flow operation: 2050 scfm / 121 hp High Flow operation: 3600 scfm / 210 hp
Energy Cost	$0.0433/kWh (CLF&P Primary General service, demand and facility charges neglected.)

Table 8-25
DCWRF Blower Energy Consumption Parameters

Existing Multistage Centrifugal Blower	250 hp (brake hp), 95.5% motor efficiency Low Flow operation: 2600 scfm / 202 hp (one blower running) High Flow operation: 2x2600 = 5200 scfm / 2x202 = 404 hp (two blowers running)
New High-Speed Turbo Blower	250 hp package (wire-to-water) Low Flow operation: 2600 scfm / 122 hp (one blower running) High Flow operation: 2x2300 scfm = 4600 scfm / 2x109=218 hp (two blowers running)
Energy Cost	$0.0433/kWh (CLF&P Primary General service, demand and facility charges neglected.)

This analysis indicates replacing one multistage centrifugal blower with an HST blower may yield an initial annual energy cost savings of $39,500 at the CCWRF; and replacement of two blowers may yield an initial annual energy cost savings of $45,200 at the DCWRF in 2013 dollars. Additional savings may be realized by the HST system in practice due to adjustment/refinement of HST airflow rates, possible reduction of utility demand charges, and potential future utility price increases.

A discounted cash flow analysis was used to calculate the payback period, internal rate of return (IRR), and net present value (NPV) for blower replacement projects at the CCWRF and DCWRF. These factors and the results of the analysis are shown in Table 8-26.

Table 8-26
Cash Flow Analysis Factors and Results

Factor	Crow Creek WRF (one blower)	Dry Creek WRF (two blowers)
Evaluation Period	10 years	10 years
Discount Rate	5.0%	5.0%
Utility Cost Escalation (Inflation) Rate	3.0%	3.0%
Blower Replacement Capital Cost	$213,570	$427,140
Initial (Year 0) Utility Energy Cost Savings	$39,500	$45,200
Payback Period (approx.)	4.9 years	8.3 years
Internal Rate of Return (IRR)	16%	4%
Net Present Value (NPV)	$135,400	($19,300)

This analysis shows that both sites have a payback period of less than ten years.

The analysis for CCWRF has a relatively high IRR and positive NPV, coupled with a short payback period of about five years, indicating that this project has very favorable economics at the CCWRF site.

The analysis for DCWRF has a low (but positive) IRR, a relatively small negative NPV, and a payback period of less than nine years. Based on these values, this project essentially breaks even economically over this evaluation period. However the project will continue to create economic value for the life of the HST blower equipment, therefore the longer-term economics of this project at DCWRF are favorable.

8.8.2 New Influent Flow Metering at DCWRF

The existing influent flow meter at the DCWRF is located downstream of the screening equipment. During normal operation, the face of the screens becomes partially blinded with rags and debris. This causes the water level on the upstream side of the screens to rise. When the water level rises to the preset level, the screens cycle, the built up material is removed and the water level goes down. In the moments immediately after the screens cycle, a momentary “surge” in flow occurs. This surge can cause the influent flow meter (located downstream) to erroneously record high influent flows. These erroneous measurements give the impression that the plant is nearing its flow capacity.

To eliminate this problem, HDR recommends that two new flow meter vaults be installed. One flow meter will be installed in the Dry Creek Interceptor and one flow meter will be installed on the Crow Creek Interceptor.

8.8.3 Secondary Clarifier Weir/Launder Covers at DCWRF

The MBBR and IFAS processes produce an extremely clear effluent. While this is desirable, it does have an undesirable side effect. The clarity of the effluent results in the rapid growth and buildup of algae on the clarifier effluent weirs and in the effluent launders. As the algae buildup becomes heavy and sloughs off into the effluent, it can foul the UV bulbs and/or cause the effluent sample to fail discharge standards. One effective way to mitigate this problem is to provide the weirs and launders with fiberglass covers.

In 2009, the secondary clarifiers at the CCWRF were fitted with weir/launder covers. The covers have been very successful in reducing the level of algae buildup on effluent weirs and launders. HDR recommends BOPU provide the secondary clarifiers at the DCWRF with fiberglass weir and launder covers.

8.8.4 Standby Power for Aeration Blower at DCWRF

Currently the DEQ does not require standby power for aeration blowers. As such, neither the CCWRF nor the DCWRF have standby power for the aeration system. While not required by the State, providing some standby power capability for the aeration system would be beneficial if utility power were lost for an extended period of time. For example, should the utility power feed be lost for a month or longer due to a tornado or malicious act, it is very likely that all of the biomass in the MBBR and IFFAS treatment tanks would die off. Re-growing that biomass would take several weeks, during which time the plants would be unlikely to meet their permitted limits. Alternatively, if each WRF were provided with enough standby power capability to run one aeration blower, the biomass could be kept viable throughout an extended outage of utility power.

The Headworks project at CCWRF (currently under design) includes provisions for installation of a new standby generator capable of powering one aeration blower. HDR recommends that a new standby generator be provided at the DCWRF capable of powering one of the larger blowers when utility power is lost.

8.8.5 Install Piping and Valves for Biological Phosphorus Removal

When the Anoxic Treatment tanks were installed in 2008, the first cell in each train was planned for future conversion to anaerobic service to facilitate biological phosphorus (BioP) removal. Currently all of the mixed liquor recycle (MLR) flow is returned to the front of Cell I

in each train of Anoxic Treatment. In order to operate in BioP mode, the MLR flow must be returned to Cell 2 of each Anoxic Treatment Train. In 2008, a tee was placed in the MLR line at the front of Cell 2 to facilitate the additional pipe spools and valves needed to operate in BioP mode.

BioP operation can be challenging to maintain consistent performance. While a discharge phosphorus limit is not envisioned in the near term, it is a certainty at some point in the future. Operating in BioP mode does not cost any more than the current operating mode. Operating in BioP mode for a few years in advance of having to meet a discharge limit will give operators valuable experience and enhance their ability to consistently meet a discharge phosphorus limit once it becomes a reality.

HDR recommends BOPU add the valves and pipe spools needed to operate the existing Anoxic Treatment Tanks in BioP mode.

8.8.6 Septage Receiving

Currently, septage haulers empty their loads directly into the WRF interceptor sewer feeding the DCWRF without any contaminant detection or screening. Operators must escort septage haulers on the site and observe their dumping operations in an effort to limit the amount of objectionable materials and substances introduced into the WRF. This process could be improved with installation of specialized septage receiving equipment.

Septage receiving equipment screens out objectionable material and will detect hydrocarbons and other objectionable contaminants before they are discharged into the WRF interceptor sewer. Also, the septage receiving equipment can be provided with automated card readers for billing and tracking of deliveries.

HDR recommends BOPU provide the CCWRF with an automated septage receiving station.

8.8.7 Sludge Drying Bed Rehabilitation

The drying beds at the CCWRF are limited to grease processing since all sludge processing is done at the DCWRF. The older of the two sets of sludge drying beds at the CCWRF has deteriorated to the point that its use has had to be discontinued. During certain times of the year, the inability of Staff to use the older drying beds has hampered grease processing operations.

HDR recommends BOPU structurally rehabilitate the existing drying beds and replace their underdrain system so that they can be placed back into regular use.

8.8.8 Electrically Operated CCWRF Primary Sludge Discharge Valves

The discharge elevation of the CCWRF primary sludge line is at a lower elevation than the normal water surface elevation in the primary clarifiers. This results in primary sludge being removed from the primary clarifers in greater volume than intended. The excess sludge removal skews influent flow measurements and puts an excessive solids load on the downstream DCWRF.

To solve the problem HDR recommends that the sludge discharge line be fitted with an electrically actuated isolation valve. As part of the valve installation, the pump controls should be modified such that the valve only opens when the sludge pumps are in operation. This will eliminate the excess sludge withdrawal problem.

8.8.9 Baffling in Secondary Clarifiers at CCWRF

Flow enters the secondary clarifiers at the center point and travels outward towards the effluent weirs located around the perimeter of the clarifier. The design intent is for solids to settle out as the flow slowly travels towards the weirs. As the flow is making its way across the clarifier, the velocity of the water can pick up solids from the blanket of sludge on the bottom of the clarifier and carry them towards the weirs. As a result a small amount of solids is washed over the weirs and into the plant effluent. To date the amount of solids carried over has not impacted discharge compliance for TSS nor has it adversely impacted UV disinfection performance. However, as the flows to the plant increase, solids carryover could prove problematic.

One effective tool in reducing solids carryover on the clarifier weirs is installation of baffles below the weirs. These weirs are called Stamford Baffles. When installed, the Stamford Baffles will redirect the solids picked up from the clarifier bottom back towards the center of the clarifier for resettling.

HDR recommends BOPU retrofit both secondary Clarifiers at the CCWRF with Stamford Baffles.

8.8.10 Summary of Operational and Efficiency Improvements

Table 8-27 summarizes the recommended improvement to both the CCWRF and DCWRF relating to Operational and Efficiency Improvement Needs.

Table 8-27
Recommended Operational and Efficiency Improvements and Associated Cost

Description	CCWRF Cost (2013 Dollars)	DCWRF Cost (2013 Dollars)
High Speed Turbo (HST) Blower Retrofit	$214,000	$427,000
New Influent Flow Metering at DCWRF	N/A	$259,000
Secondary Clarifier Weir/Launder Covers at DCWRF	N/A	$267,000
Standby Power for Aeration Blower	N/A	$294,000
Piping and Valves for Biological Phosphorus Removal	N/A	$68,000
Septage Receiving	$1,020,000	N/A
Sludge Drying Bed Rehabilitation	$1,267,000	N/A
Electrically Operated CCWRF Primary Sludge Discharge Valves	$82,000	N/A
Baffling in Secondary Clarifiers	$30,000	N/A

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8.9 Recommendations

Volume 8 provides an assessment of wastewater treatment needs for the near term (10-year), mid term (20-year) and long term 50-year planning periods. For cost estimating purposes, only the near and mid term project cost estimates are being prepared. Cost estimates for long-term improvements are not included since it is likely that additional studies will be completed before any of the long-term improvements move into planning and implementation stages.

It is vitally important that BOPU continue to monitor WYDEQ's progress in establishing nutrient limits as well as the EPA's stance towards WYDEQ so that BOPU can exert as much influence as possible in securing reasonable limits on nutrients which do not require millions of dollars of capital investment in order to comply.

8.9.1 Near-Term Recommendations (2013 to 2023)

Since BOPU is not facing any flow or loading capacity needs at either WRF, all recommendations are based on forecasted regulatory restrictions or operational improvements. Following is a listing of the recommended projects:

- **Selenium Management Study.** Implement the Selenium Management Study as described in the Regulatory Forecast section of this volume and negotiate a compliance schedule with WYDEQ for compliance with the expected new Selenium discharge limit.
- **Sludge Pretreatment Study.** Implement the sludge pretreatment Study as described in the Digester Capacity section of this volume and determine if full scale implementation can defer digester capacity expansion into the mid-term.
- **Biogas Energy Audit and New Biogas Meter.** Review of the future biogas fuel cell installation to determine if it is a viable option to maintain in the long term as well as to determine if there is additional biogas available for expansion. This study would require the installation of a biogas meter on the existing piping to detect total biogas production.
- **Digester Capacity Expansion.** Convert the existing secondary digester to Primary service and construct a new Secondary Digester to bring the digestion system in line with WYDEQ's SLR criteria. This item may or may not be deferred depending on the outcome of the Sludge Pretreatment Study described above.

- **High Speed Turbo (HST) Blower Retrofit.** Install one new HST blower at CCWRF and two new HST blowers at DCWRF to provide better turndown during low aeration demand periods.
- **New Influent Flow Metering at DCWRF.** Install two new flow meter vaults. One flow meter will be installed in the Dry Creek Interceptor and one flow meter will be installed on the Crow Creek Interceptor.
- **Secondary Clarifier Weir/Launder Covers at DCWRF.** Install fiberglass weir and launder covers at the secondary clarifiers at the DCWRF to prevent algae growth from sloughing off into the effluent troughs.
- **Standby Power for Aeration Blower.** Install a new standby generator at the DCWRF capable of powering one of the larger blowers when utility power is lost.
- **Piping and Valves for Biological Phosphorus Removal.** Install the valves and pipe spools needed to operate the existing Anoxic Treatment Tanks in BioP mode.
- **Septage Receiving.** Construct an automated septage receiving station at the CCWRF.
- **Sludge Drying Bed Rehabilitation.** Provide structural rehabilitations to the existing drying beds and replace their underdrain system so that they can be placed back into regular use.
- **Electrically Operated CCWRF Primary Sludge Discharge Valves.** Retrofit the sludge discharge line with an electrically actuated isolation valve. Modify the pump controls as part of the valve installation such that the valve only opens when the sludge pumps are in operation.
- **Baffling in Secondary Clarifiers.** Retrofit both secondary Clarifiers at the CCWRF with Stamford Baffles.
- **Flow Equalization Basin.** Design and construct a flow equalization basin at the DCWRF to shave peak hour flows

8.9.2 Mid-Term (2023 to 2033)

Depending upon the results of the Sludge Pretreatment Study, the Digester Capacity Expansion may or may not be differed to the mid-term. No other potential mid-term projects have been identified.

8.10 Capital Improvement Program

Table 8-28 summarizes the near-term CIP items and provides a capital cost for each. All costs are presented in their year of construction dollars and include engineering, construction and a 35-percent contingency. A 3.5% per year escalation rate was used to account for inflation. This near-term project cost information will be incorporated into the 10-year financial plan presented in Volume 9. Annual cost estimates were developed for each of the capital improvement projects from 2015 to 2023. Years 2013 and 2014 are currently budgeted years and the cost estimates from the financial projections provided by BOPU were not revised.

The projects are all assigned a capital improvement ID with the following format: Planning Period-System-Project Number.

- Planning Periods include:
    - 2013 – In Progress/Completed
    - NT – Near Term (2014-2023)
- Systems include:
    - CCWRF – Crow Creek Wastewater Reclamation Facility
    - DCWRF – Dry Creek Wastewater Reclamation Facility

Project Number is a sequential number for each planning period.

Cost estimating spreadsheets are provided in Appendix 8-C.

It is vitally important that BOPU continue to monitor WYDEQ's progress in establishing nutrient limits as well as the EPA's stance towards WYDEQ so that BOPU can exert as much influence as possible in securing reasonable limits on nutrients which do not require millions of dollars of capital investment in order to comply.

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Table 8-28
Near-term (2014-2023) Recommended Capital Improvement Plan

Item #	CIP ID	Project	Adjusted Budget	Proposed Budget	Projection	Projection	Projection	Projection	Projection	Projection	Projection	Projection	Projection	Near-term Expenditures
			FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	Based on Year of Construction Dollars
1	2013-CCWRF-1	CCWRF 2nd Screening Unit	$2,500,000											-
2	2013-CCWRF-2	CCWRF Operations Building	$2,500,000											-
3	NT-DCWRF-3	New Influent Flow Metering at DCWRF			$277,400									$277,400
4	NT-CCWRF-4	High Speed Turbo (HST) Blower Retrofit at CCWRF			$229,200									$229,200
5	NT-CCWRF-5	Baffling in Secondary Clarifiers at CCWRF			$32,100									$32,100
6	NT-CCWRF-6	Selenium Management Study at CCWRF				$110,900								$110,900
7	NT-DCWRF-7	Sludge Pretreatment Study at DCWRF				$110,900								$110,900
8	NT-DCWRF-8	Biogas Meter and Biogas Fuel Cell Energy Audit at DCWRF				$110,900								$110,900
9	NT-DCWRF-9	Piping and Valves for Biological Phosphorus Removal at DCWRF						$80,800						$80,800
10	NT-DCWRF-10	Secondary Clarifier Weir/Launder Covers at DCWRF						$317,100						$317,100
11	NT-CCWRF-11	Electrically Operated CCWRF Primary Sludge Discharge Valves at DCWRF						$97,400						$97,400
12	NT-DCWRF-12	Digester Capacity Expansion at DCWRF[1]						$4,117,700						$4,117,700
13	NT-DCWRF-13	Flow Equalization Basin at DCWRF[2]						$1,900,300						$1,900,300
14	NT-DCWRF-14	High Speed Turbo (HST) Blower Retrofit at DCWRF						$507,100						$507,100
15	NT-DCWRF-15	Standby Power for Aeration Blower at DCWRF						$349,200						$349,200
16	NT-CCWRF-16	Septage Receiving at CCWRF						$1,211,400						$1,211,400
17	NT-CCWRF-17	Sludge Drying Bed Rehabilitation at CCWRF										$1,726,800		$1,726,800
		Total Projects by Year	$5,000,000	$0	$538,700	$332,700	$0	$8,581,000	$0	$0	$0	$1,726,800	$0	$11,179,200
													Average Cost per Year (over 10 years)	$1,117,900

(1) Digester Capacity Expansion Project may or may not be deferred to the mid-term depending upon the results of the Sludge Pretreatment Study.
(2) Construction of the Flow Equalization Basin negates the need for additional secondary clarifiers. Cost estimates provided in the Appendix for Secondary Clarifiers are for reference only.

Appendices

Volume 8 – Wastewater Treatment

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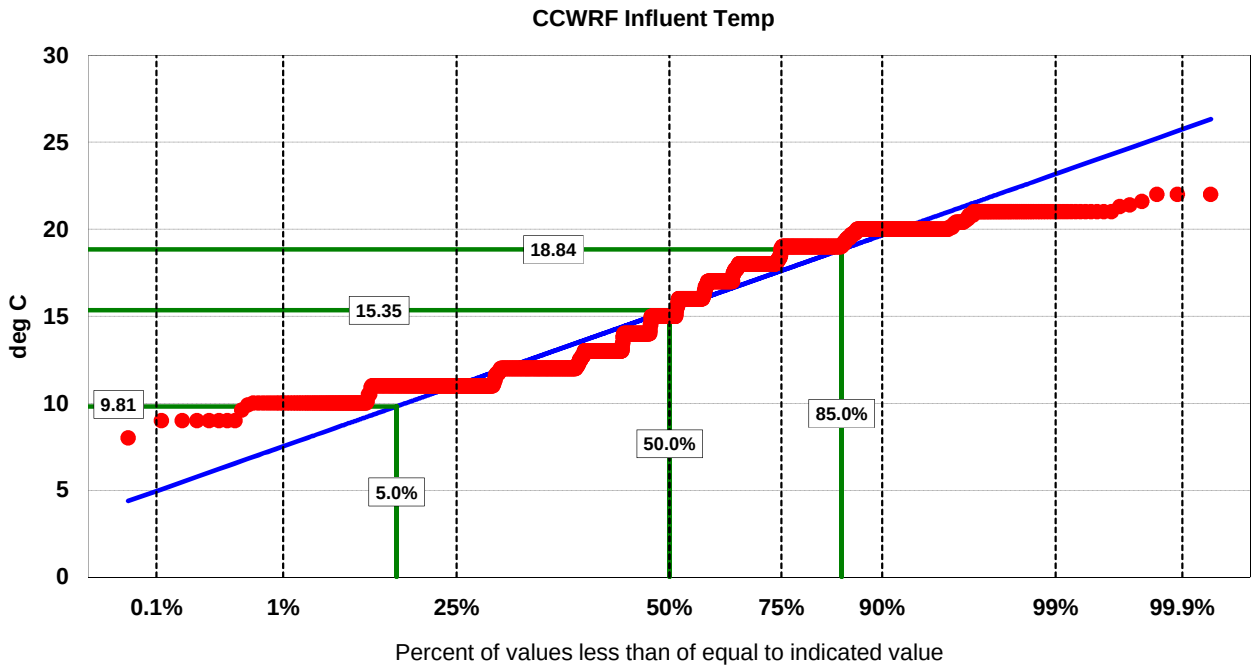
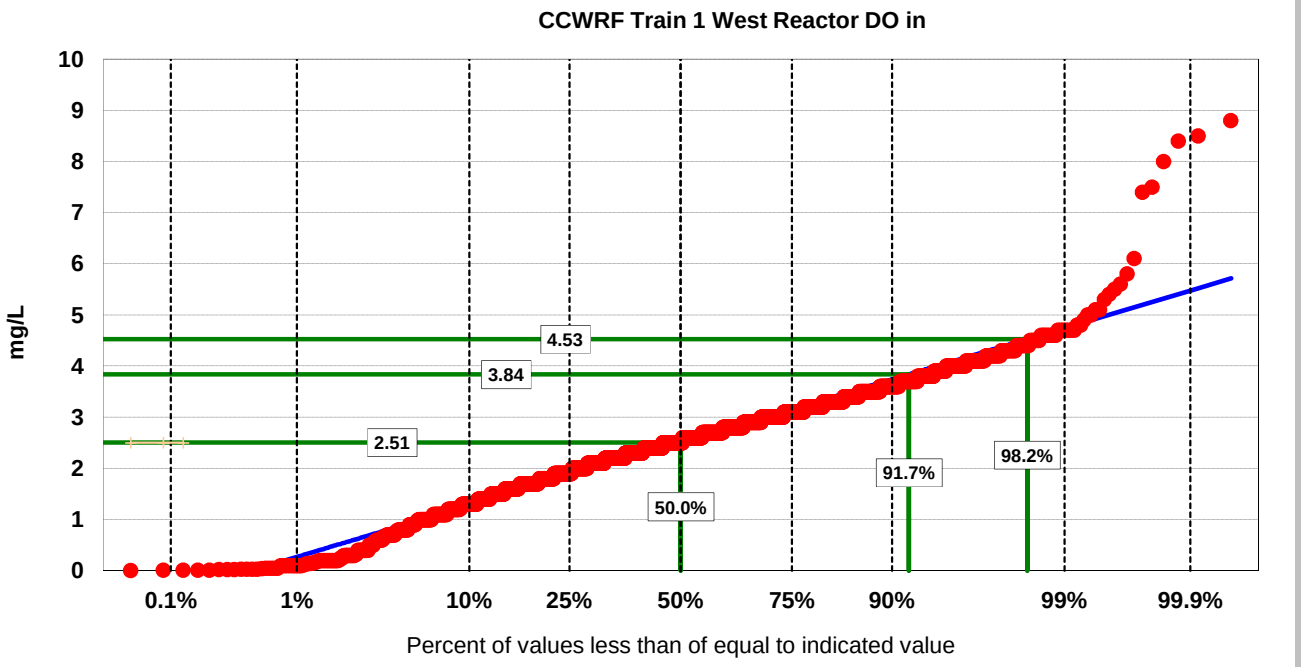
Appendix 8-A
Summary of Flow and Process Data

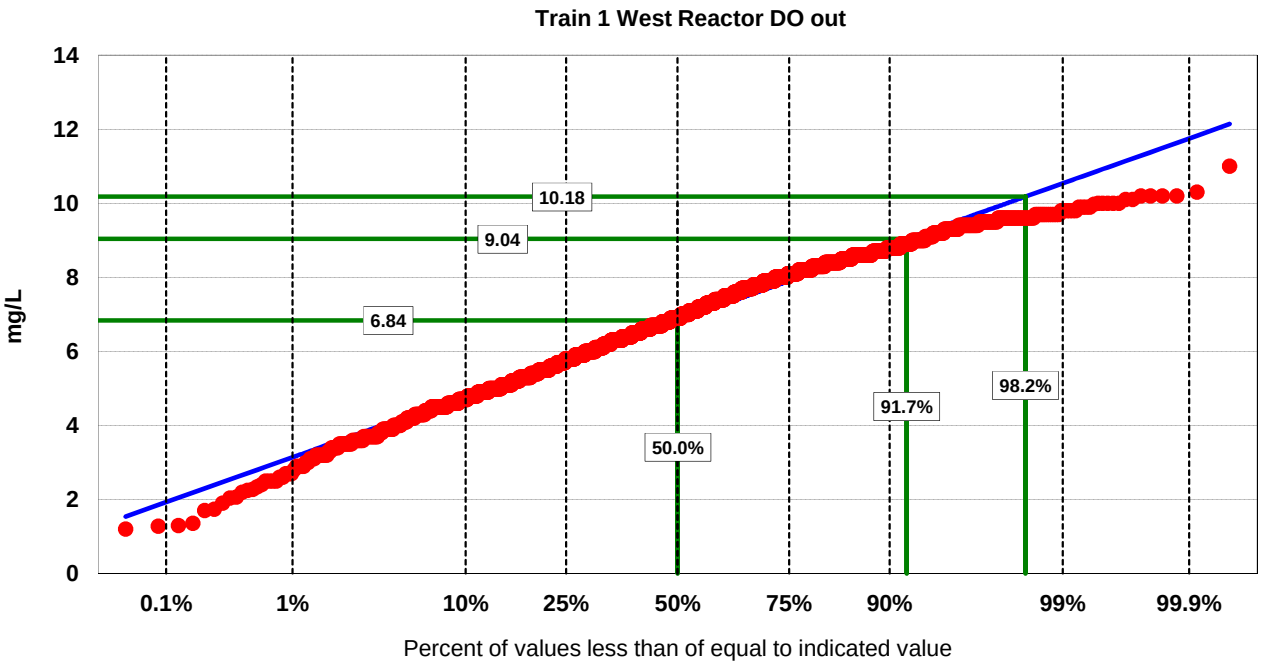
(1) CCWRF Influent Temp



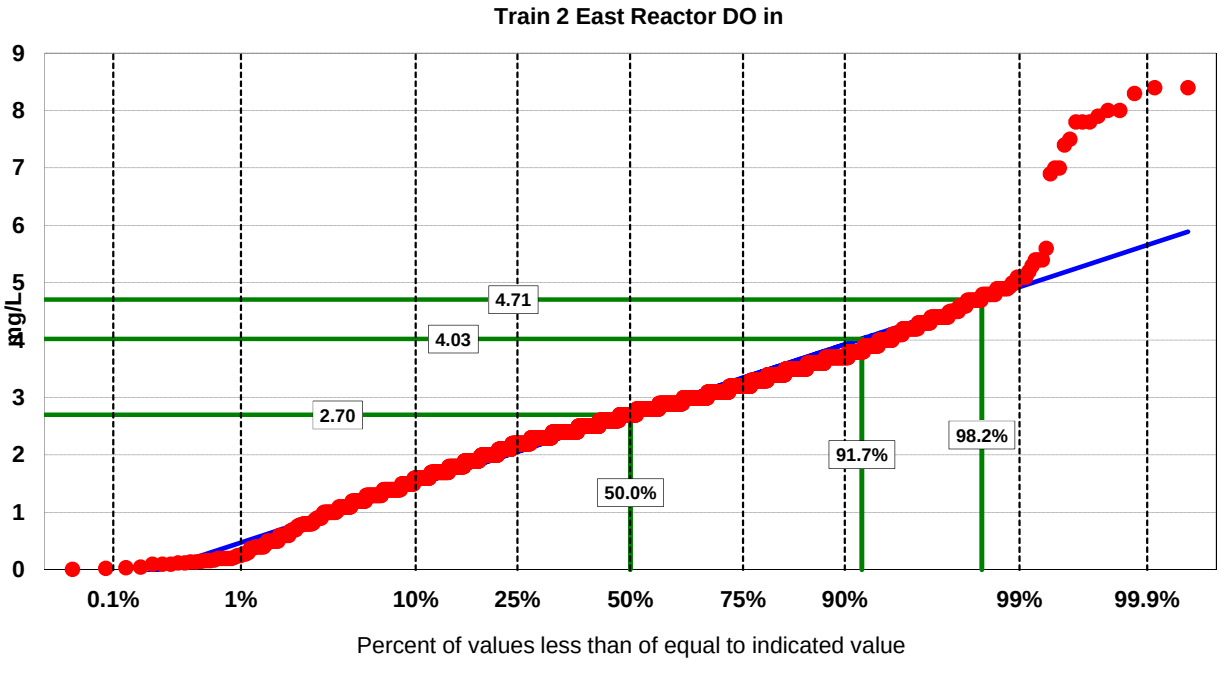
(2) CCWRF Train 1 West Reactor DO in



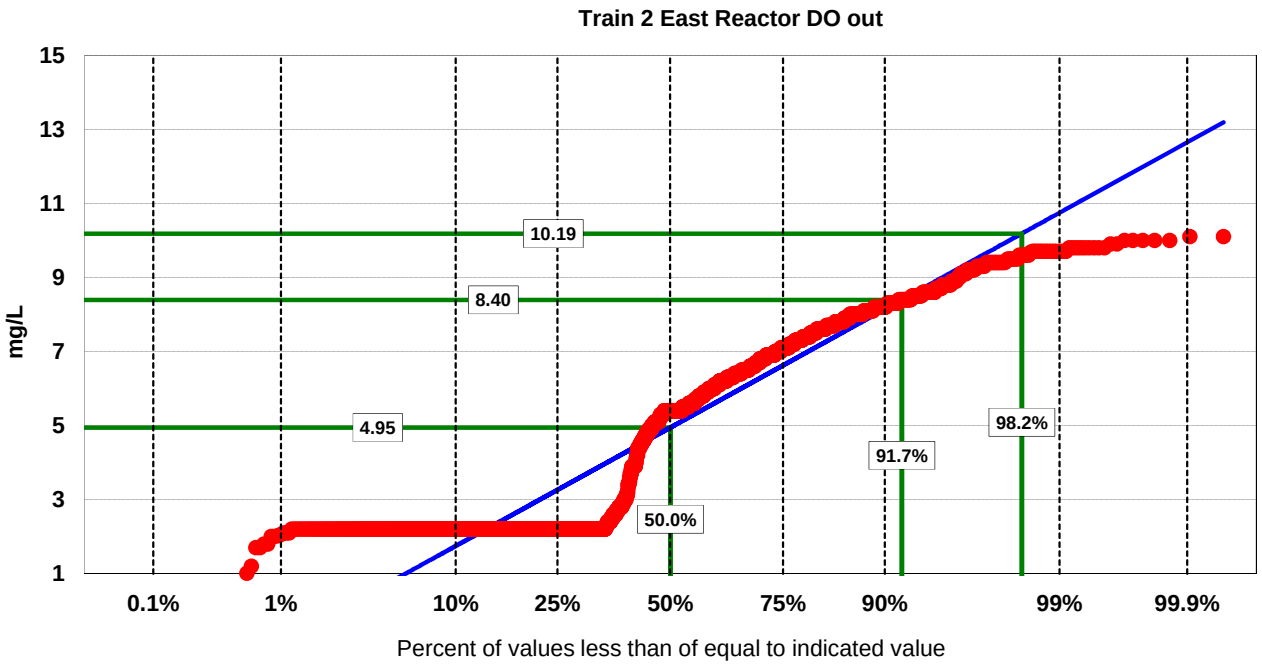
(3) Train 1 West Reactor DO out



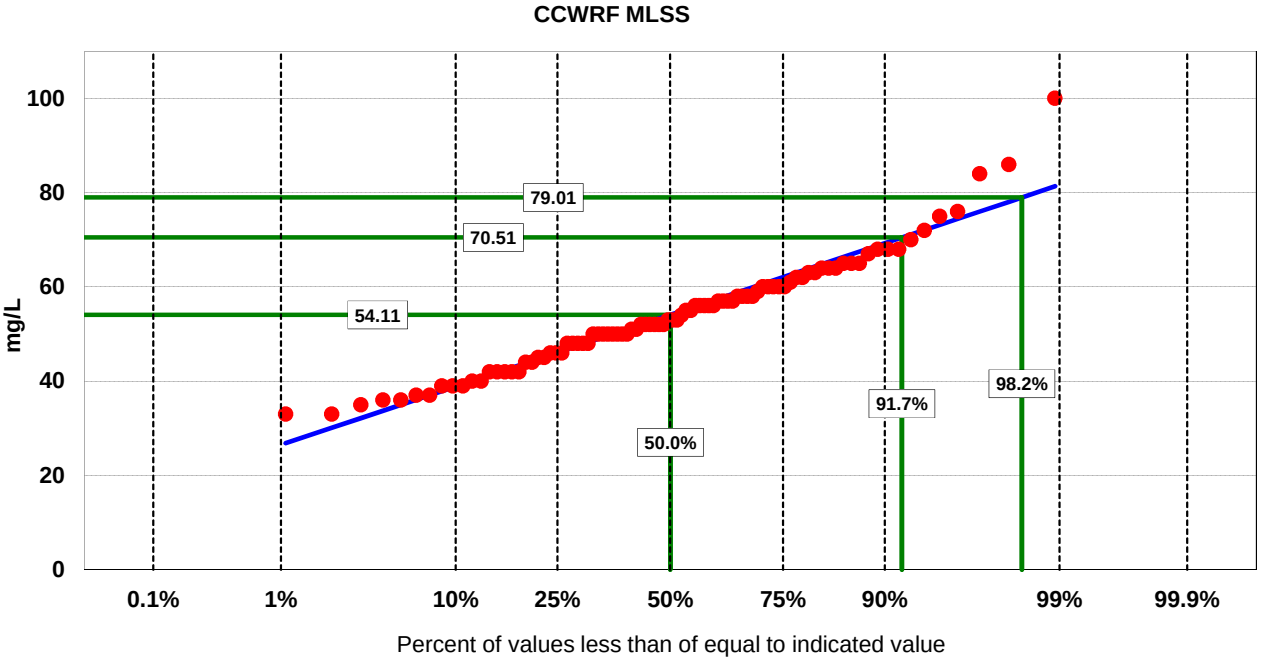
(4) Train 2 East Reactor DO in



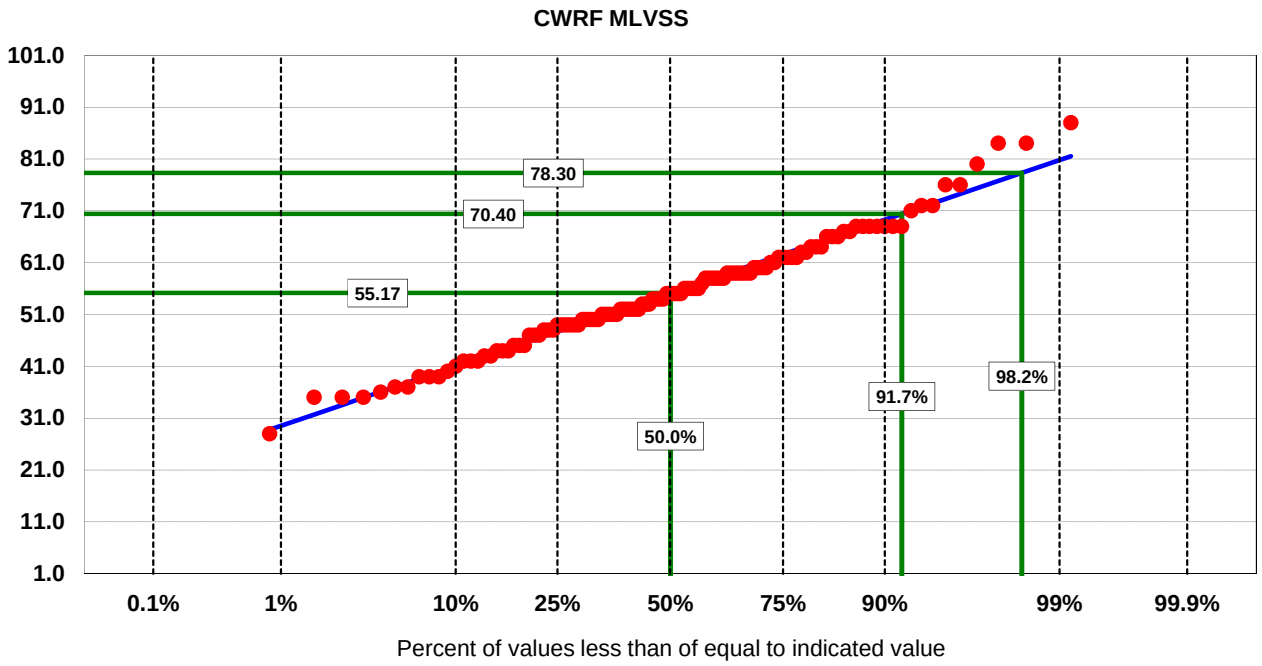
(5) Train 2 East Reactor DO out



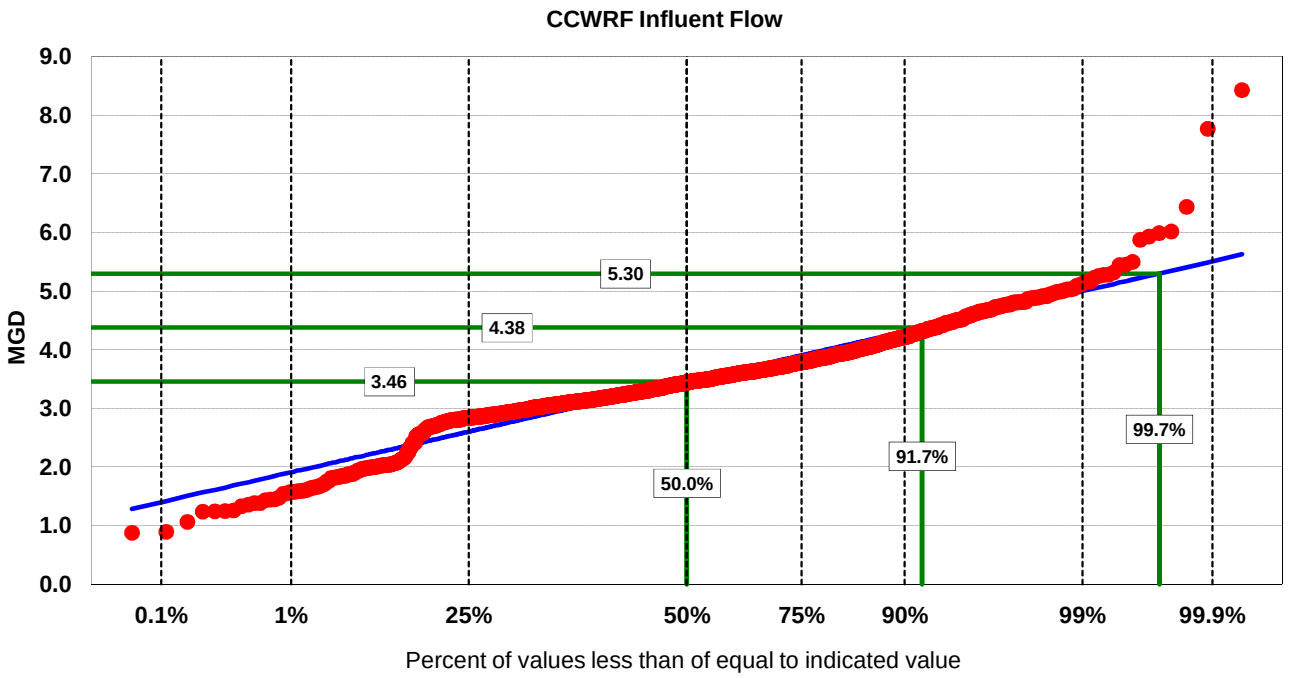
(6) CCWRF MLSS



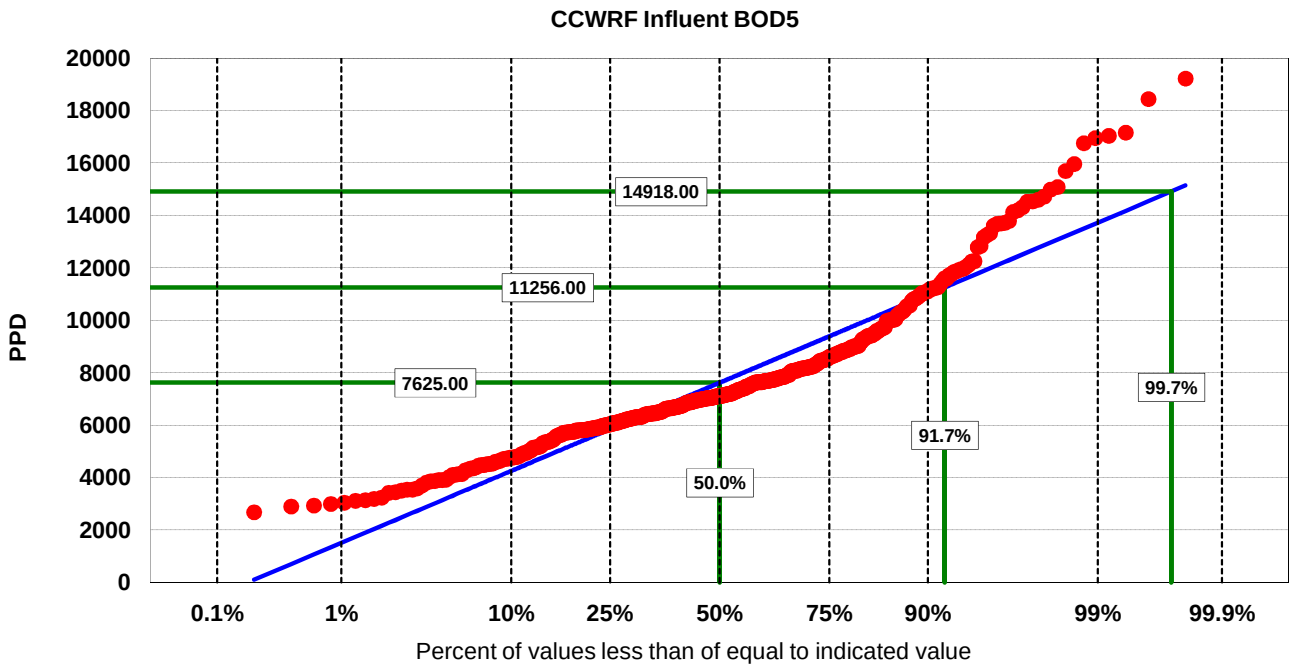
(7) CWRF MLVSS


CWRF MLVSS
101.0
91.0
81.0
71.0
61.0
51.0
41.0
31.0
21.0
11.0
1.0
78.30
70.40
55.17
50.0%
91.7%
98.2%
0.1%
1%
10%
25%
50%
75%
90%
99%
99.9%
Percent of values less than of equal to indicated value

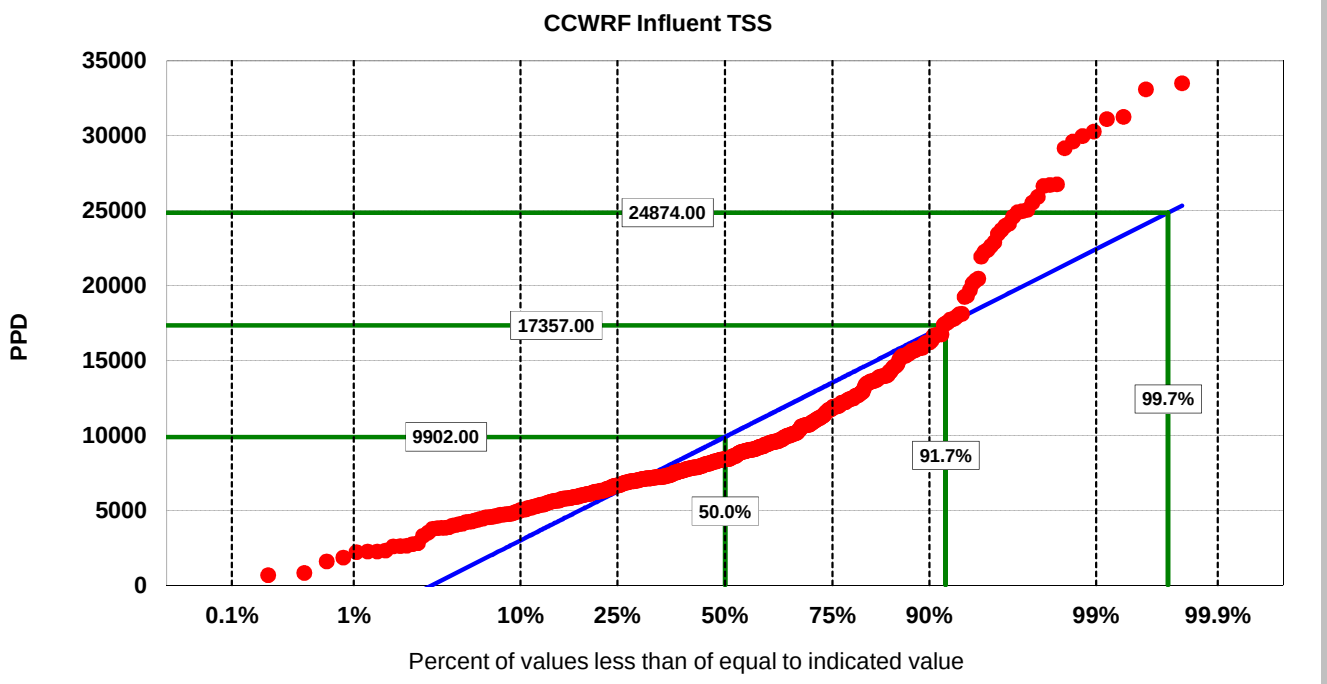
(1) CCWRF Influent Flow



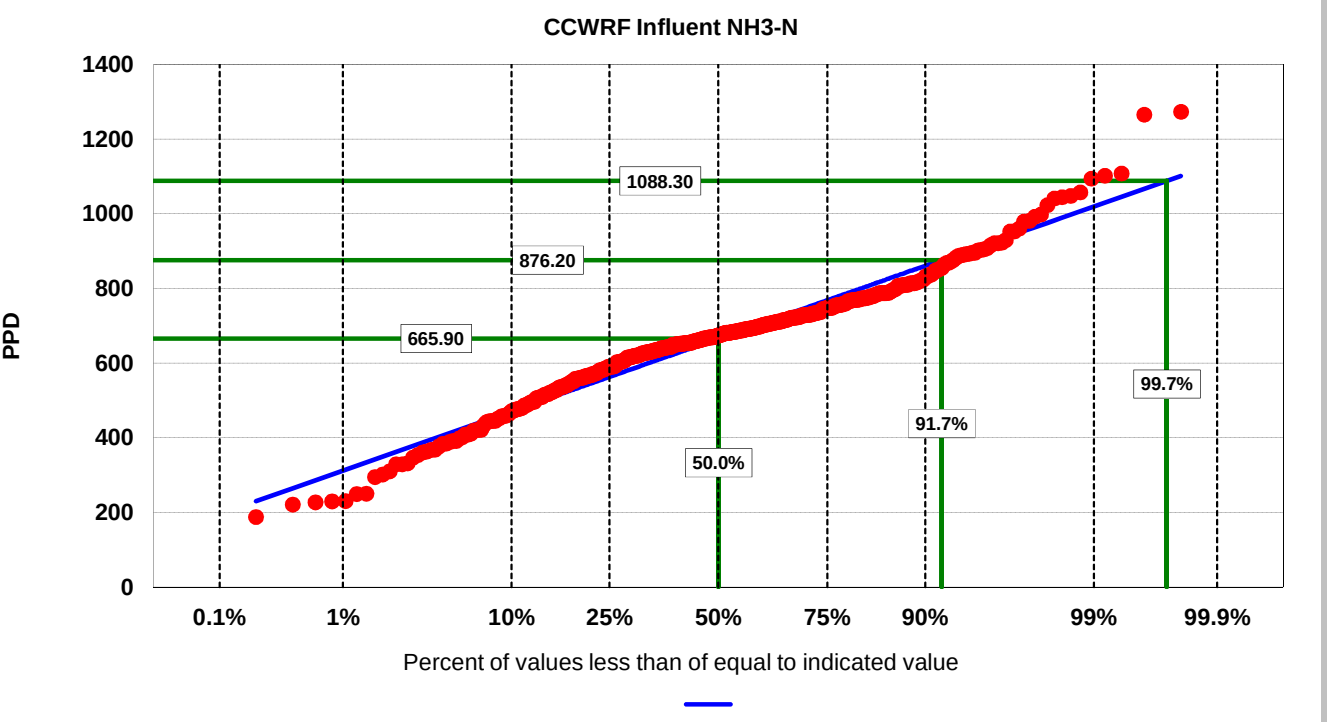
(2) CCWRF Influent BOD5



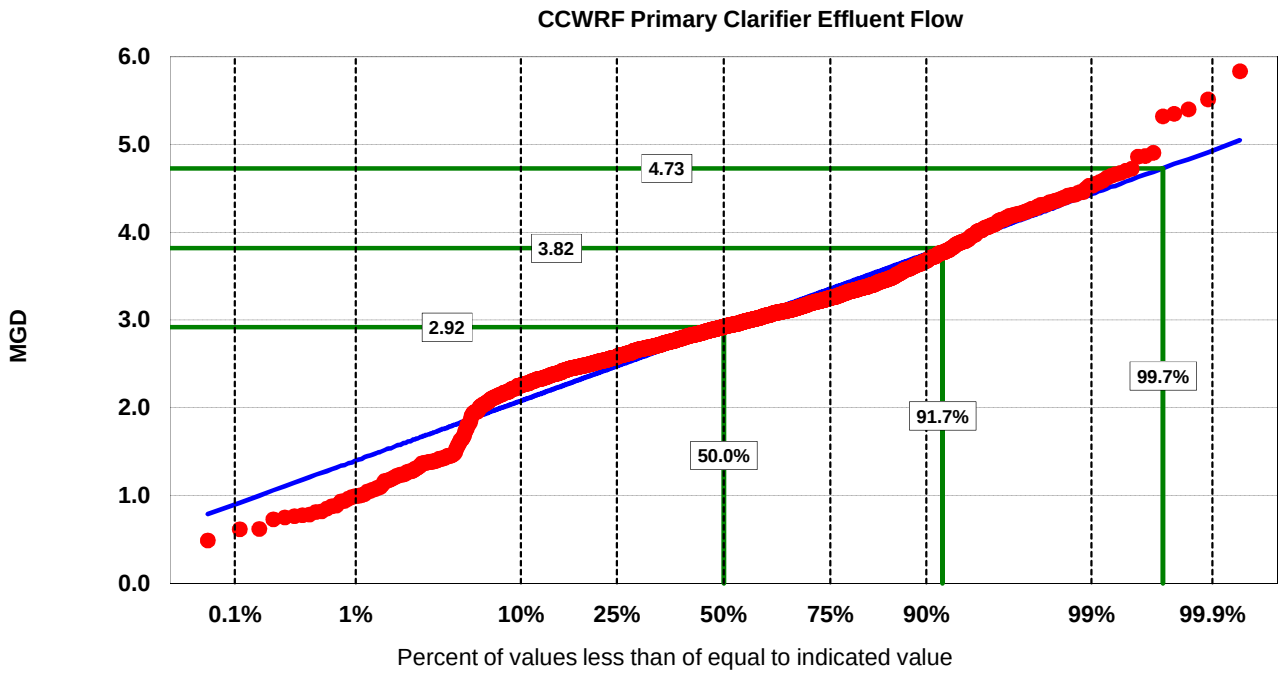
(3) CCWRF Influent TSS



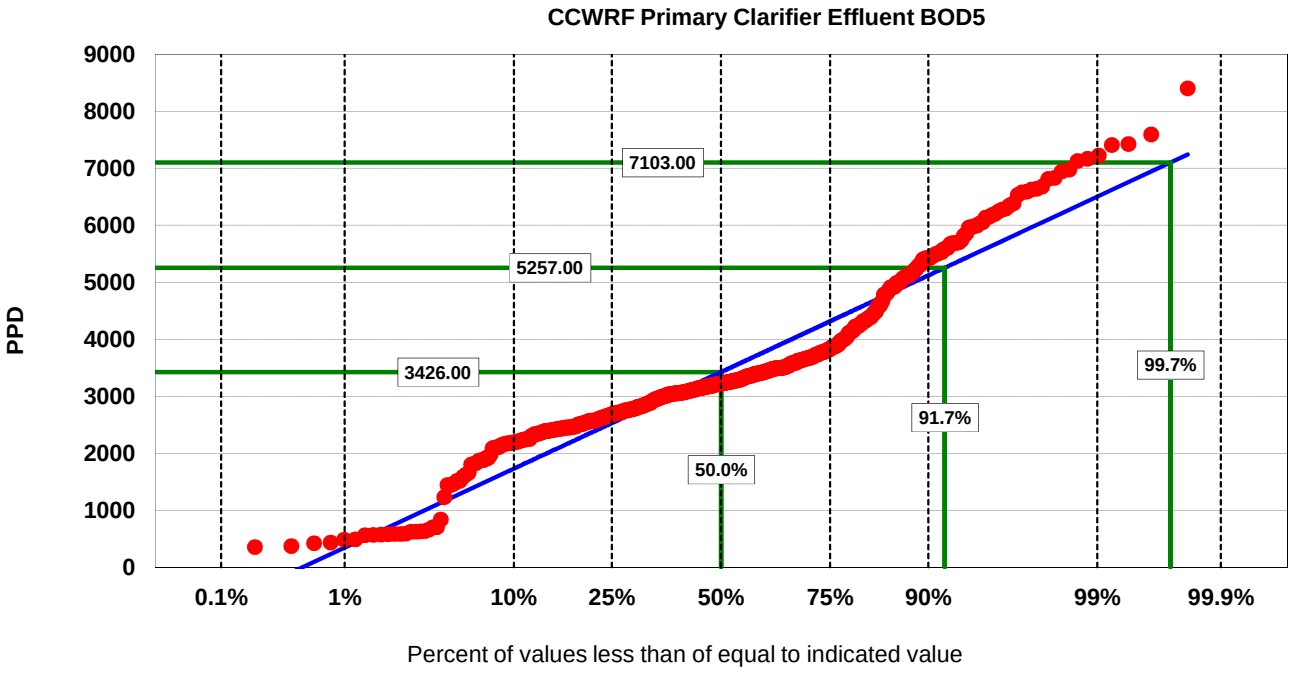
(4) CCWRF Influent NH3-N



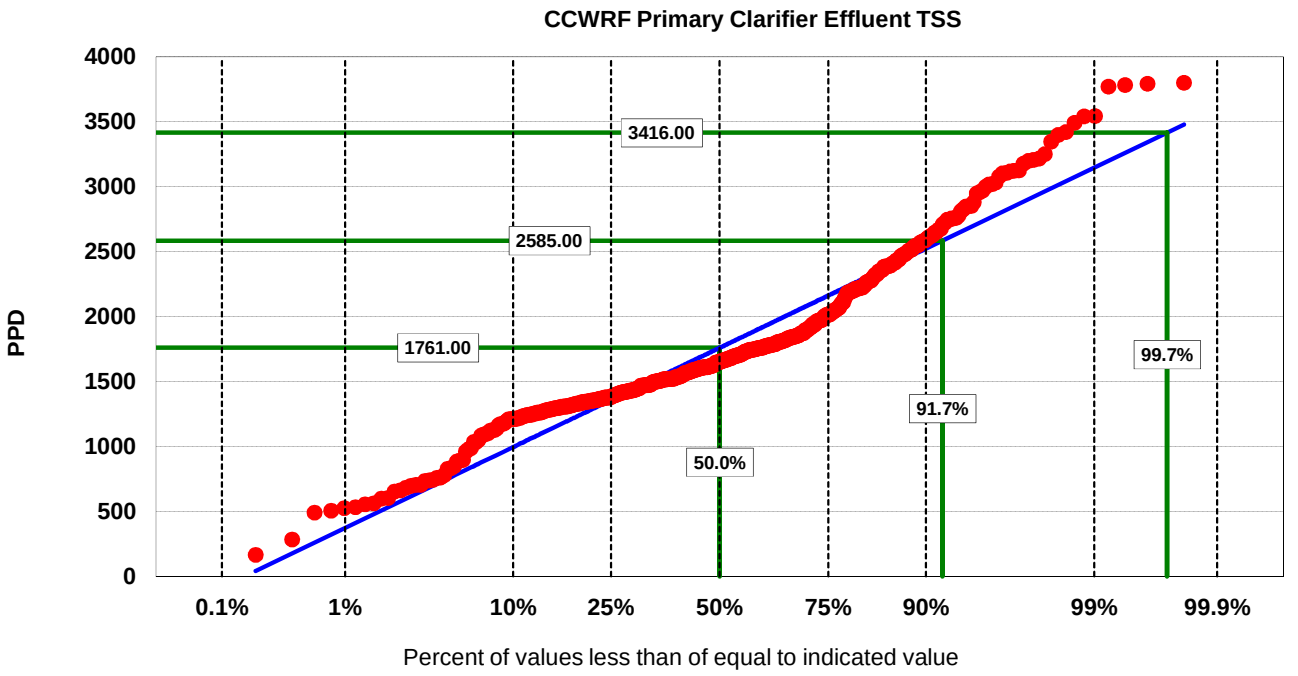
(5) CCWRF Primary Clarifier Effluent Flow



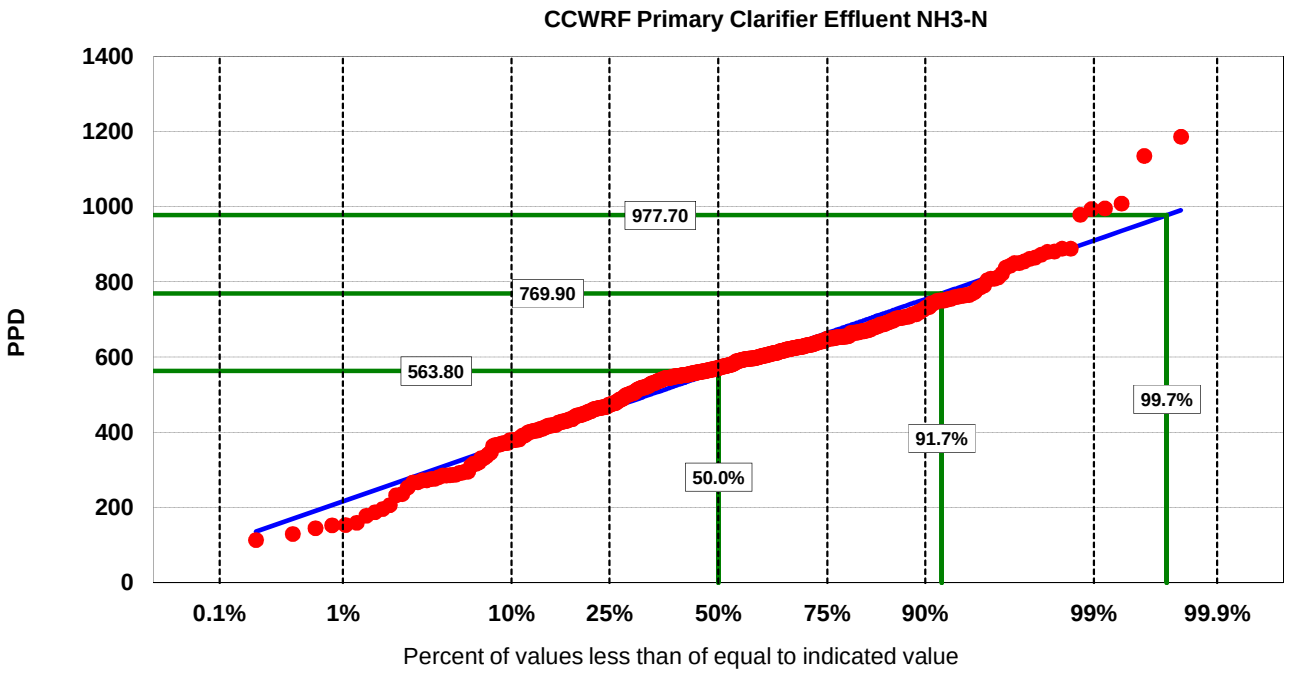
(6) CCWRF Primary Clarifier Effluent BOD5



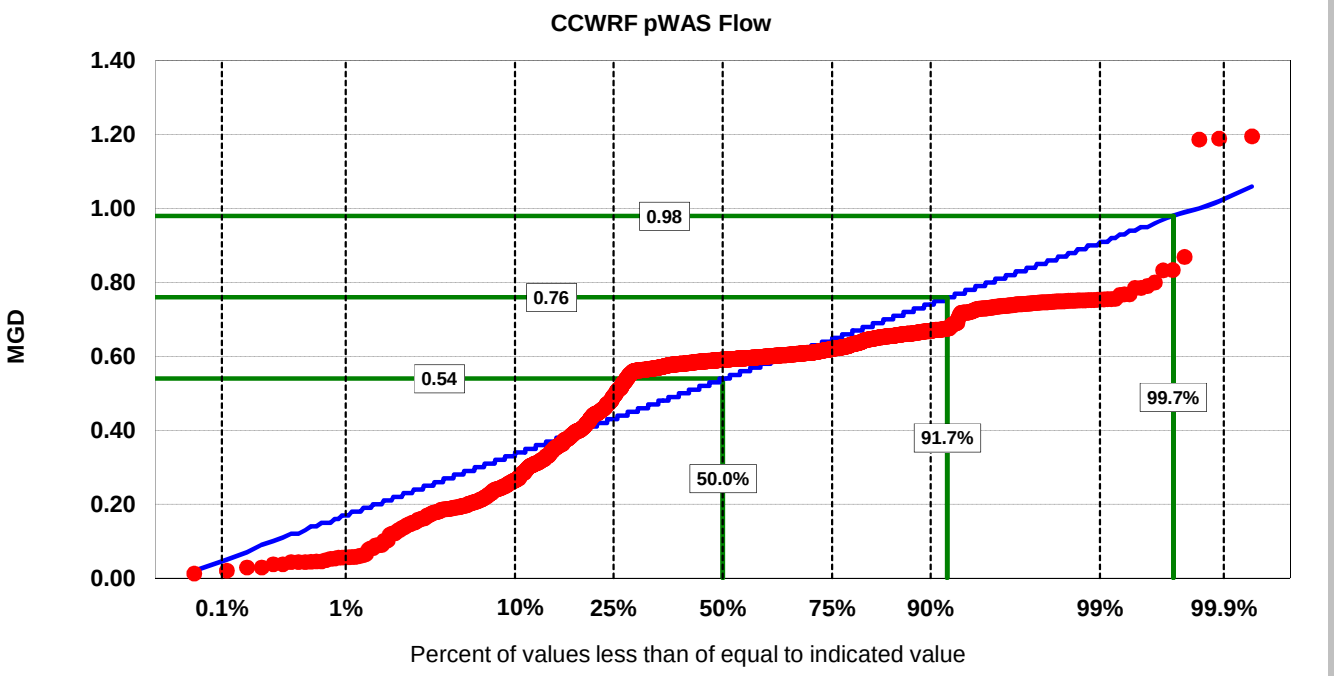
(7) CCWRF Primary Clarifier Effluent TSS



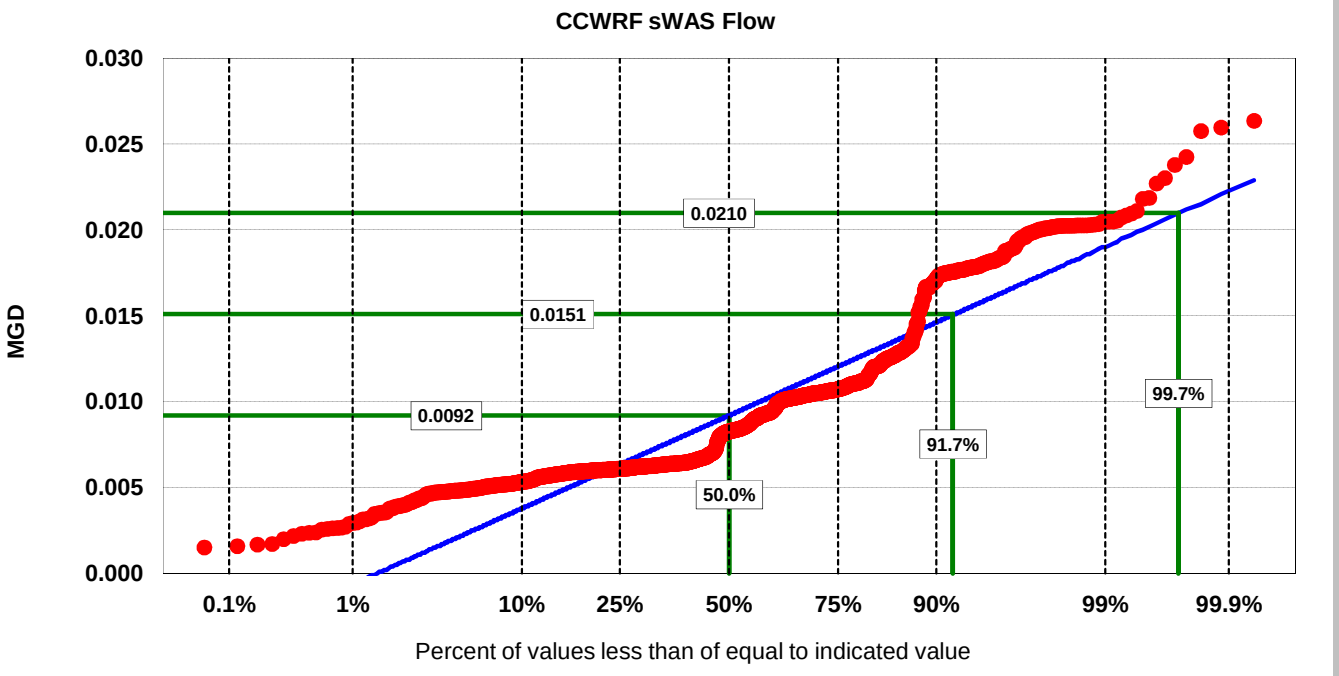
(8) CCWRF Primary Clarifier Effluent NH3-N



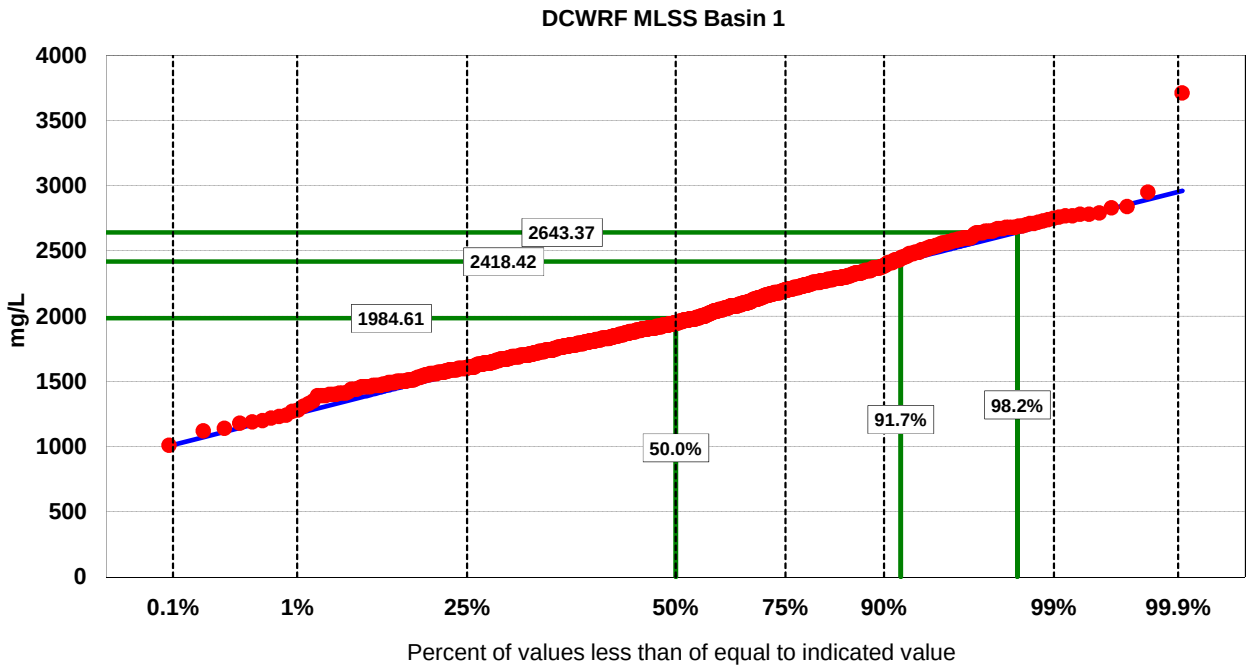
(9) CCWRF pWAS Flow



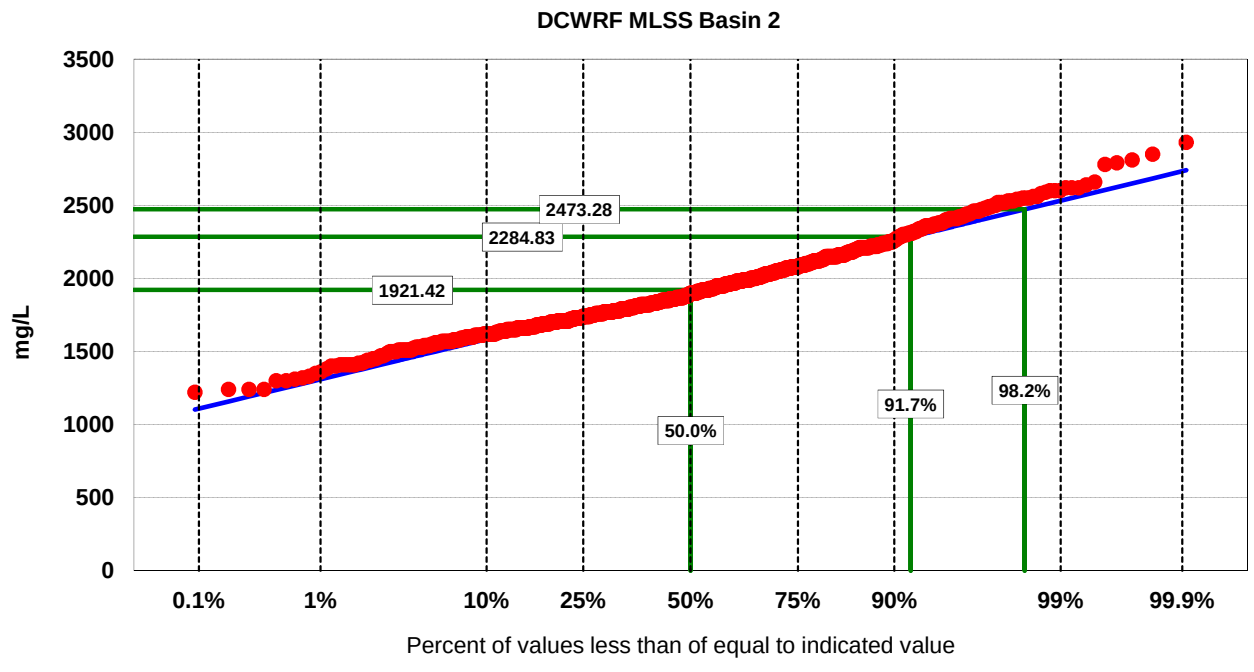
(10) CCWRF sWAS Flow



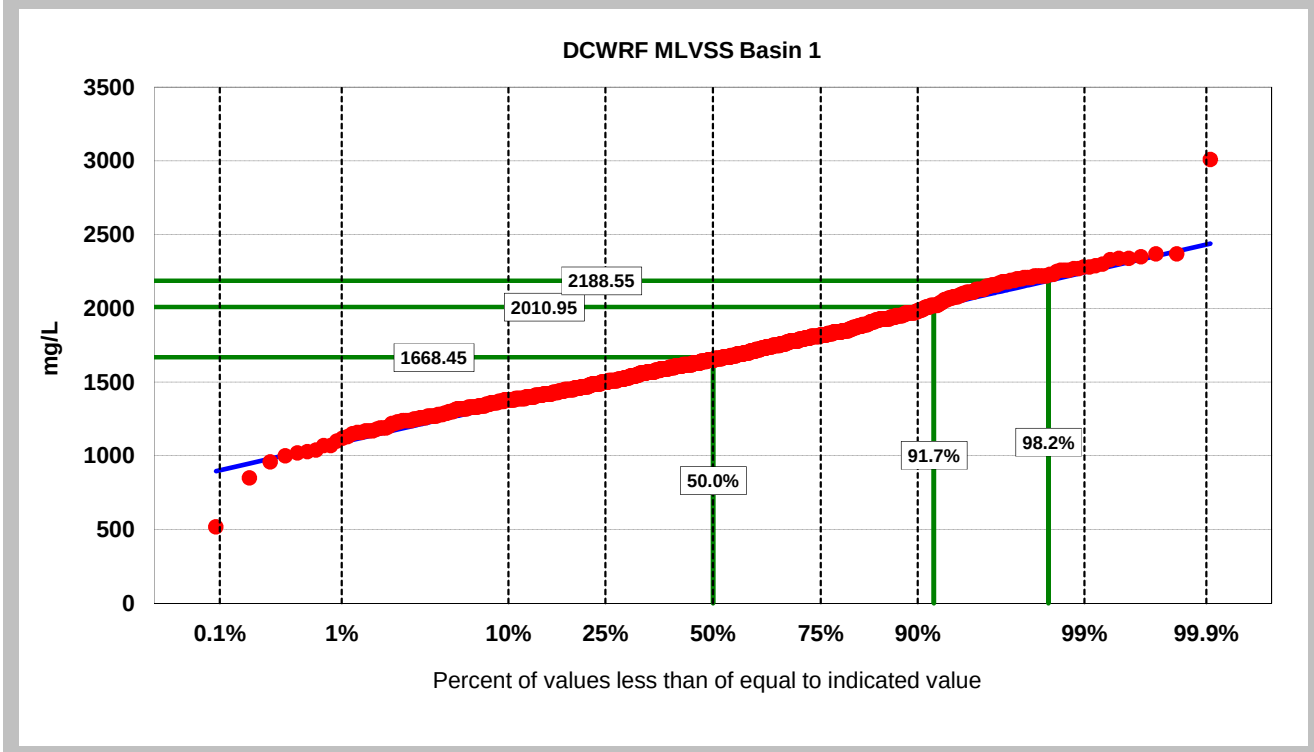
(1) DCWRF MLSS Basin 1



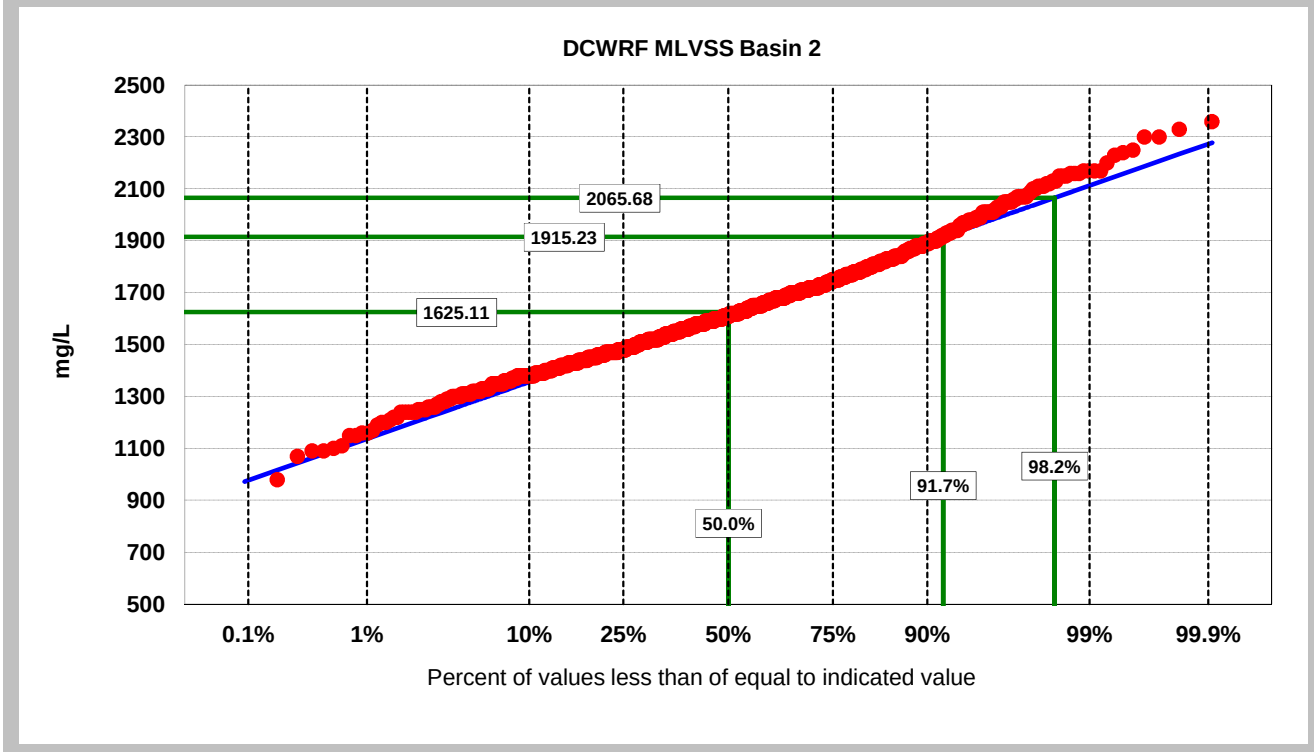
(2) DCWRF MLSS Basin 2



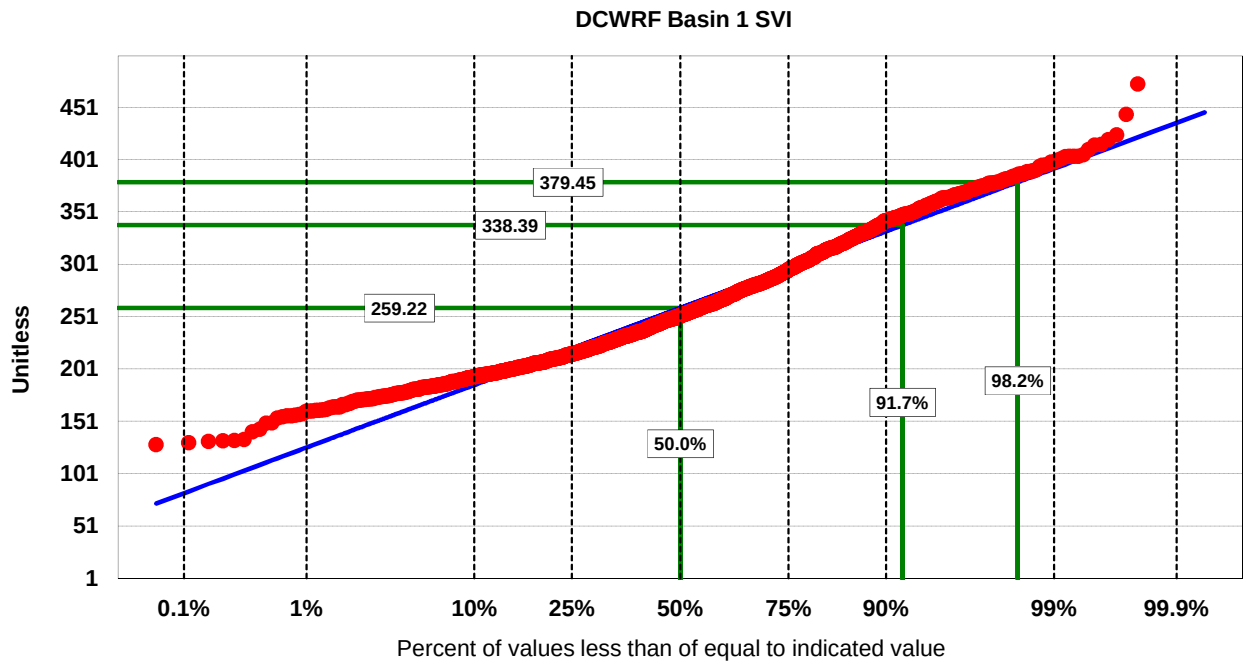
(3) DCWRF MLVSS Basin 1



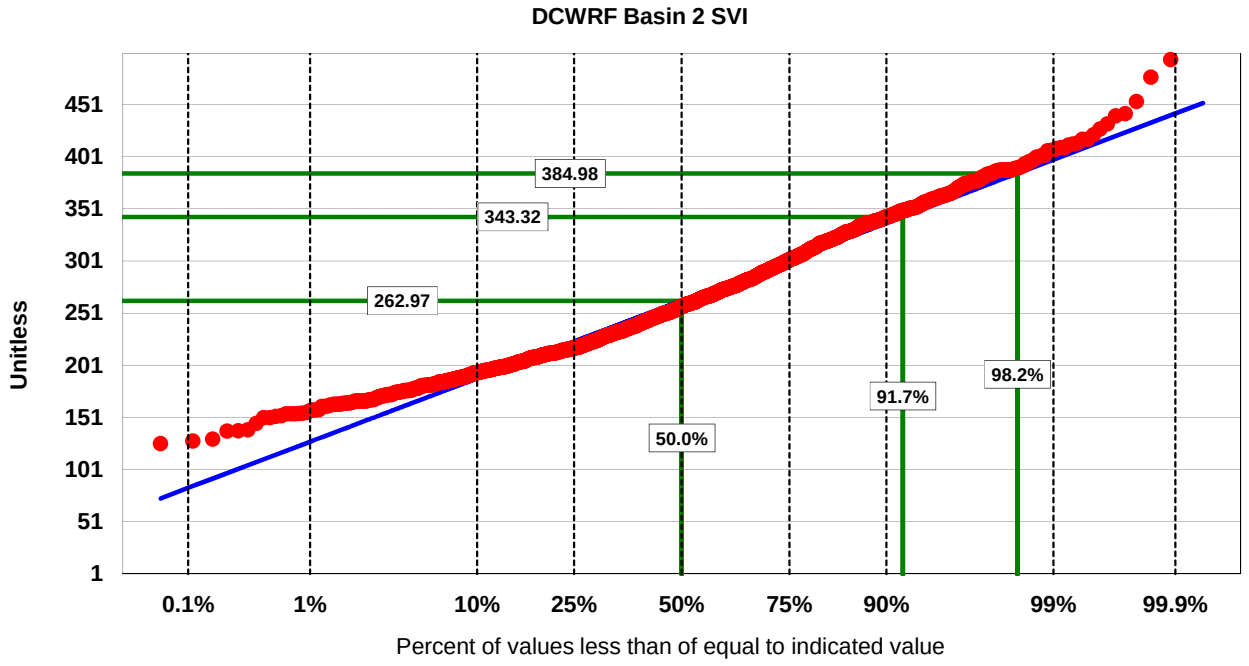
(4) DCWRF MLVSS Basin 2



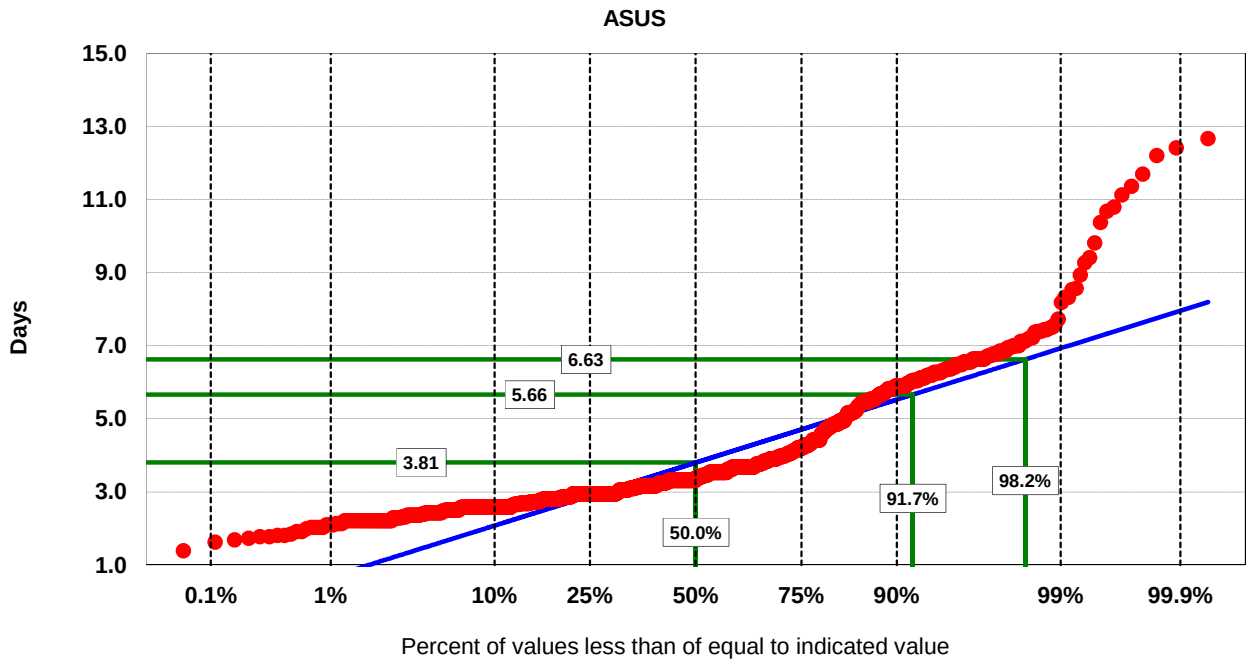
(5) DCWRF Basin 1 SVI



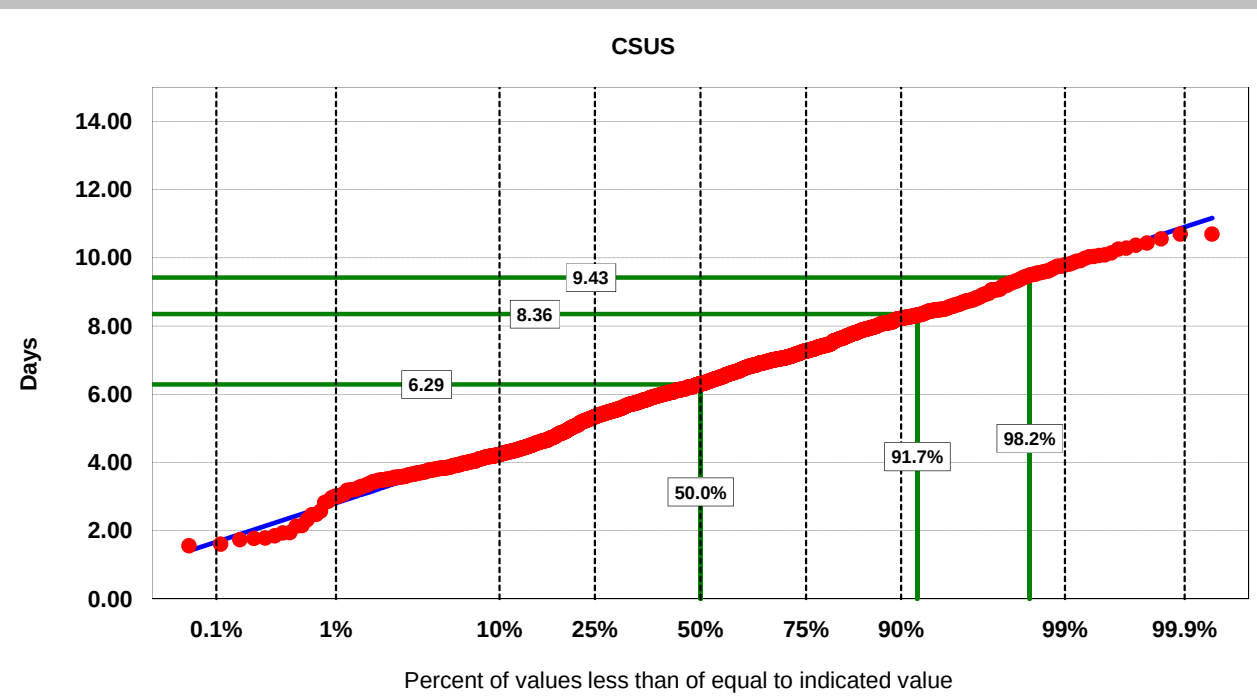
(6) DCWRF Basin 2 SVI



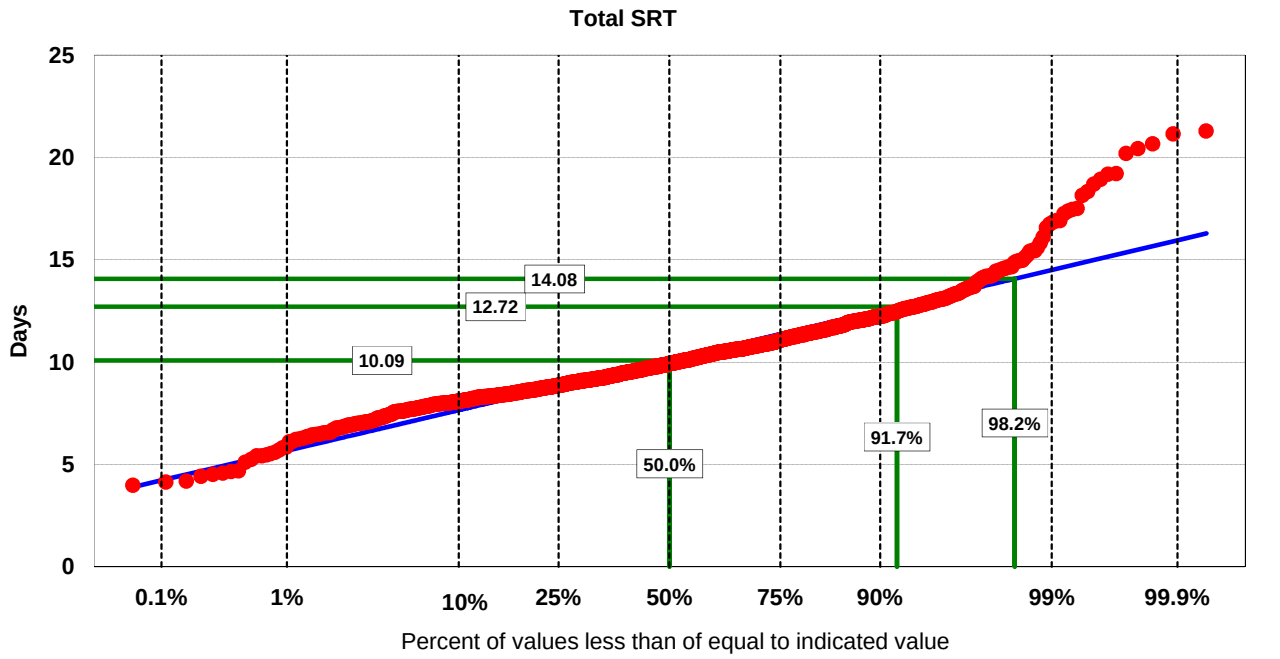
(7) ASUS


ASUS
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0
Days
6.63
5.66
3.81
50.0%
91.7%
98.2%
0.1%
1%
10%
25%
50%
75%
90%
99%
99.9%
Percent of values less than of equal to indicated value

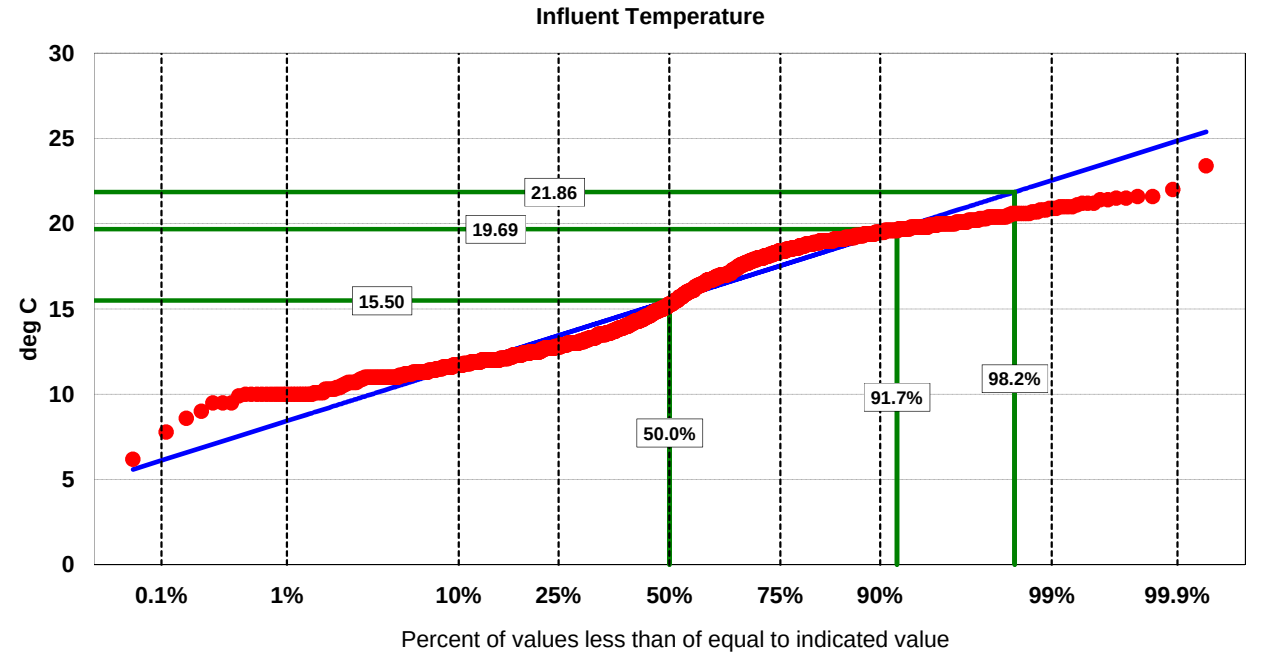
(8) CSUS


CSUS
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Days
9.43
8.36
6.29
50.0%
91.7%
98.2%
0.1%
1%
10%
25%
50%
75%
90%
99%
99.9%
Percent of values less than of equal to indicated value

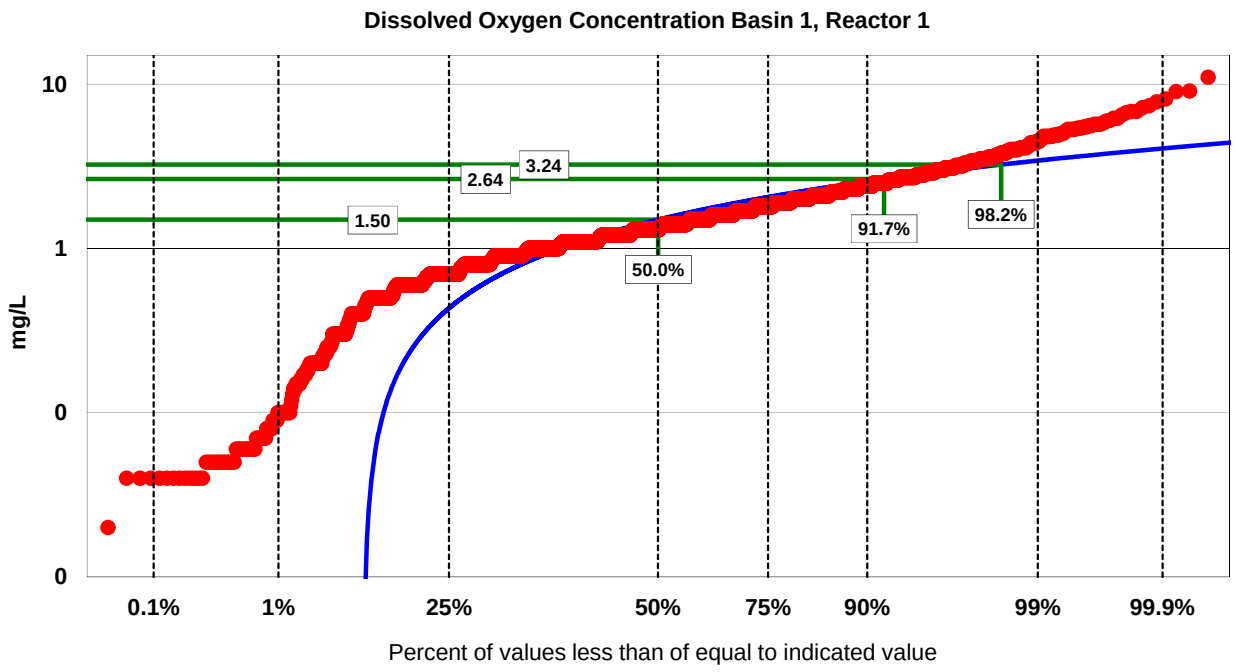
(9) Total SRT



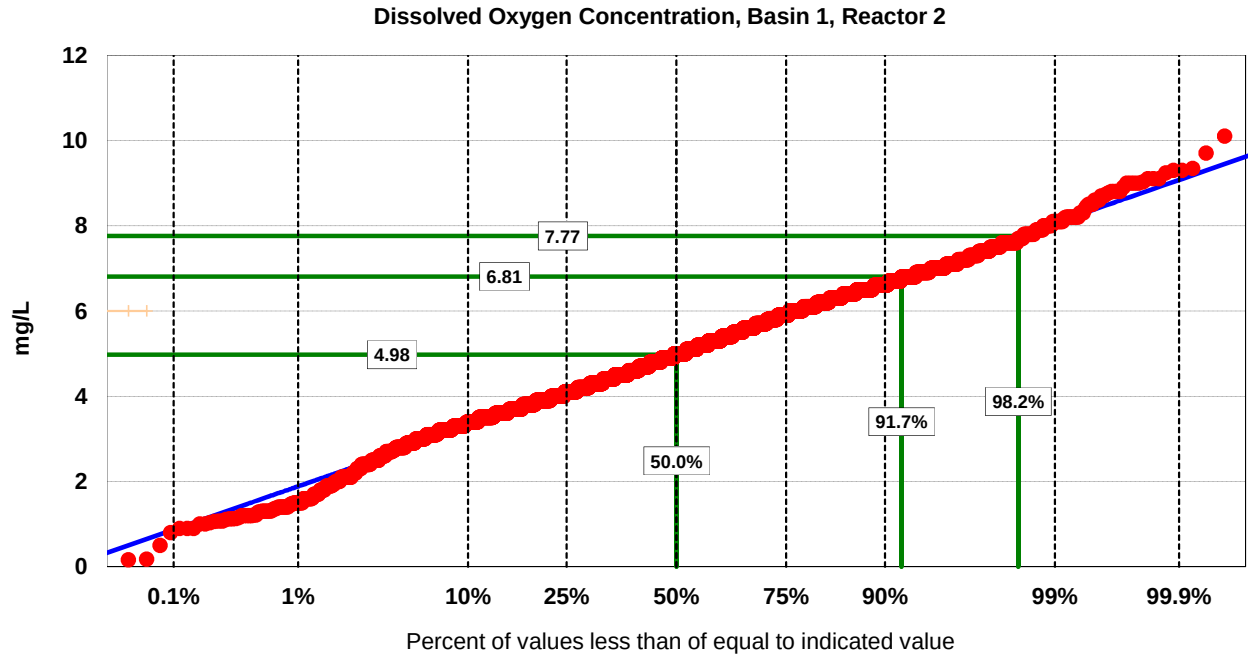
(10) Influent Temperature



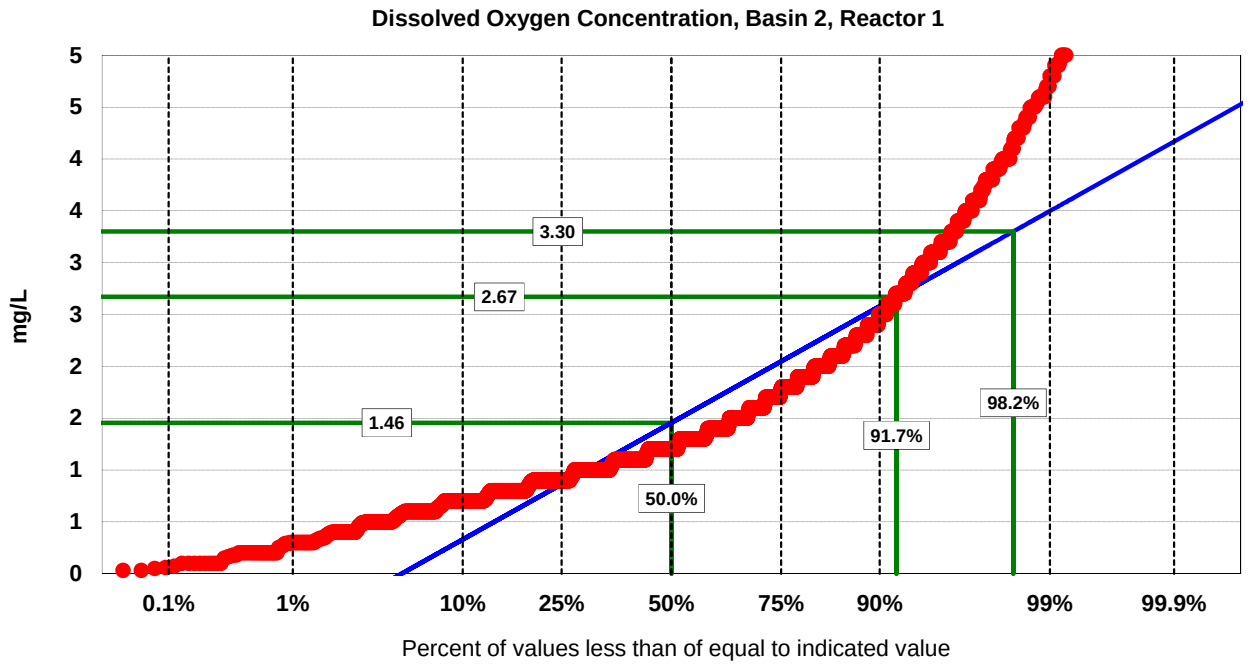
(11) Dissolved Oxygen Concentration Basin 1, Reactor 1



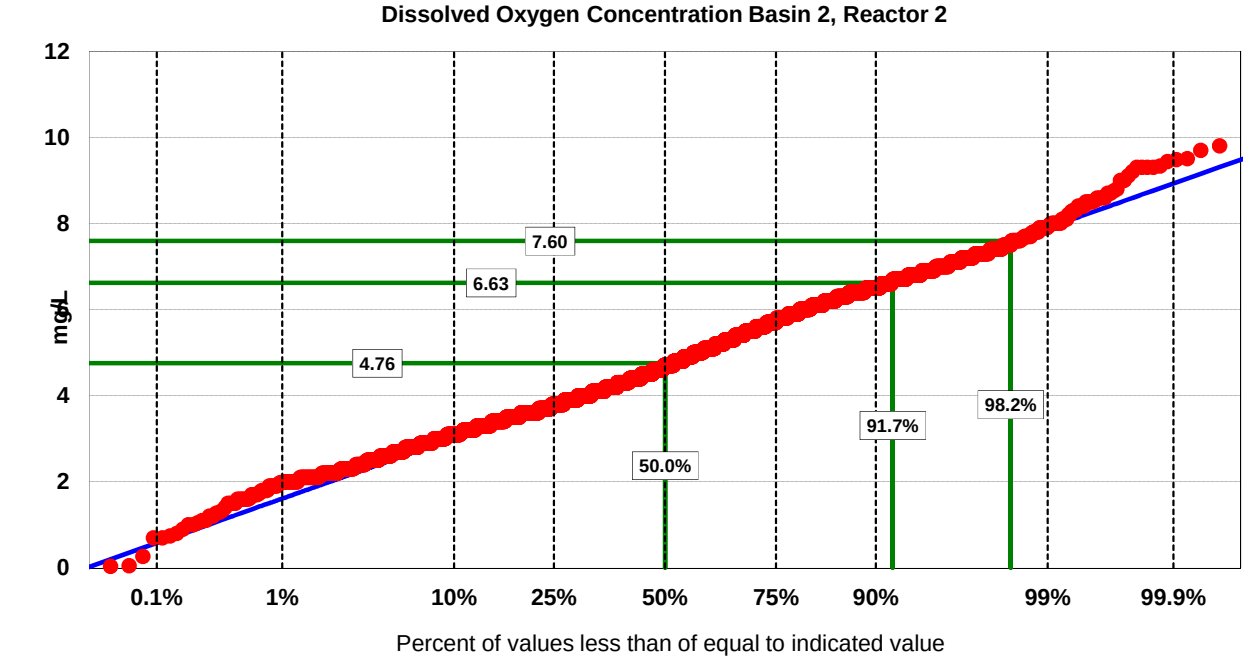
(12) Dissolved Oxygen Concentration, Basin 1, Reactor 2



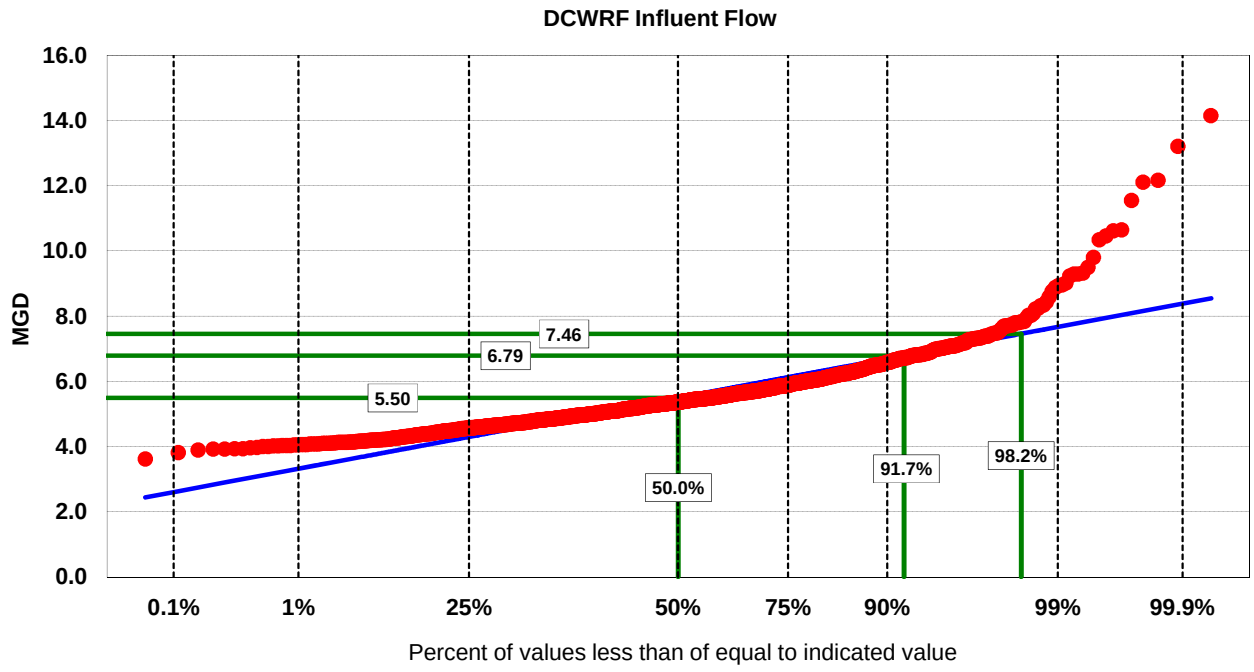
(13) Dissolved Oxygen Concentration, Basin 2, Reactor 1



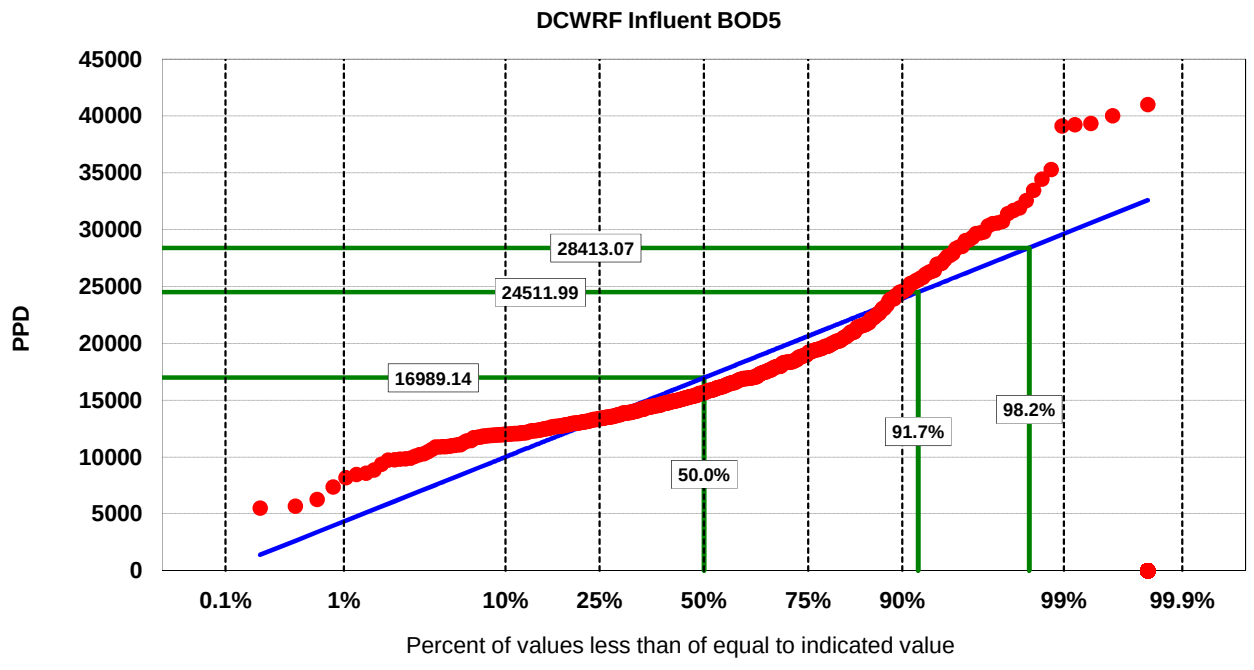
(14) Dissolved Oxygen Concentration Basin 2, Reactor 2



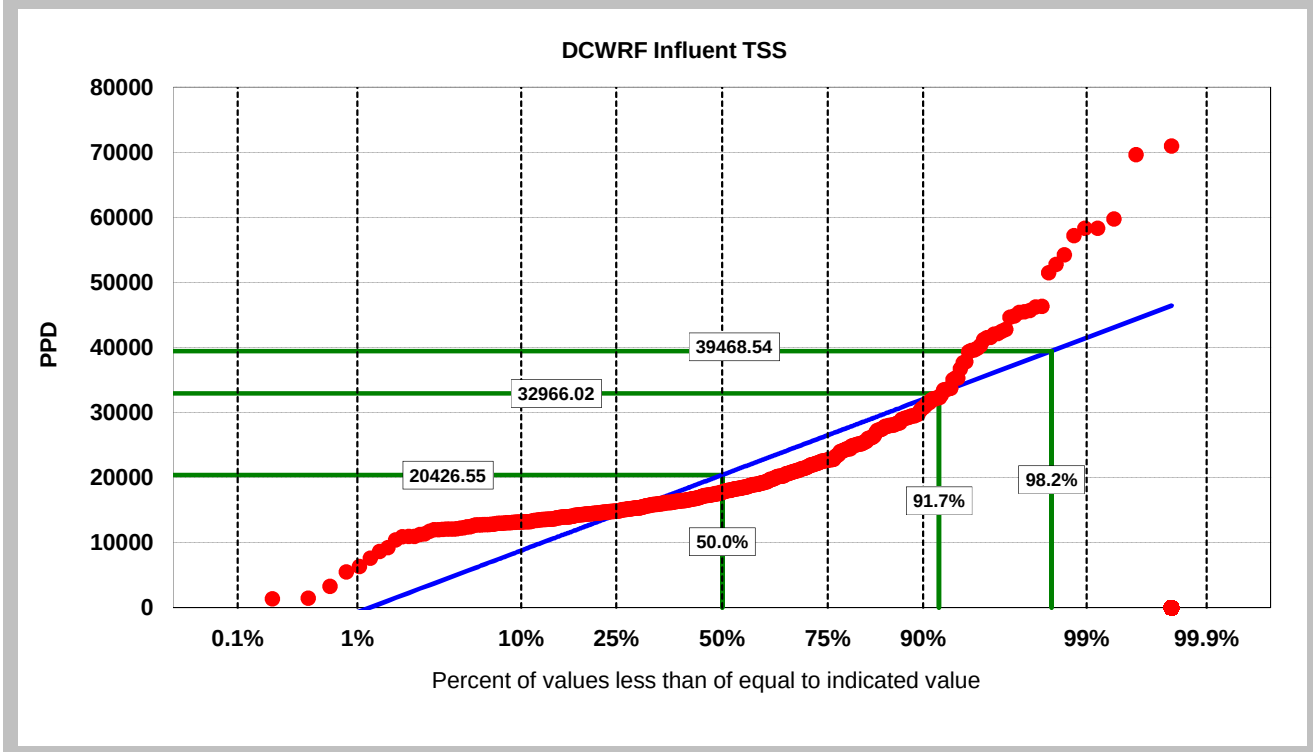
(1) DCWRF Influent Flow



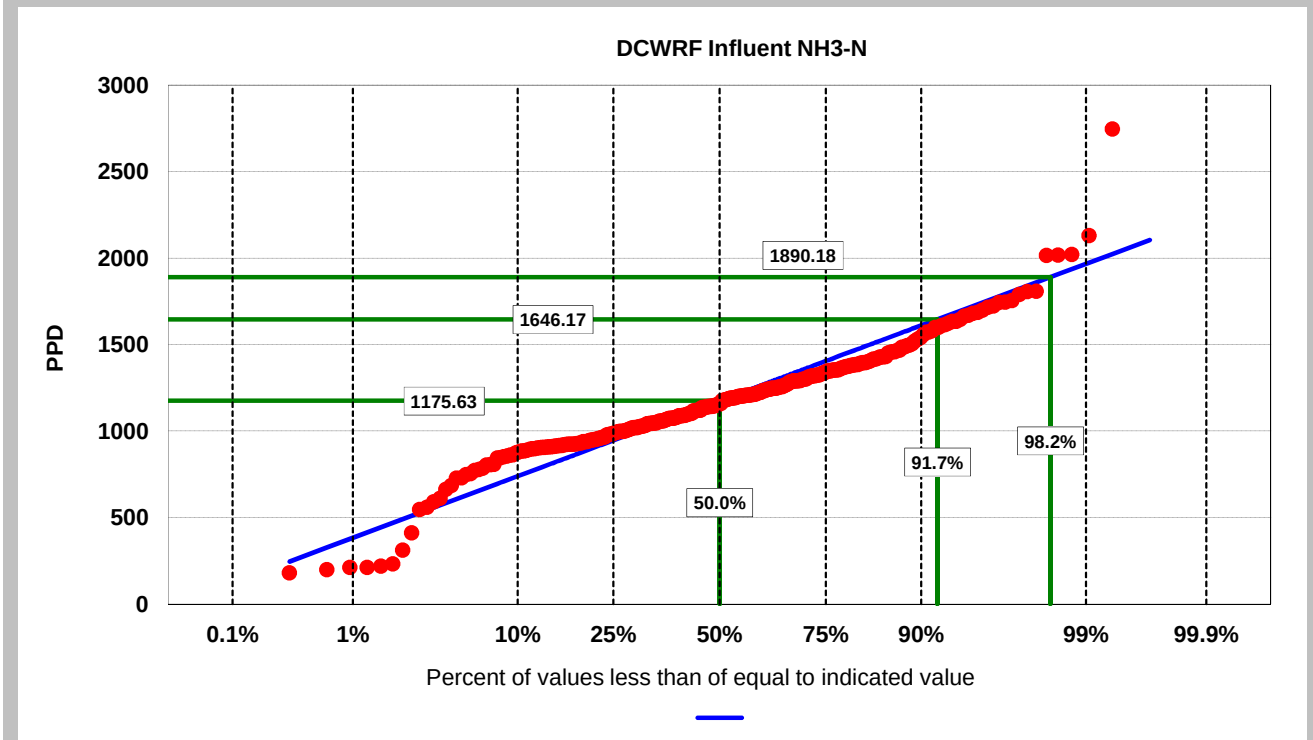
(2) DCWRF Influent BOD5



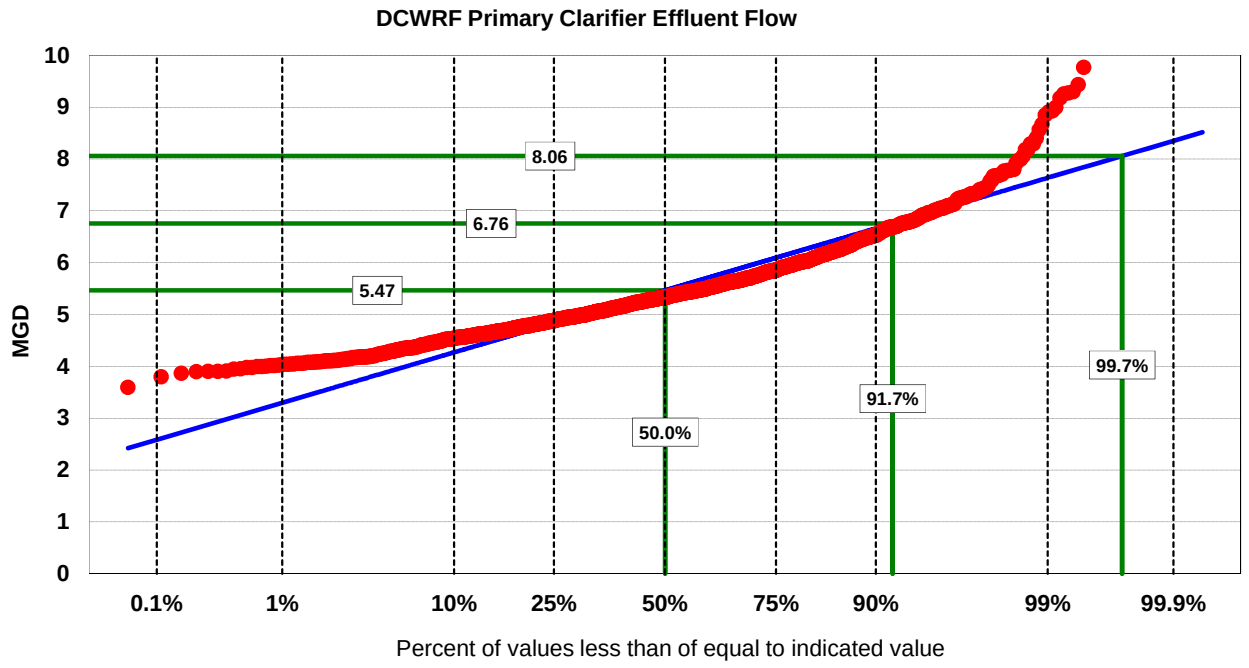
(3) DCWRF Influent TSS



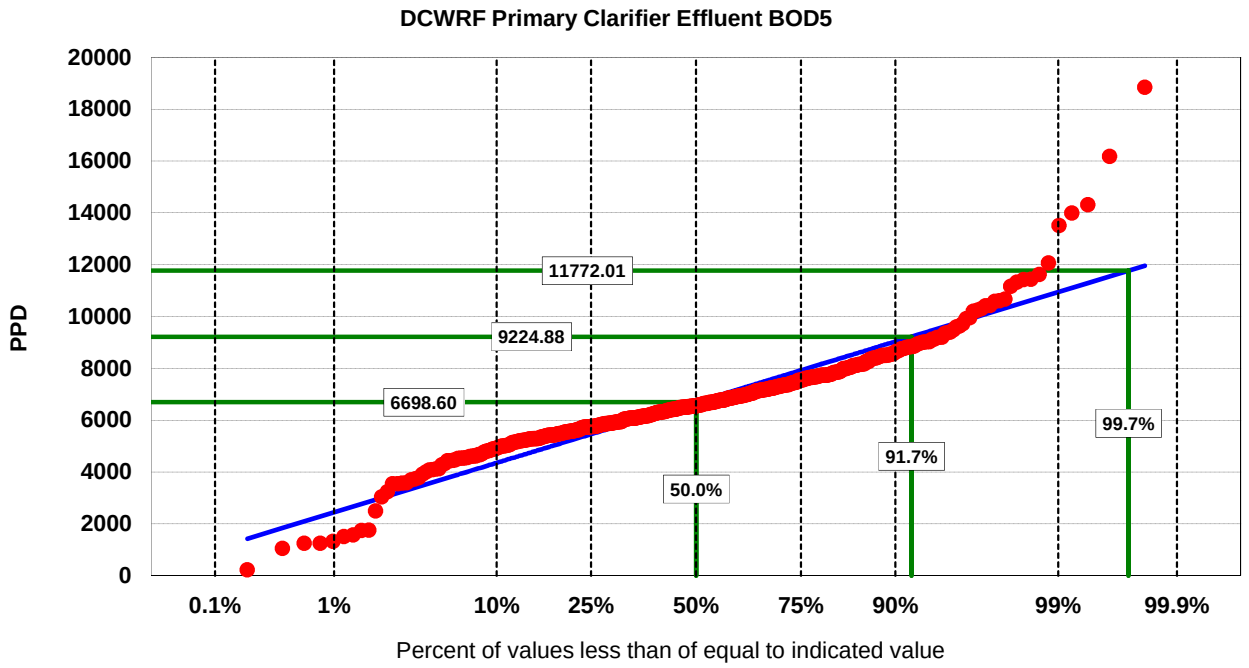
(4) DCWRF Influent NH3-N



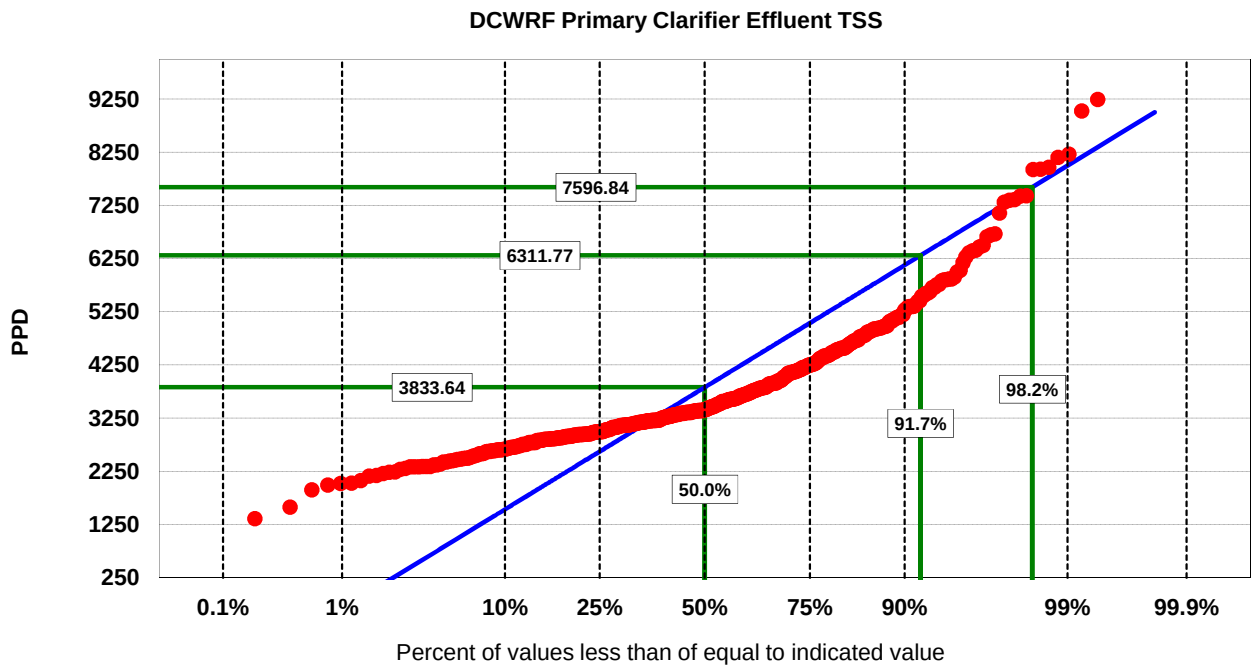
(5) DCWRF Primary Clarifier Effluent Flow



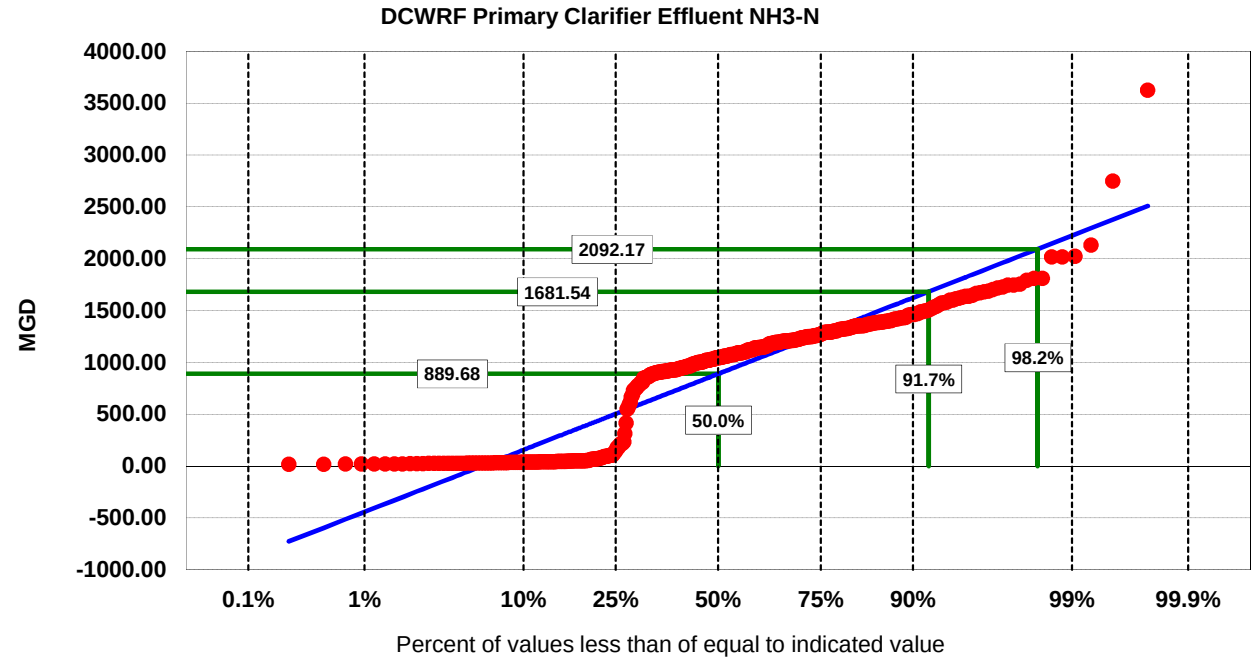
(6) DCWRF Primary Clarifier Effluent BOD5



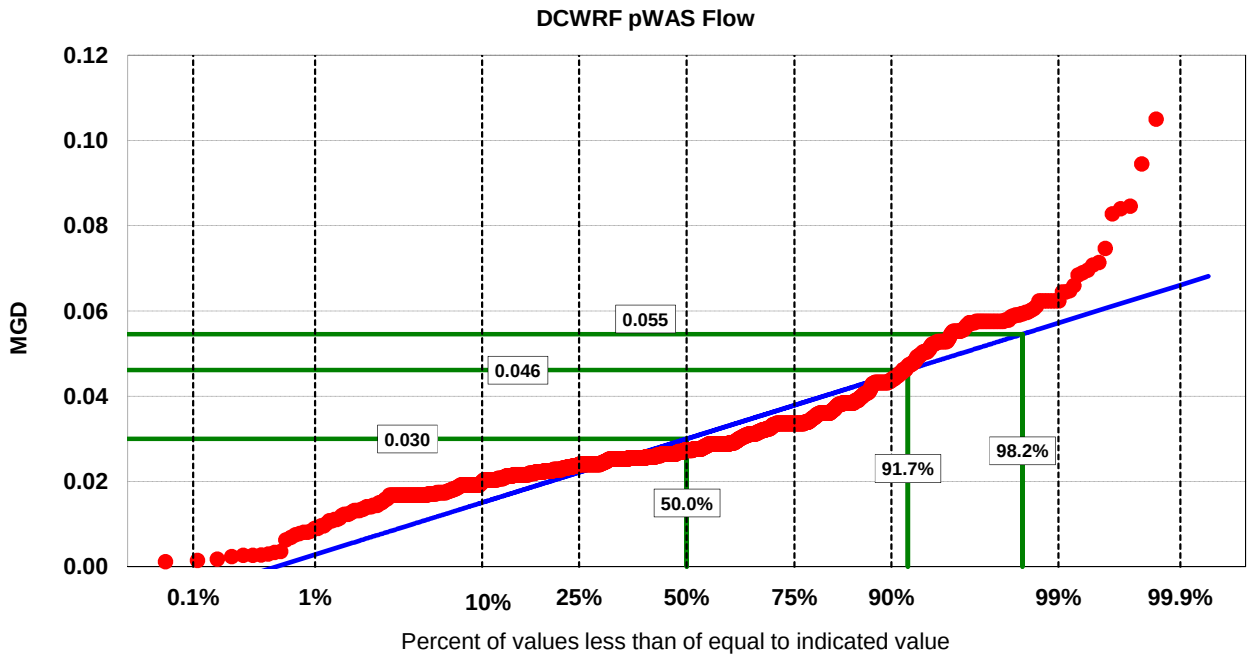
(7) DCWRF Primary Clarifier Effluent TSS



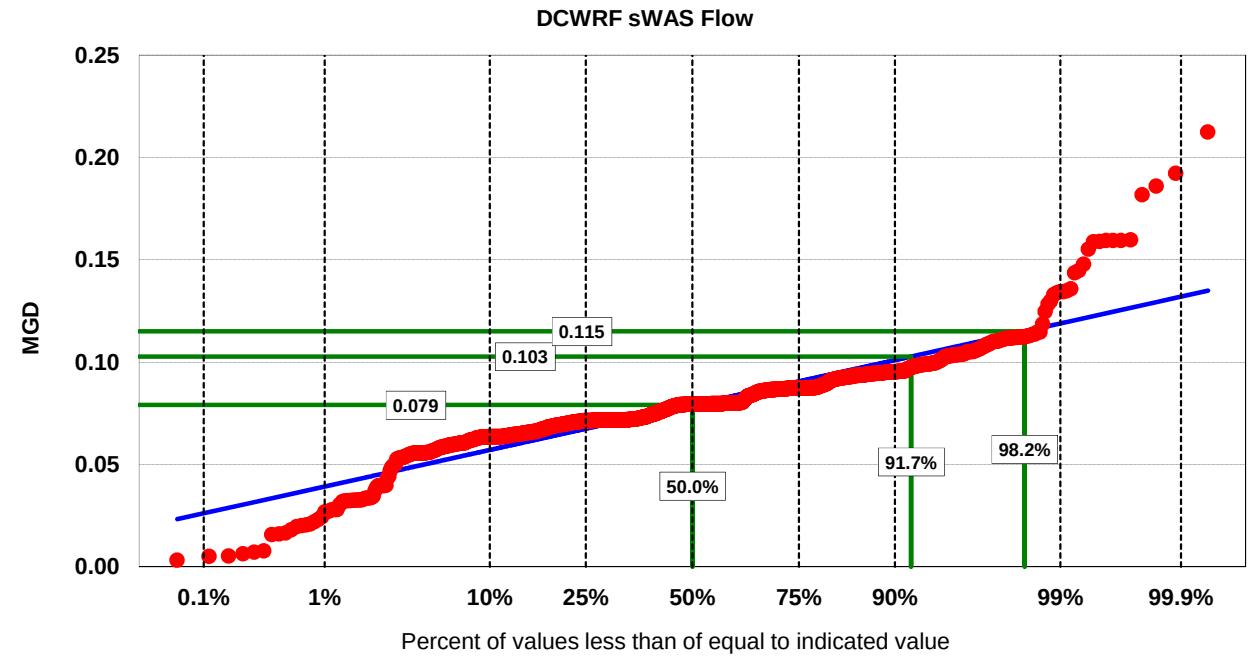
(8) DCWRF Primary Clarifier Effluent NH3-N



(9) DCWRF pWAS Flow



(10) DCWRF sWAS Flow



Appendix 8-B
WYDEQ NPDES Permits

CC

Wyoming Department of Environmental Quality
Water Quality Division
WYPDES Program
Minor Modification

This permit modification represents a minor modification of permit WY0022381, known as the Crow Creek Water Reclamation Facility, previously renewed on June 1, 2009, and expiring on October 31, 2013. The terms of permit WY0022381 are hereby modified as follows:

1. Correct the E. coli limits as per the May through September season, and the October through April season. The existing permit has the limits backward. The following table shows the correct limits:

E. coli, colonies/100 ml, May through Sept	126	N/A	576
E. coli, colonies/100 ml, Oct through April	630	N/A	630

Same Terms and Conditions: With the exception of items explicitly delineated in this minor modification, all terms and conditions of permit WY0022381 shall remain unchanged and in full force and effect.

This minor modification is effective as of the date of signature below.

Roland Peterson

Roland Peterson
WYPDES Program
Water Quality Division
Wyoming Department of Environmental Quality

10-6-09
Date

Attachments: WY0022381, Page 2

cc: File WY0022381
City of Cheyenne, Jim Hughes, PO Box 1469, Cheyenne, WY 82003-1469

PART I

A. EFFLUENT LIMITATIONS - SEE ANY ADDITIONAL REQUIREMENTS UNDER PART III

Effective upon issuance of this permit and lasting through October 31, 2013, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfall serial number(s) 001.

	Effluent Concentration		
Parameter	Monthly Average (b)	Weekly Average (b)	Daily Maximum (a) (b)
Carbonaceous Biochemical Oxygen Demand (CBOD), mg/L	25	40	80
CBOD , % Removal (c)	85	N/A	N/A
E. coli, colonies/100 ml, May through Sept	126	N/A	576
E. coli, colonies/100 ml, Oct through April	630	N/A	630
Total Suspended Solids (TSS) , mg/L	30	45	90
TSS, % Removal (c)	85	N/A	N/A
Total Residual Chlorine, mg/L	N/A	N/A	0.011
Ammonia, total as N, mg/L, June through October	3.50	N/A	8.75
Ammonia, total as N, mg/L, November through May	5.37	N/A	13.43
pH, standard units	N/A	N/A	6.5-9.0

Samples taken to determine compliance with the effluent limitations specified above shall be taken at the outfall from the final treatment unit and prior to admixture with diluent waters or the receiving stream.

(a) Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

(b) Monthly Average, Weekly Average and Daily Maximum are defined in Part I.C.3.

(c) Compliance with percent removal requirements is based on 30-day average sampling at a monitoring frequency of twice weekly. More frequent sampling is optional. The arithmetic means of the BOD and TSS concentrations for effluent samples collected in a period of 30-day average shall demonstrate a minimum of eighty-five percent (85%) removal of BOD and TSS, as measured by dividing the respective differences between the mean influent and effluent concentrations for

Wyoming Department of Environmental Quality
Water Quality Division
WYPDES (Wyoming Pollutant Discharge Elimination System) Program

STATEMENT OF BASIS

MODIFICATION

APPLICANT NAME:	Cheyenne Board of Public Utilities
MAILING ADDRESS:	PO Box 1469 Cheyenne, WY 82003-1469
FACILITY LOCATION:	Crow Creek Water Reclamation Facility, which is located in the SE Section 3, Township 13N Range 66W, Laramie County. The wastewater will be discharged to Crow Creek (class 2C water), South Platte River Basin. Lat: 41.1198918, Long: -104.7588388
PERMIT NUMBER:	WY0022381

This permit has been modified in accordance with current WYPDES permitting requirements. Specific changes to the permit include the following:

MODIFICATION:
1 *This permit is being modified to remove fecal coliform effluent limits and monitoring, as per the request of the permittee.*
2 *The interim effluent limit period ending on September 30, 2009 is removed. E. coli effluent limits and monitoring go into effect upon issuance of this permit modification.*

As of April of 2007, there are no water quality standards for fecal coliform, per Chapter 1, Wyoming Water Quality Rules and Regulations. This permit modification instead reflects the current Chapter 1 standards for the parameter, E. coli.

Effluent Limits for E. coli: E. coli limits are 126 colonies/100 mL, monthly average, and 576 colonies/100 mL, daily maximum for the April through September season. Based on best professional judgment, the outfalls discharge to an infrequently used full body contact water, so the 576 colonies/100 mL criterion is applied for daily maximum (see table below). For October through March, the E. coli limits are 630 colonies/100 mL, based on the winter recreation standards. E. coli limits are set assuming the worst case scenario of zero dilution provided by the receiving water, so effluent limits are set equal to instream standards. See the following table:

E. coli Bacteria Standards, In Waters Designated for Primary Contact Recreation			
May through September			October through April
Monthly Average Standard	Daily Maximum Standards	Criteria	Monthly Average and Daily Maximum
126 colonies/100 mL	236 colonies/100 mL	High Use Swimming Areas	630 colonies/100 mL
	298 colonies/100 mL	Moderate Fully Body Contact	
	410 colonies/100 mL	Lightly Used Full Body Contact	
	576 colonies/100 mL	Infrequently Used Full Body Contact	

Self monitoring of effluent quality and quantity is required on a regular basis with reporting of results monthly. The permit is scheduled to expire on October 31, 2013.

Roland Peterson
Water Quality Division
Department of Environmental Quality
Drafted: March 9, 2009

AUTHORIZATION TO DISCHARGE UNDER THE

WYOMING POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, (hereinafter referred to as "the Act"), and the Wyoming Environmental Quality Act,

Cheyenne Board of Public Utilities

is authorized to discharge from the Crow Creek Water Reclamation Facility treatment facilities located in

SE Section 3, Township 13N Range 66W, Laramie County
Lat: 41.1198918, Long: -104.7588388

to receiving waters named

Crow Creek (class 2C water), South Platte River Basin

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This permit shall become effective on the date of signature by the Director of the Department of Environmental Quality.

This permit and the authorization to discharge shall expire October 31, 2013 at midnight.

John F. Wagner, Administrator
Water Quality Division

5/20/09
Date

John V. Corra
Director - Department of Environmental Quality

5/20/09
Date

PART I

A. EFFLUENT LIMITATIONS - SEE ANY ADDITIONAL REQUIREMENTS UNDER PART III

Effective upon issuance of this permit and lasting through October 31, 2013, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfall serial number(s) 001.

	Effluent Concentration		
Parameter	Monthly Average (b)	Weekly Average (b)	Daily Maximum (a) (b)
Carbonaceous Biochemical Oxygen Demand (CBOD), mg/L	25	40	80
CBOD , % Removal (c)	85	N/A	N/A
E. coli, colonies/100 ml, Oct through April	126	N/A	576
E. coli, colonies/100 ml, May through Sept	630	N/A	630
Total Suspended Solids (TSS) , mg/L	30	45	90
TSS, % Removal (c)	85	N/A	N/A
Total Residual Chlorine, mg/L	N/A	N/A	0.011
Ammonia, total as N, mg/L, June through October	3.50	N/A	8.75
Ammonia, total as N, mg/L, November through May	5.37	N/A	13.43
pH, standard units	N/A	N/A	6.5-9.0

Samples taken to determine compliance with the effluent limitations specified above shall be taken at the outfall from the final treatment unit and prior to admixture with diluent waters or the receiving stream.

(a) Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

(b) Monthly Average, Weekly Average and Daily Maximum are defined in Part I.C.3.

(c) Compliance with percent removal requirements is based on 30-day average sampling. More frequent sampling is optional. The arithmetic means of the CBOD and TSS concentrations for effluent samples collected in a period of 30-day average shall demonstrate a minimum of eighty-five percent (85%) removal of BOD and TSS, as measured by dividing the respective differences between the mean influent and effluent concentrations for the calendar month by the

respective mean influent concentration for the 30-day average, and multiplying the quotient by 100.

$$\left[\frac{Influent - Effluent}{Influent}\right] \times 100$$

There shall be no discharge of floating solids or foam in other than trace amounts. Nor shall the discharge have a visible sheen or cause formation of a visible sheen or visible deposits on the bottom or shoreline of the receiving water.

All waters shall be discharged in a manner to prevent erosion, scouring, or damage to stream banks, stream beds, ditches, or other waters of the state at the point of discharge. Discharges shall not occur in such a manner that will result in violations of Water Quality Rules and Regulations, Chapter 1, Section 15. In addition, there shall be no deposition of substances in quantities which could result in significant aesthetic degradation, or degradation of habitat for aquatic life, plant life or wildlife; or which could adversely affect public water supplies or those intended for agricultural or industrial use.

B. SELF-MONITORING REQUIREMENTS

1. Effective upon issuance of this permit and lasting through October 31, 2013, the permittee shall monitor this discharge(s) as shown below:

Parameter	Frequency (a)	Sample Type (b)
E. coli, colonies/100 ml	Twice Weekly	Grab
pH, units	Twice Weekly	Grab
CBOD, mg/L, influent	Twice Weekly	Composite
CBOD, mg/L, effluent	Twice Weekly	Composite
CBOD, % Removal (d)	Monthly	Calculate
Total Flow, MGD	Twice Weekly	Continuous
Total Residual Chlorine, mg/L (c)	Daily	Grab
TSS, mg/L, influent	Twice Weekly	Composite
TSS, mg/L, effluent	Twice Weekly	Composite
TSS, % Removal	Monthly	Calculate
Ammonia, mg/L	Twice Weekly	Composite
Temperature, °C	Twice Weekly	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the outfall from the final treatment unit and prior to admixture with diluent water or the receiving stream.

(a) If the discharge occurs on an intermittent basis, samples shall be collected during the period when that intermittent discharge occurs.

(b) See "definitions" under the Monitoring and Reporting portion of this permit.

(c) Monitor only if chlorine is used in the wastewater treatment process.

2. Effluent Limitations (Toxic Pollutants)

Effective immediately upon issuance of this permit renewal, there shall be no acute discharge from outfall number 001.

3. Whole Effluent Testing (Acute)

Starting in calendar year 2009 through June 30, 2011, the permittee shall conduct quarterly acute static replacement toxicity tests on an effluent sample of the discharge.

The replacement static acute toxicity tests shall be conducted in accordance with the procedures set out the latest procedures set forth in 40 CFR 136.3 and the "Region VIII EPA NPDES Acute Test Conditions - Static Renewal Whole Effluent Toxicity Tests". In the case of conflicts, 40 CFR 136.3 will prevail. The permittee shall conduct the acute 48-hour static toxicity test using *Ceriodaphnia dubia* and an acute 96-hour static replacement toxicity test using *Pimephales promelas*.

Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentration. If more than 10 percent control mortality occurs, the test is not valid. The test shall be repeated until satisfactory control survival is achieved. If acute toxicity occurs, an additional test shall be conducted within two (2) weeks of the date of when the permittee learned of the test failure. If only one (1) species fails, retesting may be limited to this species. Should toxicity occur in the second test, testing shall occur once a month until further notified by the permit issuing authority.

Quarterly test results shall be reported along with the Discharge Monitoring Report (DMR) submitted at the end of the reporting calendar quarter (e.g., whole effluent results for the calendar quarter ending March 31, shall be reported with the DMR due April 28, with the remaining reports submitted with DMRs due each July 28, October 28 and January 28). The format for the report shall be consistent with the latest revision of the "Region VIII Guidance for Acute Whole Effluent Reporting", and shall include all chemical and physical data as specified.

If the results for four consecutive quarters of testing indicate no acute toxicity, the permittee may request the permit issuing authority to allow a reduction to quarterly acute toxicity testing on only one species on an alternating basis. The permit issuing authority may approve or deny the request based on the results and other available information without an additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

4. Whole Effluent Testing (Chronic)

Starting July 1, 2011, the permittee shall conduct quarterly chronic short term toxicity tests on the final effluent.

If chronic toxicity is detected, an additional test shall be conducted within two (2) weeks of the date of when the permittee learned of the test failure. The need for any additional samples shall be determined by the permit issuing authority.

The chronic toxicity tests shall be conducted in accordance with the procedures set out in the latest revision of "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA/600/4-91/002 and the "Region VIII EPA NPDES Chronic Test Conditions - Static Renewal Whole Effluent Toxicity Test". In the case of conflicts, the Region VIII procedure will prevail. Test species shall consist of Ceriodaphnia dubia and Pimephales promelas. A multi dilution test consisting of five (5) concentrations and a control is required. If test acceptability criteria are not met for control survival, growth, or reproduction, the test shall be considered invalid. Chronic toxicity occurs when, during a chronic toxicity test, the 25% inhibition concentration (IC25) calculated on the basis of test organism survival and growth or survival and reproduction, is equal to 100 percent effluent concentration.

Test results shall be reported along with the Discharge Monitoring Report (DMR) submitted for the end of the calendar period during which the whole effluent test was run (e.g., results for the first half of the year shall be reported with the DMR due July 28, with the remaining report submitted with DMRs due each January 28). The format for the report shall be consistent with the latest revision of the "Region VIII Guidance for Chronic Whole Effluent Reporting", and shall include all chemical and physical data as specified.

If the results for four consecutive whole effluent testing results indicate no chronic toxicity, the permittee may request the permit issuing authority to allow the permittee to reduce testing frequency, and/or reduce testing to one species on an alternating basis, and/or modify testing to the acute test program. The permit issuing authority may approve, partially approve or deny the request based on results and other available information. If approval is given, the modification will take place without a public notice.

5. Toxicity Reduction Evaluation (TRE)
Toxicity Identification Evaluation (TIE)

Should acute toxicity and/or chronic toxicity be detected in the permittee's discharge, a TIE-TRE shall be undertaken by the permittee to establish the cause of the toxicity, locate the source(s) of the toxicity, and develop control of, or treatment for the toxicity. Failure to initiate, or conduct an adequate TIE-TRE, or delays in the conduct of such tests, shall not be considered a justification for noncompliance with the whole effluent toxicity limits contained in Part I.C.1. of this permit. A TRE plan needs to be submitted to the permitting authority within 45 days after confirmation of the continuance of effluent toxicity.

6. Chronic Toxicity Limitation-Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include chronic whole effluent toxicity limitations if any other information or data are developed indicating that chronic whole effluent toxicity limits are needed as required under 40 CFR 122.44 (d). Also see Part IV.P. of this permit for additional whole effluent toxicity reopener provisions.

If acceptable to the permit issuing authority, and if in conformance with current regulations, this permit may be reopened and modified to incorporate TRE conclusions relating to additional numerical limitations, a modified compliance schedule, and or modified whole effluent protocol.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by, the permit issuing authority. Sludge samples shall be collected immediately prior to the disposal practice at a location representative of the sludge.

2. Reporting

Effluent monitoring results obtained during the previous one month(s) shall be summarized and reported on a Discharge Monitoring Report Form. If the permit requires whole effluent toxicity (WET) (biomonitoring) testing, WET test results must be reported on the most recent version of EPA Region 8 Guidance for Whole Effluent Reporting. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements (see Part II.A.11.), and submitted to the state water pollution control agency at the following addresses postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on June 28, 2009.

Wyoming Department of Environmental Quality-Water Quality Division Herschler Building, 4 West 122 West 25th Street Cheyenne, WY 82002 Telephone: (307) 777-7781	Policy, Enforcement Management and Environmental Justice Program (ENF-PJ) ATTN: NPDES Enforcement U.S. EPA, Region 8 1595 Wynkoop St. Denver, CO 80202-1129 Telephone: (303) 293-1622

If no discharge occurs during the reporting period, "no discharge" shall be reported. If discharge is intermittent during the reporting period, sampling shall be done while the facility is discharging.

3. Definitions

Concentration Values

a. Daily Maximum (mg/L) - The highest single reading from any grab or composite sample collected during the reporting period.

b. Monthly Average (mg/L) - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli) of all composite and/or grab samples collected during a calendar month.

c. Weekly Average (mg/L) - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli) of all composite and/or grab samples collected during

any week. A week begins at 12:01 am Sunday morning and ends at 12:00 midnight Saturday evening.

Quantity Values

d. Daily Maximum - The highest single daily quantity reading (see Calculations below) recorded during the reporting period.

e. Monthly Average - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli bacteria) of all the daily quantity readings (see Calculations below) recorded during a calendar month.

f. Weekly Average - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli bacteria) of all the daily quantity readings (see Calculations below) recorded during a week. A week begins at 12:01 am Sunday morning and ends at 12:00 midnight Saturday evening.

g. Twice Weekly is defined as two different sampling dates per week; i.e. Monday/Wednesday or Tuesday/Thursday, etc.

Flow Values

g. Daily Flow - The flow volume recorded on any single day. The daily flow volume may be determined by using an instantaneous reading (if authorized by this permit) or a continuous recorder.

h. Monthly Average Flow - The arithmetic mean of all daily flow values recorded during a calendar month.

i. Weekly Average Flow - The arithmetic mean of all daily flow values recorded during a week. A week begins at 12:01 am on Sunday morning and ends at 12:00 midnight Saturday evening.

Calculations

j. Daily Quantity (kg/day) - The quantity, in kilograms per day, of pollutant discharged on a single day. The Daily quantity shall be calculated by multiplying the composite or grab sample concentration value for that day in milligrams/liter (mg/L) times the flow volume (in millions of gallons per day - MGD) for that day times 3.78. If a flow volume reading for the day the sample is collected is not available, the average flow volume reading for the entire reporting period shall be used.

k. Daily Quantity (#/day) - The quantity, in number per day, of bacteria or other pollutants discharged on a single day. The number per day shall be calculated by multiplying the composite or grab sample result for that day, in number per 100 milliliters (#/100 ml), times the flow volume (in millions of gallons per day - MGD) times 3.78 X 10^7. If a flow volume reading for the day the sample is collected is not available , the average flow volume reading for the entire reporting period shall be used.

L. Geometric Mean - Calculated in accordance with the procedure described in the most recent edition of "Standard Methods for the Examination of Water and Wastewater".

Miscellaneous

m. A "composite" sample, for monitoring requirements, is defined as a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow.

n. An "instantaneous" measurement for monitoring requirements is defined as a single reading, measurement, or observation.

o. "MGD", for monitoring requirements, is defined as million gallons per day.

p. "Net" value, if noted under Effluent Characteristics, is calculated on the basis of the net increase of the individual parameter over the quantity of that same parameter present in the intake water measured prior to any contamination or use in the process of this facility. Any contaminants contained in any intake water obtained from underground wells shall not be adjusted for as described above and, therefore, shall be considered as process input to the final effluent. Limitations in which "net" is not noted are calculated on the basis of gross measurements of each parameter in the discharge, irrespective of the quantity of those parameters in the intake waters.

q. A "pollutant" is any substance or substances which, if allowed to enter surface waters of the state, causes or threatens to cause pollution as defined in the Wyoming Environmental Quality Act, Section 35-11-103.

4. Test Procedures

Test procedures for the analysis of pollutants, collection of samples, sample containers, sample preservation, and holding times, shall conform to regulations published pursuant to 40 CFR, Part 136, unless other test procedures have been specified in this permit.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;

b. The dates and times the analyses were performed;

c. The person(s) who performed the analyses and collected the samples;

d. The analytical techniques or methods used; and

e. The results of all required analyses including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine the results.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

7. Records Retention

The permittee shall 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, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the administrator at any time. Data collected on site, copies of Discharge Monitoring Reports and a copy of this WYPDES permit must be maintained on site during the duration of activity at the permitted location.

8. Penalties for Tampering

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 per violation, or by imprisonment for not more than two (2) years per violation, or both.

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Table 1
Outfalls
WY0022381
Crow Creek Water Reclamation Facility

Outfall	Qtr/Qtr	Section	Township-North	Range-West	Latitude	Longitude	Receiving Water
001*	SE	3	13	66	41.1198918	-104.7588388	Crow Creek (class 2C water), South Platte River Basin

*Asterisk denotes outfalls for which WDEQ has field-verified the Latitude and Longitude locations. These are considered to be the most accurate location data available for these outfalls, and will supersede Latitude and Longitude values presented in the application.

PART II

A. MANAGEMENT REQUIREMENTS

1. Changes

The permittee shall give notice to the administrator of the Water Quality Division as soon as possible of any physical alterations or additions to the permitted facility. Notice is required when:

a. 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

b. The alteration or addition could change the nature or increase the quantity of pollutants discharged.

2. Noncompliance Notification

a. The permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

b. The permittee shall report any noncompliance which may endanger health or the environment as soon as possible, but no later than 24 hours from the time the permittee first became aware of the circumstances. The report shall be made to the Water Quality Division, Wyoming Department of Environmental Quality at (307) 777-7781.

c. For any incidence of noncompliance, including noncompliance related to non-toxic pollutants or non-hazardous substances, a written submission shall be provided within five (5) days of the time that the permittee becomes aware of the noncompliance circumstance.

The written submission shall contain:

(1) A description of the noncompliance and its cause;

(2) The period of noncompliance, including exact dates and times;

(3) The estimated time noncompliance is expected to continue if it has not been corrected; and

(4) Steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance.

d. The following occurrences of unanticipated noncompliance shall be reported by telephone to the Water Quality Division, Watershed Management Section, WYPDES Program (307) 777-7781 as soon as possible, but no later than 24 hours from the time the permittee first became aware of the circumstances.

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

(2) Any upset which exceeds any effluent limitation in the permit; or

(3) Violation of a maximum daily discharge limitation for any toxic pollutants or hazardous substances, or any pollutants specifically identified as the method to control a toxic pollutant or hazardous substance listed in the permit.

e. The administrator of the Water Quality Division may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Quality Division, WYPDES Program (307) 777-7781.

f. Reports shall be submitted to the Wyoming Department of Environmental Quality at the address in Part I under Reporting and to the Planning and Targeting Program, 8ENF-PT, Office of Enforcement, Compliance, and Environmental Justice, U.S. EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129.

g. The permittee shall report all instances of noncompliance that have not been specifically addressed in any part of this permit at the time the monitoring reports are due.

3. Facilities Operation

The permittee shall, 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. However, the permittee shall operate, as a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the state resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypass of Treatment Facilities

a. Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

b. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of

paragraphs c. and d. of this section. Return of removed substances to the discharge stream shall not be considered a bypass under the provisions of this paragraph.

c. Notice:

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice at least 60 days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II.A.2.

d. Prohibition of bypass.

(1) Bypass is prohibited and the administrator of the Water Quality Division may take enforcement action against a permittee for a bypass, unless:

(a) The bypass was unavoidable to prevent loss of life, personal injury or severe property damage;

(b) 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 to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(c) The permittee submitted notices as required under paragraph c. of this section.

e. The administrator of the Water Quality Division may approve an anticipated bypass, after considering its adverse effects, if the administrator determines that it will meet the three conditions listed above in paragraph d. (L) of this section.

6. Upset Conditions

a. 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, improper designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph c. of this section are met.

c. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required under Part II.A.2; and

(4) The permittee complied with any remedial measures required under Part II.A.4.

d. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

7. Removed Substances

Solids, sludges, filter backwash or other pollutants removed in the course of treatment or control of wastewaters or intake waters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the state.

8. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with a schedule of compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities; or

b. If such alternative power source as described in paragraph a. above is not in existence and no date for its implementation appears in Part I, take such precautions as are necessary to maintain and operate the facility under its control in a manner that will minimize upsets and insure stable operation until power is restored.

9. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the federal act and the Wyoming Environmental Quality Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the administrator of the Water Quality Division advance notice of any planned changes at the permitted facility or of any activity which may result in permit noncompliance.

10. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

11. Signatory Requirements

All applications, reports or information submitted to the administrator of the Water Quality Division shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

(3) For a municipality, state, federal or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the administrator of the Water Quality Division shall 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:

(1) The authorization is made in writing by a person described above and submitted to the administrator of the Water Quality Division; and

(2) The authorization specified 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. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

c. If an authorization under paragraph II.A.11.b. 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 paragraph II.A.11.b must be submitted to the administrator of the Water Quality Division prior to or together with any reports, information or applications to be signed by an authorized representative.

d. Any person signing a document under this section shall 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."

B. RESPONSIBILITIES

1. Inspection and Entry

If requested, the permittee shall provide written certification from the surface landowner(s), if different than the permittee, that the administrator or the administrator's authorized agent has access to all physical locations associated with this permit including well heads, discharge points, reservoirs, monitoring locations, and any waters of the state.

The permittee shall allow the administrator of the Water Quality Division or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. 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;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the federal act, any substances or parameters at any location.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the regional administrator of the Environmental Protection Agency and the administrator of the Water Quality Division. The administrator of the Water Quality Division shall then provide written notification to the new owner or controller of the date in which they assume legal responsibility of the permit. The permit may be modified or revoked and reissued to change the name of the permittee and incorporate such other requirements as described in the federal act.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the federal act, all reports prepared in accordance with the terms of this permit shall be available for public

inspection at the offices of the Wyoming Department of Environmental Quality and the regional administrator of the Environmental Protection Agency. As required by the federal act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the federal act.

4. Toxic Pollutants

The permittee shall comply with effluent standards or prohibitions established under Section 307 (a) of the federal 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.

5. Changes in Discharge of Toxic Substances

Notification shall be provided to the administrator of the Water Quality Division as soon as the permittee knows of, or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 µg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/1) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/1) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

6. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. As long as the conditions related to the provisions of "Bypass of Treatment Facilities" (Part II.A.5), "Upset Conditions" (Part II.A.6), and "Power Failures" (Part II.A.8) are satisfied then they shall not be considered as noncompliance.

7. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8. Oil and Hazardous Substance Liability

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 to which the permittee is or may be subject under Section 311 of the federal act.

9. 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 or federal law or regulation. In addition, issuance of this permit does not substitute for any other permits required under the Clean Water Act or any other federal, state, or local law.

10. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights nor any infringement of federal, state or local laws or regulations.

11. Duty to Reapply

If the permittee wishes 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. The application should be submitted at least 180 days before the expiration date of this permit.

12. Duty to Provide Information

The permittee shall furnish to the administrator of the Water Quality Division, within a reasonable time, any information which the administrator 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 shall also furnish to the administrator, upon request, copies of records required by this permit to be kept.

13. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or any report to the administrator of the Water Quality Division, it shall promptly submit such facts or information.

14. Permit Action

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

15. Permit Fees

Once this permit has been issued, the permittee will be assessed a $100.00 per-year permit fee by the Water Quality Division. The fee year runs from January 1st through December 31st. This permit fee will continue to be assessed for as long as the permit is active, regardless of whether discharge actually occurs. This fee is not pro-rated. If the permit is active during any portion of the fee year, the full fee will be billed to the permittee for that fee year. In the event that this permit is transferred from one permittee to another, each party will be billed the full permit fee for the fee year in which the permit transfer was finalized. See the Wyoming Environmental Quality Act §35-11-312 for further information.

PART III

A. OTHER REQUIREMENTS

1. Percentage Removal Requirements

The 30-day average value (arithmetic mean), of the BOD and the Total Suspended Solids concentrations for effluent samples shall not exceed 15 percent of the arithmetic mean of the concentrations for influent samples collected at approximately the same times during the same period (85 percent removal). This is in addition to the concentration limitations on BOD and Total Suspended Solids. In the case of stabilization pond treatment systems, this section does not apply to the parameter Total Suspended Solids.

2. Violations Resulting from Overloading

Should there be a violation of any conditions of this permit, the Wyoming Department of Environmental Quality has the authority under Sections 35-11-901 and 35-11-902 of the Wyoming Environmental Quality Act to proceed in a court of competent jurisdiction to restrict or prohibit further connections to the treatment system covered by this permit by any sources not utilizing the system prior to the finding that such a violation occurred.

3. Discharge Duration

If the rate of discharge is controlled, that rate and duration of discharge shall be reported.

4. Flow Measurement

At the request of the administrator of the Water Quality Division, the permittee must be able to show proof of the accuracy of any flow measuring device used in obtaining data submitted in the monitoring report. The flow measuring device must indicate values of within plus or minus ten (10) percent of the actual flow being measured.

5. Sewer Overflow Located Prior to Waste Treatment Facility

Overflow structures shall be maintained and operated in such a manner that no discharge shall occur except to prevent health hazards, severe property damage or loss of treatment capacity.

Such overflows shall satisfy Wyoming water quality standards and/or any appropriate federal or state effluent limitations. Following documentation of specific water quality standard or effluent standard violations resulting from such overflows, specific numerical effluent limitations, or the requirement for elimination of the overflow structures, may be included upon reissuance or revision of this permit.

6. Compliance with Construction Grant

In the case of publicly owned treatment works, the permittee shall comply with those terms of any construction grant implementing the provisions of Section 201(b) through (g) of the Clean Water Act.

7. 208(b) Plans

This permit may be modified, suspended or revoked to comply with the provisions of any 208 (b) plan certified by the Governor of the State of Wyoming.

8. Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary) or other appropriate requirements if one or more of the following events occurs:

a. The state water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit;

b. A total maximum daily load (TMDL) and/or watershed management plan is developed and approved by the state and/or the Environmental Protection Agency which specifies a wasteload allocation for incorporation in this permit;

c. A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this permit;

d. There have been substantial changes (or such changes are planned) in sewage sludge use or disposal practices; applicable management practices or numerical limitations for pollutants in sludge have been promulgated which are more stringent than the requirements in this permit; and/or it has been determined that the permittee's sewage sludge use or disposal practices do not comply with existing applicable state or federal regulations.

e. The limits established by the permit no longer attain and/or maintain applicable water quality standards;

f. The permit does not control or limit a pollutant that has the potential to cause or contribute to a violation of a state water quality standard.

g. If new applicable effluent guidelines and/or standards have been promulgated and the standards are more stringent than the effluent limits established by the permit.

h. If an Interstate Memorandum of Cooperation exists, effluent limits may be incorporated into this permit or existing limits may be modified to ensure that the appropriate criteria, water quality standards and assimilative capacity are attained.

9. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

d. If necessary to comply with any applicable effluent standard or limitation issued or approved under Sections 301 (b) (2) (C) and (D), 304 (b) (2) and 307 (a) (2) of the federal act, if the effluent standard or limitation so issued or approved:

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(2) Controls any pollutant not limited in the permit.

10. Toxicity Limitation - Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include a new compliance date, additional or modified numerical limitations, a new or different compliance schedule, a change in the whole effluent protocol or any other conditions related to the control of toxicants if one or more of the following events occur:

a. Toxicity was detected late in the life of the permit near or past the deadline for compliance;

b. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and the permit issuing authority agrees with the conclusion;

c. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits and the permit issuing authority agrees that numerical controls are the most appropriate course of action;

d. Following the implementation of numerical controls on toxicants, the permit issuing authority agrees that a modified whole effluent protocol is necessary to compensate for those toxicants that are controlled numerically;

e. The TRE reveals other unique conditions or characteristics which, in the opinion of the permit issuing authority, justify the incorporation of unanticipated special conditions in the permit.

11. Severability

The provisions of this permit are severable and, if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit, shall not be affected thereby.

12. Penalties for Falsification of Reports

The federal act 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

noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation or by imprisonment for not more than two years per violation or both.

B. INDUSTRIAL PRETREATMENT PROGRAM (CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS)

1. The Permittee shall operate an industrial pretreatment program in accordance with the following permit requirements developed pursuant to Section 402(b)(8) of the Clean Water Act, the General Pretreatment Regulations (40 CFR Part 403), and the approved pretreatment program submitted by the Permittee. The pretreatment program was approved on **March 28, 1986** and has subsequently incorporated substantial modifications as approved by the Approval Authority. The approved pretreatment program, and any approved modifications thereto, is hereby incorporated by reference and shall be implemented in a manner consistent with the following requirements:

a. Industrial user information shall be updated at a minimum of once per year or at that frequency necessary to ensure that all Industrial Users are properly permitted and/or controlled. The records shall be maintained and updated as necessary;

b. The Permittee shall sample and inspect each Significant Industrial User (SIU) at least once per calendar year (40 CFR Section 403.8(f)(2)(v)). This is in addition to any industrial self-monitoring activities;

c. The Permittee shall evaluate, at least every two years, whether each Significant Industrial User needs a plan to control slugs or spills or needs to update such a plan. Where needed, the Permittee shall require the SIU to prepare or update, and then implement the plan. Where a slug prevention plan is required, the Permittee shall ensure that the plan contains at least the minimum elements required in 40 CFR Section 403.8(f)(2)(v);

d. The Permittee shall investigate instances of non-compliance with Pretreatment Standards and requirements indicated in reports and notices required under 40 CFR Section 403.12, or indicated by analysis, inspection, and surveillance activities.

e. The Permittee shall enforce all applicable Pretreatment Standards and requirements and obtain remedies for noncompliance by any industrial user;

f. The Permittee shall control, through the legal authority in the approved pretreatment program, the contribution to the POTW by each industrial user to ensure compliance with applicable Pretreatment Standards and requirements. In the case of industrial users identified as significant under 40 CFR Section 403.3(t), this control shall be achieved through permit, order, or similar means and shall contain, at a minimum, the following conditions:

(1) Statement of duration (in no case more than five (5) years);

(2) Statement of non-transferability without, at a minimum, prior notification to the Permittee and provision of a copy of the existing control mechanism to the new owner or operator;

(3) Effluent limits based on applicable Pretreatment Standards, Categorical Pretreatment Standards, local limits, and State and local law;

(4) Self-monitoring, sampling, reporting, notification and recordkeeping requirements, including an identification of the pollutants to be monitored, sampling location, sampling frequency, and sample type, based on the applicable Pretreatment Standards in 40 CFR Part 403, Categorical Pretreatment Standards, local limits, and State and local law; and,

(5) Statement of applicable civil and criminal penalties for violation of Pretreatment Standards and requirements, and any applicable compliance schedule. Such schedules may not extend the compliance date beyond deadlines mandated by federal statute or regulation.

g. The Permittee shall provide adequate staff, equipment, and support capabilities to carry out all elements of the pretreatment program as required by 40 CFR Section 403.8(f)(3);

h. The approved program shall not be substantially modified by the Permittee without the approval of the EPA. Substantial and non-substantial modifications shall follow the procedures outlined in 40 CFR Section 403.18;

i. The Permittee shall develop, implement, and maintain an enforcement response plan as required by 40 CFR Section 403.8(f)(5); and

j. The Permittee shall notify all Industrial Users of the users' obligations to comply with applicable requirements under Subtitles C and D of the Resource Conservation and Recovery Act (RCRA) as required by 40 CFR Section 403.8(f)(2)(iii).

2. The Permittee shall establish and enforce specific local limits to implement the provisions of 40 CFR Section 403.5(a) and (b), as required by 40 CFR Section 403.5(c). The Permittee shall continue to develop these limits as necessary and effectively enforce such limits.

In accordance with EPA policy and with the requirements of 40 CFR sections 403.8(f)(4) and 403.5(c), the Permittee shall determine if technically based local limits are necessary to implement the general and specific prohibitions of 40 CFR sections 403.5(a) and (b).

This evaluation should be conducted in accordance with the latest revision of the "EPA Region VIII Strategy for Developing Technically Based Local Limits", and after review of the "Guidance Manual on the Development and implementation of Local Discharge Limitations Under the Pretreatment Program" December 1987. Where the Permittee determines that revised or new local limits are necessary, the Permittee shall submit the proposed local limits to the Approval Authority in approvable form based upon the findings of the technical evaluation within two-hundred and seventy (270) days from the effective date of this permit.

3. The Permittee shall analyze the treatment facility influent and effluent for the presence of the toxic pollutants listed in 40 CFR Part 122 Appendix D (NPDES Application Testing

Requirements) Table II at least **once per two years,** and the toxic pollutants in Table III at least **every-six-months**. If, based upon information available to the Permittee, there is reason to suspect the presence of any toxic or hazardous pollutant listed in Table V, or any other pollutant in a quantity or concentration known or suspected to adversely affect POTW operation, receiving water quality, or solids disposal procedures, analysis for those pollutants shall be performed at least **every six months** on both the influent and the effluent.

Along with the Permittee's pretreatment annual report, the Permittee will submit a list of compounds included in Table V that are suspected or known to be present in its influent wastewater. This determination shall be based on a review of the Permittee's pretreatment program records. The state and/or Approval Authority may review and comment on the list and the list may be revised if, in the opinion of the state and/or Approval Authority the list is incomplete. The Permittee will perform **every six-months** analysis on the influent for the revised list of compounds for which there are acceptable testing procedures.

Where the pollutants monitored in accordance with this section are reported as being above the method detection limit, the results for these pollutants shall be reported in the Permittee's pretreatment annual report.

The Permittee shall analyze the treatment facility sludge (biosolids) prior to disposal, for the presence of the toxic pollutants listed in 40 CFR Part 122 Appendix D (NPDES Application Testing Requirements) Table III at least once per year. If the Permittee does not dispose of biosolids during the calendar year, the Permittee shall certify to that in the Pretreatment Annual Report and the monitoring requirements in this paragraph shall be suspended for that calendar year.

The Permittee shall review the pollutants in 40 CFR Part 122, Appendix D, tables II and V. If any of the pollutants in these tables were above detection in the influent samples during the previous 2 years or last 2 analyses, whichever is greater, the Permittee shall sample and analyze it's sewage sludge for these pollutants. The Permittee shall perform this evaluation and analysis at least once per year.

The Permittee shall use sample collection and analysis procedures as approved for use under 40 CFR Part 503.

The Permittee shall report the results for these pollutants in the Permittee's pretreatment annual report.

All analyses shall be in accordance with test procedures established in 40 CFR Part 136. Where analytical techniques are not specified or approved under 40 CFR Part 136, the Permittee shall use its best professional judgement and guidance from the State and the Approval Authority regarding analytical procedures. All analytical procedures and method detection limits must be specified when reporting the results of such analyses. Sampling methods shall be those defined in 40 CFR Part 136, 40 CFR Part 403, as defined in this permit, or as specified by the Approval Authority. Where sampling methods are not specified, the influent and effluent samples collected shall be composite samples consisting of at least twelve (12) aliquots collected at approximately equal intervals over a representative 24-hour period and composited according to flow. Where automated composite sampling is inappropriate, at least four (4) grab samples shall be

manually taken at equal intervals over a representative 24-hour period, and composited prior to analysis using approved methods.

4. The Permittee shall prepare annually a list of industrial users which during the preceding twelve (12) months have significantly violated Pretreatment Standards or requirements. This list is to be published annually in the largest newspaper in the Permittee's service area as required by 40 CFR Section 403.8(f)(2)(vii).

In addition, on or before March 28, the Permittee shall submit a pretreatment program annual report to the Approval Authority and the state which contains the following information:

a. An updated list of all Significant Industrial Users as defined at 40 CFR 403.3(t). For each Significant Industrial User listed the following information shall be included:

(1) All applicable Standard Industrial Classification (SIC) codes and categorical determinations, as appropriate. In addition, a brief description of the industry and general activities;

(2) Permit status. Whether each Significant Industrial User has an unexpired control mechanism and an explanation as to why any SIUs are operating without a current, unexpired control mechanism (e.g. permit);

(3) A summary of all monitoring activities performed within the previous twelve (12) months. The following information shall be reported:

(a) Total number of Significant Industrial Users inspected; and

(b) Total number of Significant Industrial Users sampled.

b. For all industrial users that were in Significant Non-Compliance during the previous twelve (12) months, provide the name of the violating industrial user, indicate the nature of the violations, the type and number of actions taken (warning letter, notice of violation, administrative order, criminal or civil suit, fines or penalties collected, etc.) and current compliance status. If the industrial user was put on a schedule to attain compliance with effluent limits, indicate the date the schedule was issued and the date compliance is to be attained. Determination of Significant Non-Compliance shall be performed as defined at 40 CFR Section 403.8(f)(2)(vii).

A summary of all enforcement actions not covered by the paragraph above conducted in accordance with the approved Enforcement Response Plan.

c. A list of all Significant Industrial Users whose authorization to discharge was terminated or revoked during the preceding twelve (12) month period and the reason for termination;

d. A report on any Interference, Pass Through, upset or permit violations known or suspected to be caused by non-domestic discharges of pollutant and actions taken by the Permittee in response;

e. Verification of publication of industrial users in Significant Non-Compliance;

f. Identification of the specific locations, if any, designated by the Permittee for receipt (discharge) of trucked or hauled waste;

g. Information as required by the Approval Authority or state on the discharge to the POTW from the following activities:

(1) Ground water clean-up from underground storage tanks;

(2) Trucked or hauled waste; and,

(3) Groundwater clean-up from RCRA or Superfund sites.

h. A description of all changes made during the previous calendar year to the Permittee's pretreatment program that were not submitted as substantial or non substantial modifications to EPA.

i. The Permittee shall evaluate actual pollutants loadings against the approved Maximum Allowable Headworks Loadings (MAHLs). Where the actual loading exceeds the MAHL, the Permittee shall immediately begin a program to either revise the existing local limit and/or undertake such other studies as necessary to evaluate the cause(s) of the exceedence. The Permittee shall provide a summary of its intended action.

j. Other information that may be deemed necessary by the Approval Authority.

5. The Permittee shall prohibit the introduction of the following pollutants into the POTW:

a. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, wastestreams with a closed cup flashpoint of less than sixty (60) degrees Centigrade (140 degrees Fahrenheit) using the test methods specified in 40 CFR Section 261.21;

b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works are specifically designed to accommodate such discharges;

c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, or other interference with the operation of the POTW;

d. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW;

e. Heat in amounts which will 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 forty (40) degrees Centigrade (104 degrees Fahrenheit) unless the Approval Authority, 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;

h. Any trucked or hauled pollutants, except at discharge points designated by the POTW; and,

i. Any specific pollutant which exceeds a local limitation established by the POTW in accordance with the requirements of 40 CFR Section 403.5(c) and (d).

j. Any other pollutant which may cause Pass Through or Interference.

6. The Permittee shall provide the pretreatment Approval Authority with adequate notice of any substantial change in the volume or character of pollutants being introduced into the treatment works by any Significant Industrial User introducing pollutants into the treatment works at the time of application for the discharge permit. For the purposes of this section, "substantial change" shall mean a level of change which has a reasonable probability of affecting the Permittee's ability to comply with its permit conditions or to cause a violation of stream standards applied to the receiving water.

   Adequate notice shall include information on: (1) the quality and quantity of effluent to be introduced into the treatment works, and (2) any anticipated impact of the change on the quality or quantity of effluent to be discharged from the publicly owned treatment works.

7. Section 309(f) of the Act provides that EPA may issue a notice to the POTW stating that a determination has been made that appropriate enforcement action must be taken against an industrial user for noncompliance with any Pretreatment Standards and requirements. The notice provides the POTW with thirty (30) days to commence such action. The issuance of such permit notice shall not be construed to limit the authority of the permit issuing authority or Approval Authority.

8 The state and the Approval Authority retains, at all times, the right to take legal action against the industrial contributor for violations of a permit issued by the Permittee, violations of any Pretreatment Standard or requirement, or for failure to discharge at an acceptable level under national standards issued by EPA under 40 CFR, chapter I, subchapter N. In those cases where a permit violation has occurred because of the failure of the Permittee to properly develop and enforce Pretreatment Standards and requirements as necessary to protect the POTW, the state and/or Approval Authority shall hold the Permittee responsible and may take legal action against the Permittee as well as the Indirect Discharger(s) contributing to the permit violation.

DC

Wyoming Department of Environmental Quality
Water Quality Division
WYPDES Program
Minor Modification

This permit modification represents a minor modification of permit WY0022934, known as the Dry Creek Water Reclamation Facility, previously renewed on June 1, 2009, and expiring on October 31, 2013. The terms of permit WY0022934 are hereby modified as follows:

1. Correct the E. coli limits as per the May through September season, and the October through April season. The existing permit has the limits backward. The following table shows the correct limits:

E. coli, colonies/100 ml, May through Sept	126	N/A	576
E. coli, colonies/100 ml, Oct through April	630	N/A	630

Same Terms and Conditions: With the exception of items explicitly delineated in this minor modification, all terms and conditions of permit WY0022934 shall remain unchanged and in full force and effect.

This minor modification is effective as of the date of signature below.

Roland Peterson

Roland Peterson
WYPDES Program
Water Quality Division
Wyoming Department of Environmental Quality

10-6-09
Date

Attachments: WY0022934, Page 2

cc: File WY0022934
City of Cheyenne, Jim Hughes, PO Box 1469, Cheyenne, WY 82003-1469

PART I

A. EFFLUENT LIMITATIONS - SEE ANY ADDITIONAL REQUIREMENTS UNDER PART III

Effective upon permit issuance date and lasting through October 31, 2013, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfall serial number(s) 001.

1. Such discharges shall be limited as specified below:

	Effluent Concentration		
Parameter	Monthly Average (b)	Weekly Average (b)	Daily Maximum (a)(b)
Carbonaceous Biochemical Oxygen Demand (CBOD), mg/L	25	40	80
CBOD , % Removal (c)	85	N/A	N/A
E. coli, colonies/100 mL, May through Sept	126	N/A	576
E. coli, colonies/100 mL, Oct through April	630	N/A	630
Total Suspended Solids (TSS) , mg/L	30	45	90
TSS, % Removal (c)	85	N/A	N/A
Total Residual Chlorine, mg/L	N/A	N/A	0.011
Ammonia, total as N, mg/L, June through October	3.50	N/A	8.75
Ammonia, total as N, mg/L, November through May	5.37	N/A	13.43
pH, standard units	N/A	N/A	6.5-9.0

Samples taken to determine compliance with the effluent limitations specified above shall be taken at the outfall from the final treatment unit and prior to admixture with diluent waters or the receiving stream.

(a) Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

(b) Monthly Average, Weekly Average and Daily Maximum are defined in Part I.C.3.

(c) Compliance with percent removal requirements is based on 30-day average sampling at a monitoring frequency of twice weekly. More frequent sampling is optional. The arithmetic means of the BOD and TSS concentrations for effluent samples collected in a period of 30-day average shall demonstrate a minimum of eighty-five percent (85%) removal of BOD and TSS, as measured by dividing the

Wyoming Department of Environmental Quality
Water Quality Division
WYPDES (Wyoming Pollutant Discharge Elimination System) Program

STATEMENT OF BASIS

MODIFICATION

APPLICANT NAME:	Cheyenne Board of Public Utilities
MAILING ADDRESS:	PO Box 1469 Cheyenne, WY 82003-1469
FACILITY LOCATION:	Dry Creek Water Reclamation Facility, which is located in NW Section 6, Township 13N, Range 65W, Laramie County. The wastewater will be discharged to Crow Creek (class 2C water), South Platte River Basin. Lat: 41.12715187, Long: -104.7084016
PERMIT NUMBER:	WY0022934

This permit has been modified in accordance with current WYPDES permitting requirements. Specific changes to the permit include the following:

MODIFICATION:
1 *This permit is being modified to remove fecal coliform effluent limits and monitoring, as per the request of the permittee.*
2 *The interim effluent limit period ending on September 30, 2009 is removed. E. coli effluent limits and monitoring go into effect upon issuance of this permit modification.*

As of April of 2007, there are no water quality standards for fecal coliform, per Chapter 1, Wyoming Water Quality Rules and Regulations. This permit modification instead reflects the current Chapter 1 standards for the parameter E. coli.

Effluent Limits for E. coli: E. coli limits are 126 colonies/100 mL, monthly average, and 576 colonies/100 mL, daily maximum for the April through September season. Based on best professional judgment, the outfalls discharge to an infrequently used full body contact water, so the 576 colonies/100 mL criterion is applied for daily maximum (see table below). For October through March, the E. coli limits are 630 colonies/100 mL, based on the winter recreation standards. E. coli limits are set assuming the worst case scenario of zero dilution provided by the class 3B receiving water, so effluent limits are set equal to instream standards. See the following table:

E. coli Bacteria Standards, In Waters Designated for Primary Contact Recreation			
May through September			October through April
Monthly Average Standard	Daily Maximum Standards	Criteria	Monthly Average and Daily Maximum
126 colonies/100 mL	236 colonies/100 mL	High Use Swimming Areas	630 colonies/100 mL
	298 colonies/100 mL	Moderate Fully Body Contact	
	410 colonies/100 mL	Lightly Used Full Body Contact	
	576 colonies/100 mL	Infrequently Used Full Body Contact	

Self monitoring of effluent quality and quantity is required on a regular basis with reporting of results monthly. The permit is scheduled to expire on October 31, 2013.

Roland Peterson
Water Quality Division
Department of Environmental Quality
Drafted; March 9, 2009

AUTHORIZATION TO DISCHARGE UNDER THE

WYOMING POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, (hereinafter referred to as "the Act"), and the Wyoming Environmental Quality Act,

Cheyenne Board of Public Utilities

is authorized to discharge from the Dry Creek Water Reclamation Facility treatment facilities located in

NW Section 6, Township 13N, Range 65W, Laramie County
Lat: 41.12715187, Long: -104.7084016

to receiving waters named

Crow Creek (class 2C water), South Platte River Basin

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This permit shall become effective on the date of signature by the Director of the Department of Environmental Quality.

This permit and the authorization to discharge shall expire October 31, 2013 at midnight.

John F. Wagner, Administrator
Water Quality Division

5/20/09
Date

John V. Corra
Director - Department of Environmental Quality

5/20/09
Date

PART I

A. EFFLUENT LIMITATIONS - SEE ANY ADDITIONAL REQUIREMENTS UNDER PART III

Effective upon permit issuance date and lasting through October 31, 2013, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfall serial number(s) 001.

1. Such discharges shall be limited as specified below:

	Effluent Concentration		
Parameter	Monthly Average (b)	Weekly Average (b)	Daily Maximum (a)(b)
Carbonaceous Biochemical Oxygen Demand (CBOD), mg/L	25	40	80
CBOD , % Removal (c)	85	N/A	N/A
E. coli, colonies/100 mL, Oct through April	126	N/A	576
E. coli, colonies/100 mL, May through Sept	630	N/A	630
Total Suspended Solids (TSS) , mg/L	30	45	90
TSS, % Removal (c)	85	N/A	N/A
Total Residual Chlorine, mg/L	N/A	N/A	0.011
Ammonia, total as N, mg/L, June through October	3.50	N/A	8.75
Ammonia, total as N, mg/L, November through May	5.37	N/A	13.43
pH, standard units	N/A	N/A	6.5-9.0

Samples taken to determine compliance with the effluent limitations specified above shall be taken at the outfall from the final treatment unit and prior to admixture with diluent waters or the receiving stream.

(a) Any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

(b) Monthly Average, Weekly Average and Daily Maximum are defined in Part I.C.3.

(c) Compliance with percent removal requirements is based on 30-day average sampling. More frequent sampling is optional. The arithmetic means of the CBOD and TSS concentrations for effluent samples collected in a period of 30-day average shall demonstrate a minimum of eighty-five percent (85%) removal of BOD and TSS, as measured by dividing the respective differences between the

mean influent and effluent concentrations for the calendar month by the respective mean influent concentration for the 30-day average, and multiplying the quotient by 100.

$$\left[\frac{Influent - Effluent}{Influent}\right] \times 100$$

There shall be no discharge of floating solids or foam in other than trace amounts. Nor shall the discharge have a visible sheen or cause formation of a visible sheen or visible deposits on the bottom or shoreline of the receiving water.

All waters shall be discharged in a manner to prevent erosion, scouring, or damage to stream banks, stream beds, ditches, or other waters of the state at the point of discharge. Discharges shall not occur in such a manner that will result in violations of Water Quality Rules and Regulations, Chapter 1, Section 15. In addition, there shall be no deposition of substances in quantities which could result in significant aesthetic degradation, or degradation of habitat for aquatic life, plant life or wildlife; or which could adversely affect public water supplies or those intended for agricultural or industrial use.

B. SELF-MONITORING REQUIREMENTS

1. Effective upon permit issuance date and lasting through October 31, 2013, the permittee shall monitor this discharge(s) as shown below:

	Parameter	Frequency (a)	Sample Type (b)
L	E. coli, colonies/100 mL	Twice Weekly	Grab
L	pH, units	Twice Weekly	Grab
	Total Residual Chlorine, mg/L (c)	Daily	Grab
	CBOD, mg/L, influent	Twice Weekly	Composite
L	CBOD, mg/L, effluent	Twice Weekly	Composite
L	CBOD, % Removal	Monthly	Calculate
	Total Flow, MGD	Twice Weekly	Continuous
L	TSS, mg/L, effluent	Twice Weekly	Composite
	TSS, mg/L, influent	Twice Weekly	Composite
L	TSS, % Removal	Monthly	Calculate
L	Ammonia, mg/L	Twice Weekly	Composite
	Temperature, °C	Twice Weekly	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the outfall from the final treatment unit and prior to admixture with diluent water or the receiving stream.

(a) If the discharge occurs on an intermittent basis, samples shall be collected during the period when that intermittent discharge occurs.

(b) See "definitions" under the Monitoring and Reporting portion of this permit.

(c) Monitor only if chlorine is used in the wastewater treatment process.

2. Effluent Limitations (Toxic Pollutants)

Effective immediately upon issuance of this permit renewal, there shall be no acute discharge from outfall number 001.

3. Whole Effluent Testing (Acute)

Starting in calendar year 2009 through June 30, 2011, the permittee shall conduct quarterly acute static replacement toxicity tests on an effluent sample of the discharge.

The replacement static acute toxicity tests shall be conducted in accordance with the procedures set out the latest procedures set forth in 40 CFR 136.3 and the "Region VIII EPA NPDES Acute Test Conditions - Static Renewal Whole Effluent Toxicity Tests". In the case of conflicts, 40 CFR 136.3 will prevail. The permittee shall conduct the acute 48-hour static toxicity test using *Ceriodaphnia dubia* and an acute 96-hour static replacement toxicity test using *Pimephales promelas*.

Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentration. If more than 10 percent control mortality occurs, the test is not valid. The test shall be repeated until satisfactory control survival is achieved. If acute toxicity occurs, an additional test shall be conducted within two (2) weeks of the date of when the permittee learned of the test failure. If only one (1) species fails, retesting may be limited to this species. Should toxicity occur in the second test, testing shall occur once a month until further notified by the permit issuing authority.

Quarterly test results shall be reported along with the Discharge Monitoring Report (DMR) submitted at the end of the reporting calendar quarter (e.g., whole effluent results for the calendar quarter ending March 31, shall be reported with the DMR due April 28, with the remaining reports submitted with DMRs due each July 28, October 28 and January 28). The format for the report shall be consistent with the latest revision of the "Region VIII Guidance for Acute Whole Effluent Reporting", and shall include all chemical and physical data as specified.

If the results for four consecutive quarters of testing indicate no acute toxicity, the permittee may request the permit issuing authority to allow a reduction to quarterly acute toxicity testing on only one species on an alternating basis. The permit issuing authority may approve or deny the request based on the results and other available information without an additional public notice. If the request is approved, the test procedures are to be the same as specified above for the test species.

4. Whole Effluent Testing (Chronic)

Starting July 1, 2011, the permittee shall conduct quarterly chronic short term toxicity tests on the final effluent.

If chronic toxicity is detected, an additional test shall be conducted within two (2) weeks of the date of when the permittee learned of the test failure. The need for any additional samples shall be determined by the permit issuing authority.

The chronic toxicity tests shall be conducted in accordance with the procedures set out in the latest revision of "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA/600/4-91/002 and the "Region VIII EPA NPDES Chronic Test Conditions - Static Renewal Whole Effluent Toxicity Test". In the case of conflicts, the Region VIII procedure will prevail. Test species shall consist of Ceriodaphnia dubia and Pimephales promelas. A multi dilution test consisting of five (5) concentrations and a control is required. If test acceptability criteria are not met for control survival, growth, or reproduction, the test shall be considered invalid. Chronic toxicity occurs when, during a chronic toxicity test, the 25% inhibition concentration (IC25) calculated on the basis of test organism survival and growth or survival and reproduction, is equal to 100 percent effluent concentration.

Test results shall be reported along with the Discharge Monitoring Report (DMR) submitted for the end of the calendar period during which the whole effluent test was run (e.g., results for the first half of the year shall be reported with the DMR due July 28, with the remaining report submitted with DMRs due each January 28). The format for the report shall be consistent with the latest revision of the "Region VIII Guidance for Chronic Whole Effluent Reporting", and shall include all chemical and physical data as specified.

If the results for four consecutive whole effluent testing results indicate no chronic toxicity, the permittee may request the permit issuing authority to allow the permittee to reduce testing frequency, and/or reduce testing to one species on an alternating basis, and/or modify testing to the acute test program. The permit issuing authority may approve, partially approve or deny the request based on results and other available information. If approval is given, the modification will take place without a public notice.

5. Toxicity Reduction Evaluation (TRE)
Toxicity Identification Evaluation (TIE)

Should acute toxicity and/or chronic toxicity be detected in the permittee's discharge, a TIE-TRE shall be undertaken by the permittee to establish the cause of the toxicity, locate the source(s) of the toxicity, and develop control of, or treatment for the toxicity. Failure to initiate, or conduct an adequate TIE-TRE, or delays in the conduct of such tests, shall not be considered a justification for noncompliance with the whole effluent toxicity limits contained in Part I.C.1. of this permit. A TRE plan needs to be submitted to the permitting authority within 45 days after confirmation of the continuance of effluent toxicity.

6. Chronic Toxicity Limitation-Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include chronic whole effluent toxicity limitations if any other information or data are developed indicating that chronic whole effluent toxicity limits are needed as required under 40 CFR 122.44 (d). Also see Part IV.P. of this permit for additional whole effluent toxicity reopener provisions.

If acceptable to the permit issuing authority, and if in conformance with current regulations, this permit may be reopened and modified to incorporate TRE conclusions relating to additional numerical limitations, a modified compliance schedule, and or modified whole effluent protocol.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by, the permit issuing authority. Sludge samples shall be collected immediately prior to the disposal practice at a location representative of the sludge.

2. Reporting

Effluent monitoring results obtained during the previous one month(s) shall be summarized and reported on a Discharge Monitoring Report Form. If the permit requires whole effluent toxicity (WET) (biomonitoring) testing, WET test results must be reported on the most recent version of EPA Region 8 Guidance for Whole Effluent Reporting. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements (see Part II.A.11.), and submitted to the state water pollution control agency at the following address postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on June 28, 2009.

Wyoming Department of Environmental Quality-Water Quality Division Herschler Building, 4 West 122 West 25th Street Cheyenne, WY 82002 Telephone: (307) 777-7781	Policy, Enforcement Management and Environmental Justice Program (ENF-PJ) ATTN: NPDES Enforcement U.S. EPA, Region 8 1595 Wynkoop St. Denver, CO 80202-1129 Telephone: (303) 293-1622

If no discharge occurs during the reporting period, "no discharge" shall be reported. If discharge is intermittent during the reporting period, sampling shall be done while the facility is discharging.

3. Definitions

Concentration Values

a. Daily Maximum (mg/L) - The highest single reading from any grab or composite sample collected during the reporting period.

b. Monthly Average (mg/L) - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli) of all composite and/or grab samples collected during a calendar month.

c. Weekly Average (mg/L) - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli) of all composite and/or grab samples collected during

any week. A week begins at 12:01 am Sunday morning and ends at 12:00 midnight Saturday evening.

Quantity Values

d. Daily Maximum - The highest single daily quantity reading (see Calculations below) recorded during the reporting period.

e. Monthly Average - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli bacteria) of all the daily quantity readings (see Calculations below) recorded during a calendar month.

f. Weekly Average - The arithmetic mean (geometric mean in the case of fecal coliform and E. coli bacteria) of all the daily quantity readings (see Calculations below) recorded during a week. A week begins at 12:01 am Sunday morning and ends at 12:00 midnight Saturday evening.

Flow Values

g. Daily Flow - The flow volume recorded on any single day. The daily flow volume may be determined by using an instantaneous reading (if authorized by this permit) or a continuous recorder.

h. Monthly Average Flow - The arithmetic mean of all daily flow values recorded during a calendar month.

i. Weekly Average Flow - The arithmetic mean of all daily flow values recorded during a week. A week begins at 12:01 am on Sunday morning and ends at 12:00 midnight Saturday evening.

Calculations

j. Daily Quantity (kg/day) - The quantity, in kilograms per day, of pollutant discharged on a single day. The Daily quantity shall be calculated by multiplying the composite or grab sample concentration value for that day in milligrams/liter (mg/L) times the flow volume (in millions of gallons per day - MGD) for that day times 3.78. If a flow volume reading for the day the sample is collected is not available, the average flow volume reading for the entire reporting period shall be used.

k. Daily Quantity (#/day) - The quantity, in number per day, of bacteria or other pollutants discharged on a single day. The number per day shall be calculated by multiplying the composite or grab sample result for that day, in number per 100 milliliters (#/100 mL), times the flow volume (in millions of gallons per day - MGD) times 3.78×10^7. If a flow volume reading for the day the sample is collected is not available , the average flow volume reading for the entire reporting period shall be used.

L. Geometric Mean - Calculated in accordance with the procedure described in the most recent edition of "Standard Methods for the Examination of Water and Wastewater".

Miscellaneous

m. A "composite" sample, for monitoring requirements, is defined as a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow.

n. An "instantaneous" measurement for monitoring requirements is defined as a single reading, measurement, or observation.

o. "MGD", for monitoring requirements, is defined as million gallons per day.

p. "Net" value, if noted under Effluent Characteristics, is calculated on the basis of the net increase of the individual parameter over the quantity of that same parameter present in the intake water measured prior to any contamination or use in the process of this facility. Any contaminants contained in any intake water obtained from underground wells shall not be adjusted for as described above and, therefore, shall be considered as process input to the final effluent. Limitations in which "net" is not noted are calculated on the basis of gross measurements of each parameter in the discharge, irrespective of the quantity of those parameters in the intake waters.

q. A "pollutant" is any substance or substances which, if allowed to enter surface waters of the state, causes or threatens to cause pollution as defined in the Wyoming Environmental Quality Act, Section 35-11-103.

4. Test Procedures

Test procedures for the analysis of pollutants, collection of samples, sample containers, sample preservation, and holding times, shall conform to regulations published pursuant to 40 CFR, Part 136, unless other test procedures have been specified in this permit.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;

b. The dates and times the analyses were performed;

c. The person(s) who performed the analyses and collected the samples;

d. The analytical techniques or methods used; and

e. The results of all required analyses including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine the results.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of

the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

7. Records Retention

The permittee shall 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, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the administrator at any time. Data collected on site, copies of Discharge Monitoring Reports and a copy of this WYPDES permit must be maintained on site during the duration of activity at the permitted location.

8. Penalties for Tampering

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 per violation, or by imprisonment for not more than two (2) years per violation, or both.

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Dry Creek Water Reclamation Facility

TABLE 1

Outfall	Qtr/Qtr	Section	Township-North	Range-West	Latitude	Longitude	Receiving Water
001*	NW	6	13	65	41.12715187	-104.7084016	Crow Creek (class 2C water), South Platte River Basin

*Asterisk denotes outfalls for which WDEQ has field-verified the Latitude and Longitude locations. These are considered to be the most accurate location data available for these outfalls, and will supersede Latitude and Longitude values presented in the application.

PART II

A. MANAGEMENT REQUIREMENTS

1. Changes

The permittee shall give notice to the administrator of the Water Quality Division as soon as possible of any physical alterations or additions to the permitted facility. Notice is required when:

a. 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

b. The alteration or addition could change the nature or increase the quantity of pollutants discharged.

2. Noncompliance Notification

a. The permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

b. The permittee shall report any noncompliance which may endanger health or the environment as soon as possible, but no later than 24 hours from the time the permittee first became aware of the circumstances. The report shall be made to the Water Quality Division, Wyoming Department of Environmental Quality at (307) 777-7781.

c. For any incidence of noncompliance, including noncompliance related to non-toxic pollutants or non-hazardous substances, a written submission shall be provided within five (5) days of the time that the permittee becomes aware of the noncompliance circumstance.

The written submission shall contain:

(1) A description of the noncompliance and its cause;

(2) The period of noncompliance, including exact dates and times;

(3) The estimated time noncompliance is expected to continue if it has not been corrected; and

(4) Steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance.

d. The following occurrences of unanticipated noncompliance shall be reported by telephone to the Water Quality Division, Watershed Management Section, WYPDES Program (307) 777-7781 as soon as possible, but no later than 24 hours from the time the permittee first became aware of the circumstances.

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

(2) Any upset which exceeds any effluent limitation in the permit; or

(3) Violation of a maximum daily discharge limitation for any toxic pollutants or hazardous substances, or any pollutants specifically identified as the method to control a toxic pollutant or hazardous substance listed in the permit.

e. The administrator of the Water Quality Division may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Quality Division, WYPDES Program (307) 777-7781.

f. Reports shall be submitted to the Wyoming Department of Environmental Quality at the address in Part I under Reporting and to the Planning and Targeting Program, 8ENF-PT, Office of Enforcement, Compliance, and Environmental Justice, U.S. EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129.

g. The permittee shall report all instances of noncompliance that have not been specifically addressed in any part of this permit at the time the monitoring reports are due.

3. Facilities Operation

The permittee shall, 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. However, the permittee shall operate, as a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the state resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypass of Treatment Facilities

a. Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

b. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this section. Return of removed substances to the

discharge stream shall not be considered a bypass under the provisions of this paragraph.

c. Notice:

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice at least 60 days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II.A.2.

d. Prohibition of bypass.

(1) Bypass is prohibited and the administrator of the Water Quality Division may take enforcement action against a permittee for a bypass, unless:

(a) The bypass was unavoidable to prevent loss of life, personal injury or severe property damage;

(b) 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 to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(c) The permittee submitted notices as required under paragraph c. of this section.

e. The administrator of the Water Quality Division may approve an anticipated bypass, after considering its adverse effects, if the administrator determines that it will meet the three conditions listed above in paragraph d. (L) of this section.

6. Upset Conditions

a. 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, improper designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph c. of this section are met.

c. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required under Part II.A.2; and

(4) The permittee complied with any remedial measures required under Part II.A.4.

d. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

7. Removed Substances

Solids, sludges, filter backwash or other pollutants removed in the course of treatment or control of wastewaters or intake waters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the state.

8. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with a schedule of compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities; or

b. If such alternative power source as described in paragraph a. above is not in existence and no date for its implementation appears in Part I, take such precautions as are necessary to maintain and operate the facility under its control in a manner that will minimize upsets and insure stable operation until power is restored.

9. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the federal act and the Wyoming Environmental Quality Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the administrator of the Water Quality Division advance notice of any planned changes at the permitted facility or of any activity which may result in permit noncompliance.

10. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

11. Signatory Requirements

All applications, reports or information submitted to the administrator of the Water Quality Division shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

(3) For a municipality, state, federal or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the administrator of the Water Quality Division shall 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:

(1) The authorization is made in writing by a person described above and submitted to the administrator of the Water Quality Division; and

(2) The authorization specified 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. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

c. If an authorization under paragraph II.A.11.b. 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 paragraph II.A.11.b must be submitted to the administrator of the Water Quality Division prior to or together with any reports, information or applications to be signed by an authorized representative.

d. Any person signing a document under this section shall 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."

B. RESPONSIBILITIES

1. Inspection and Entry

If requested, the permittee shall provide written certification from the surface landowner(s), if different than the permittee, that the administrator or the administrator's authorized agent has access to all physical locations associated with this permit including well heads, discharge points, reservoirs, monitoring locations, and any waters of the state.

The permittee shall allow the administrator of the Water Quality Division or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. 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;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the federal act, any substances or parameters at any location.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the regional administrator of the Environmental Protection Agency and the administrator of the Water Quality Division. The administrator of the Water Quality Division shall then provide written notification to the new owner or controller of the date in which they assume legal responsibility of the permit. The permit may be modified or revoked and reissued to change the name of the permittee and incorporate such other requirements as described in the federal act.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the federal act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Wyoming Department of Environmental Quality and the regional administrator of the Environmental Protection Agency. As required by the federal act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the federal act.

4. Toxic Pollutants

The permittee shall comply with effluent standards or prohibitions established under Section 307 (a) of the federal 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.

5. Changes in Discharge of Toxic Substances

Notification shall be provided to the administrator of the Water Quality Division as soon as the permittee knows of, or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 µg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

6. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. As long as the conditions related to the provisions of "Bypass of Treatment Facilities" (Part II.A.5), "Upset Conditions" (Part II.A.6), and

"Power Failures" (Part II.A.8) are satisfied then they shall not be considered as noncompliance.

7. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8. Oil and Hazardous Substance Liability

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 to which the permittee is or may be subject under Section 311 of the federal act.

9. 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 or federal law or regulation. In addition, issuance of this permit does not substitute for any other permits required under the Clean Water Act or any other federal, state, or local law.

10. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights nor any infringement of federal, state or local laws or regulations.

11. Duty to Reapply

If the permittee wishes 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. The application should be submitted at least 180 days before the expiration date of this permit.

12. Duty to Provide Information

The permittee shall furnish to the administrator of the Water Quality Division, within a reasonable time, any information which the administrator 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 shall also furnish to the administrator, upon request, copies of records required by this permit to be kept.

13. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or any report to the administrator of the Water Quality Division, it shall promptly submit such facts or information.

14. Permit Action

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

15. Permit Fees

Once this permit has been issued, the permittee will be assessed a $100.00 per-year permit fee by the Water Quality Division. The fee year runs from January 1st through December 31st. This permit fee will continue to be assessed for as long as the permit is active, regardless of whether discharge actually occurs. This fee is not pro-rated. If the permit is active during any portion of the fee year, the full fee will be billed to the permittee for that fee year. In the event that this permit is transferred from one permittee to another, each party will be billed the full permit fee for the fee year in which the permit transfer was finalized. See the Wyoming Environmental Quality Act §35-11-312 for further information.

PART III

A. OTHER REQUIREMENTS

1. Percentage Removal Requirements

The 30-day average value (arithmetic mean), of the BOD and the Total Suspended Solids concentrations for effluent samples shall not exceed 15 percent of the arithmetic mean of the concentrations for influent samples collected at approximately the same times during the same period (85 percent removal). This is in addition to the concentration limitations on BOD and Total Suspended Solids. In the case of stabilization pond treatment systems, this section does not apply to the parameter Total Suspended Solids.

2. Violations Resulting from Overloading

Should there be a violation of any conditions of this permit, the Wyoming Department of Environmental Quality has the authority under Sections 35-11-901 and 35-11-902 of the Wyoming Environmental Quality Act to proceed in a court of competent jurisdiction to restrict or prohibit further connections to the treatment system covered by this permit by any sources not utilizing the system prior to the finding that such a violation occurred.

3. Discharge Duration

If the rate of discharge is controlled, that rate and duration of discharge shall be reported.

4. Flow Measurement

At the request of the administrator of the Water Quality Division, the permittee must be able to show proof of the accuracy of any flow measuring device used in obtaining data submitted in the monitoring report. The flow measuring device must indicate values of within plus or minus ten (10) percent of the actual flow being measured.

5. Sewer Overflow Located Prior to Waste Treatment Facility

Overflow structures shall be maintained and operated in such a manner that no discharge shall occur except to prevent health hazards, severe property damage or loss of treatment capacity.

Such overflows shall satisfy Wyoming water quality standards and/or any appropriate federal or state effluent limitations. Following documentation of specific water quality standard or effluent standard violations resulting from such overflows, specific numerical effluent limitations, or the requirement for elimination of the overflow structures, may be included upon reissuance or revision of this permit.

6. Compliance with Construction Grant

In the case of publicly owned treatment works, the permittee shall comply with those terms of any construction grant implementing the provisions of Section 201(b) through (g) of the Clean Water Act.

7. 208(b) Plans

This permit may be modified, suspended or revoked to comply with the provisions of any 208 (b) plan certified by the Governor of the State of Wyoming.

8. Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary) or other appropriate requirements if one or more of the following events occurs:

a. The state water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit;

b. A total maximum daily load (TMDL) and/or watershed management plan is developed and approved by the state and/or the Environmental Protection Agency which specifies a wasteload allocation for incorporation in this permit;

c. A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this permit;

d. There have been substantial changes (or such changes are planned) in sewage sludge use or disposal practices; applicable management practices or numerical limitations for pollutants in sludge have been promulgated which are more stringent than the requirements in this permit; and/or it has been determined that the permittee's sewage sludge use or disposal practices do not comply with existing applicable state or federal regulations.

e. The limits established by the permit no longer attain and/or maintain applicable water quality standards;

f. The permit does not control or limit a pollutant that has the potential to cause or contribute to a violation of a state water quality standard.

g. If new applicable effluent guidelines and/or standards have been promulgated and the standards are more stringent than the effluent limits established by the permit.

h. If an Interstate Memorandum of Cooperation exists, effluent limits may be incorporated into this permit or existing limits may be modified to ensure that the appropriate criteria, water quality standards and assimilative capacity are attained.

9. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

d. If necessary to comply with any applicable effluent standard or limitation issued or approved under Sections 301 (b) (2) (C) and (D), 304 (b) (2) and 307 (a) (2) of the federal act, if the effluent standard or limitation so issued or approved:

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(2) Controls any pollutant not limited in the permit.

10. Toxicity Limitation - Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include a new compliance date, additional or modified numerical limitations, a new or different compliance schedule, a change in the whole effluent protocol or any other conditions related to the control of toxicants if one or more of the following events occur:

a. Toxicity was detected late in the life of the permit near or past the deadline for compliance;

b. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and the permit issuing authority agrees with the conclusion;

c. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits and the permit issuing authority agrees that numerical controls are the most appropriate course of action;

d. Following the implementation of numerical controls on toxicants, the permit issuing authority agrees that a modified whole effluent protocol is necessary to compensate for those toxicants that are controlled numerically;

e. The TRE reveals other unique conditions or characteristics which, in the opinion of the permit issuing authority, justify the incorporation of unanticipated special conditions in the permit.

11. Severability

The provisions of this permit are severable and, if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit, shall not be affected thereby.

12. Penalties for Falsification of Reports

The federal act 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 noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation or by imprisonment for not more than two years per violation or both.

B. INDUSTRIAL PRETREATMENT PROGRAM (CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS)

1. The Permittee shall operate an industrial pretreatment program in accordance with the following permit requirements developed pursuant to Section 402(b)(8) of the Clean Water Act, the General Pretreatment Regulations (40 CFR Part 403), and the approved pretreatment program submitted by the Permittee. The pretreatment program was approved on **March 28, 1986** and has subsequently incorporated substantial modifications as approved by the Approval Authority. The approved pretreatment program, and any approved modifications thereto, is hereby incorporated by reference and shall be implemented in a manner consistent with the following requirements:

a. Industrial user information shall be updated at a minimum of once per year or at that frequency necessary to ensure that all Industrial Users are properly permitted and/or controlled. The records shall be maintained and updated as necessary;

b. The Permittee shall sample and inspect each Significant Industrial User (SIU) at least once per calendar year (40 CFR Section 403.8(f)(2)(v)). This is in addition to any industrial self-monitoring activities;

c. The Permittee shall evaluate, at least every two years, whether each Significant Industrial User needs a plan to control slugs or spills or needs to update such a plan. Where needed, the Permittee shall require the SIU to prepare or update, and then implement the plan. Where a slug prevention plan is required, the Permittee shall ensure that the plan contains at least the minimum elements required in 40 CFR Section 403.8(f)(2)(v);

d. The Permittee shall investigate instances of non-compliance with Pretreatment Standards and requirements indicated in reports and notices required under 40 CFR Section 403.12, or indicated by analysis, inspection, and surveillance activities.

e. The Permittee shall enforce all applicable Pretreatment Standards and requirements and obtain remedies for noncompliance by any industrial user;

f. The Permittee shall control, through the legal authority in the approved pretreatment program, the contribution to the POTW by each industrial user to ensure compliance with applicable Pretreatment Standards and requirements. In the case of industrial users identified as significant under 40 CFR Section 403.3(t), this control shall be achieved through permit, order, or similar means and shall contain, at a minimum, the following conditions:

(1) Statement of duration (in no case more than five (5) years);

(2) Statement of non-transferability without, at a minimum, prior notification to the Permittee and provision of a copy of the existing control mechanism to the new owner or operator;

(3) Effluent limits based on applicable Pretreatment Standards, Categorical Pretreatment Standards, local limits, and State and local law;

(4) Self-monitoring, sampling, reporting, notification and recordkeeping requirements, including an identification of the pollutants to be monitored, sampling location,

sampling frequency, and sample type, based on the applicable Pretreatment Standards in 40 CFR Part 403, Categorical Pretreatment Standards, local limits, and State and local law; and,

(5) Statement of applicable civil and criminal penalties for violation of Pretreatment Standards and requirements, and any applicable compliance schedule. Such schedules may not extend the compliance date beyond deadlines mandated by federal statute or regulation.

g. The Permittee shall provide adequate staff, equipment, and support capabilities to carry out all elements of the pretreatment program as required by 40 CFR Section 403.8(f)(3);

h. The approved program shall not be substantially modified by the Permittee without the approval of the EPA. Substantial and non-substantial modifications shall follow the procedures outlined in 40 CFR Section 403.18;

i. The Permittee shall develop, implement, and maintain an enforcement response plan as required by 40 CFR Section 403.8(f)(5); and

j. The Permittee shall notify all Industrial Users of the users' obligations to comply with applicable requirements under Subtitles C and D of the Resource Conservation and Recovery Act (RCRA) as required by 40 CFR Section 403.8(f)(2)(iii).

2. The Permittee shall establish and enforce specific local limits to implement the provisions of 40 CFR Section 403.5(a) and (b), as required by 40 CFR Section 403.5(c). The Permittee shall continue to develop these limits as necessary and effectively enforce such limits.

In accordance with EPA policy and with the requirements of 40 CFR sections 403.8(f)(4) and 403.5(c), the Permittee shall determine if technically based local limits are necessary to implement the general and specific prohibitions of 40 CFR sections 403.5(a) and (b).

This evaluation should be conducted in accordance with the latest revision of the "EPA Region VIII Strategy for Developing Technically Based Local Limits", and after review of the "Guidance Manual on the Development and implementation of Local Discharge Limitations Under the Pretreatment Program" December 1987. Where the Permittee determines that revised or new local limits are necessary, the Permittee shall submit the proposed local limits to the Approval Authority in approvable form based upon the findings of the technical evaluation within two-hundred and seventy (270) days from the effective date of this permit.

3. The Permittee shall analyze the treatment facility influent and effluent for the presence of the toxic pollutants listed in 40 CFR Part 122 Appendix D (NPDES Application Testing Requirements) Table II at least **once per year** and the toxic pollutants in Table III at least **every quarter**. If, based upon information available to the Permittee, there is reason to suspect the presence of any toxic or hazardous pollutant listed in Table V, or any other pollutant in a quantity or concentration known or suspected to adversely affect POTW operation, receiving water quality, or solids disposal procedures, analysis for those pollutants shall be performed at least **once per quarter** on both the influent and the effluent.

Along with the Permittee's pretreatment annual report, the Permittee will submit a list of compounds included in Table V that are suspected or known to be present in its influent wastewater. This determination shall be based on a review of the Permittee's pretreatment program records. The state and/or Approval Authority may review and comment on the list and the list may be revised if, in the

opinion of the state and/or Approval Authority the list is incomplete. The Permittee will perform **once-per-quarter** analysis on the influent for the revised list of compounds for which there are acceptable testing procedures.

Where the pollutants monitored in accordance with this section are reported as being above the method detection limit, the results for these pollutants shall be reported in the Permittee's pretreatment annual report.

The Permittee shall analyze the treatment facility sludge (biosolids) prior to disposal, for the presence of the toxic pollutants listed in 40 CFR Part 122 Appendix D (NPDES Application Testing Requirements) Table III at least once per year. If the Permittee does not dispose of biosolids during the calendar year, the Permittee shall certify to that in the Pretreatment Annual Report and the monitoring requirements in this paragraph shall be suspended for that calendar year.

The Permittee shall review the pollutants in 40 CFR Part 122, Appendix D, tables II and V. If any of the pollutants in these tables were above detection in the influent samples during the previous 2 years or last 2 analyses, whichever is greater, the Permittee shall sample and analyze it's sewage sludge for these pollutants. The Permittee shall perform this evaluation and analysis at least once per year.

The Permittee shall use sample collection and analysis procedures as approved for use under 40 CFR Part 503.

The Permittee shall report the results for these pollutants in the Permittee's pretreatment annual report.

All analyses shall be in accordance with test procedures established in 40 CFR Part 136. Where analytical techniques are not specified or approved under 40 CFR Part 136, the Permittee shall use its best professional judgement and guidance from the State and the Approval Authority regarding analytical procedures. All analytical procedures and method detection limits must be specified when reporting the results of such analyses. Sampling methods shall be those defined in 40 CFR Part 136, 40 CFR Part 403, as defined in this permit, or as specified by the Approval Authority. Where sampling methods are not specified, the influent and effluent samples collected shall be composite samples consisting of at least twelve (12) aliquots collected at approximately equal intervals over a representative 24-hour period and composited according to flow. Where automated composite sampling is inappropriate, at least four (4) grab samples shall be manually taken at equal intervals over a representative 24-hour period, and composited prior to analysis using approved methods.

4. The Permittee shall prepare annually a list of industrial users which during the preceding twelve (12) months have significantly violated Pretreatment Standards or requirements. This list is to be published annually in the largest newspaper in the Permittee's service area as required by 40 CFR Section 403.8(f)(2)(vii).

In addition, on or before March 28, the Permittee shall submit a pretreatment program annual report to the Approval Authority and the state which contains the following information:

a. An updated list of all Significant Industrial Users as defined at 40 CFR 403.3(t). For each Significant Industrial User listed the following information shall be included:

(1) All applicable Standard Industrial Classification (SIC) codes and categorical determinations, as appropriate. In addition, a brief description of the industry and general activities;

(2) Permit status. Whether each Significant Industrial User has an unexpired control mechanism and an explanation as to why any SIUs are operating without a current, unexpired control mechanism (e.g. permit);

(3) A summary of all monitoring activities performed within the previous twelve (12) months. The following information shall be reported:

(a) Total number of Significant Industrial Users inspected; and

(b) Total number of Significant Industrial Users sampled.

b. For all industrial users that were in Significant Non-Compliance during the previous twelve (12) months, provide the name of the violating industrial user, indicate the nature of the violations, the type and number of actions taken (warning letter, notice of violation, administrative order, criminal or civil suit, fines or penalties collected, etc.) and current compliance status. If the industrial user was put on a schedule to attain compliance with effluent limits, indicate the date the schedule was issued and the date compliance is to be attained. Determination of Significant Non-Compliance shall be performed as defined at 40 CFR Section 403.8(f)(2)(vii).

A summary of all enforcement actions not covered by the paragraph above conducted in accordance with the approved Enforcement Response Plan.

c. A list of all Significant Industrial Users whose authorization to discharge was terminated or revoked during the preceding twelve (12) month period and the reason for termination;

d. A report on any Interference, Pass Through, upset or permit violations known or suspected to be caused by non-domestic discharges of pollutant and actions taken by the Permittee in response;

e. Verification of publication of industrial users in Significant Non-Compliance;

f. Identification of the specific locations, if any, designated by the Permittee for receipt (discharge) of trucked or hauled waste;

g. Information as required by the Approval Authority or state on the discharge to the POTW from the following activities:

(1) Ground water clean-up from underground storage tanks;

(2) Trucked or hauled waste; and,

(3) Groundwater clean-up from RCRA or Superfund sites.

h. A description of all changes made during the previous calendar year to the Permittee's pretreatment program that were not submitted as substantial or non substantial modifications to EPA.

i. The Permittee shall evaluate actual pollutants loadings against the approved Maximum Allowable Headworks Loadings (MAHLs). Where the actual loading exceeds the MAHL, the Permittee shall immediately begin a program to either revise the existing local limit and/or undertake such other studies as necessary to evaluate the cause(s) of the exceedence. The Permittee shall provide a summary of its intended action.

j. Other information that may be deemed necessary by the Approval Authority.

5. The Permittee shall prohibit the introduction of the following pollutants into the POTW:

a. Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including, but not limited to, wastestreams with a closed cup flashpoint of less than sixty (60) degrees Centigrade (140 degrees Fahrenheit) using the test methods specified in 40 CFR Section 261.21;

b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works are specifically designed to accommodate such discharges;

c. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, or other interference with the operation of the POTW;

d. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with the POTW;

e. Heat in amounts which will 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 forty (40) degrees Centigrade (104 degrees Fahrenheit) unless the Approval Authority, 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;

h. Any trucked or hauled pollutants, except at discharge points designated by the POTW; and,

i. Any specific pollutant which exceeds a local limitation established by the POTW in accordance with the requirements of 40 CFR Section 403.5(c) and (d).

j. Any other pollutant which may cause Pass Through or Interference.

6. The Permittee shall provide the pretreatment Approval Authority with adequate notice of any substantial change in the volume or character of pollutants being introduced into the treatment works by any Significant Industrial User introducing pollutants into the treatment works at the time of application for the discharge permit. For the purposes of this section, "substantial change" shall mean a level of change which has a reasonable probability of affecting the Permittee's ability to comply with its permit conditions or to cause a violation of stream standards applied to the receiving water.

Adequate notice shall include information on: (1) the quality and quantity of effluent to be introduced into the treatment works, and (2) any anticipated impact of the change on the quality or quantity of effluent to be discharged from the publicly owned treatment works.

7. Section 309(f) of the Act provides that EPA may issue a notice to the POTW stating that a determination has been made that appropriate enforcement action must be taken against an industrial user for noncompliance with any Pretreatment Standards and requirements. The notice provides the POTW with thirty (30) days to commence such action. The issuance of such permit notice shall not be construed to limit the authority of the permit issuing authority or Approval Authority.

8 The state and the Approval Authority retains, at all times, the right to take legal action against the industrial contributor for violations of a permit issued by the Permittee, violations of any Pretreatment Standard or requirement, or for failure to discharge at an acceptable level under national standards issued by EPA under 40 CFR, chapter I, subchapter N. In those cases where a permit violation has occurred because of the failure of the Permittee to properly develop and enforce Pretreatment Standards and requirements as necessary to protect the POTW, the state and/or Approval Authority shall hold the Permittee responsible and may take legal action against the Permittee as well as the Indirect Discharger(s) contributing to the permit violation.

Appendix 8-C
Cost Estimating Spreadsheets

Cheyenne Board of Public Utilities
Capital Cost Opinion

REVISED 6/18/13

DRY CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
Flow Equalization				
TEMPORARY FACILITIES				
Shoring	1	LS	5500.00	$5,500
Dewatering	1	LS	27000.00	$27,000
EARTHWORK				
Soil Excavation	8000	CY	9.00	$72,000
Structural Backfill	500	CY	17.00	$8,500
Backfill	3000	CY	11.00	$33,000
CONCRETE				
Slab on Grade	600	CY	400.00	$240,000
Suspended Slabs	60	CY	650.00	$39,000
Walls	300	CY	500.00	$150,000
METALS				
Handrail	940	LF	41.00	$38,540
Miscellaneous Metals (carbon steel)	1000	LB	4.42	$4,420
Grating	500	SF	30.94	$15,470
Acess Hatch	1	EA	3315.00	$3,315
Valve Boxes	2	EA	828.75	$1,658
PAINTING				
Pipe & Misc.	1	LS	8287.50	$8,288
INSTRUMENTATION				
SCADA System	1	LS	30000.00	$30,000
LIQUID STREAM PIPING				
Wall Fittings (not Including sieves)	1	LS	8840.00	$8,840
Flanged In-Plant (sieve wall pipes)	4	EA	828.75	$3,315
36 inch Influent	120	LF	221.00	$26,520
Pipe Supports	1	LS	5525.00	$5,525
SLUICE GATES				
42 inch Sluice Gate	2	EA	17680.00	$35,360
VALVES				
10 inch Shear Gate (drain)	2	EA	2762.50	$5,525
ELECTRICAL				
Wiring, conduit		LS		$10,000
RAW SUBTOTAL				**$772,000**

GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$115,800
Contaractor Overhead & Proffit (12% of total)		LS		$92,600
CONSTRUCTION SUBTOTAL				**$980,400**

TOTAL PROJECT COSTS					
Engineering (20%)				$196,080	
CONTINGENCY (35% of total)		LS		$411,800	
TOTAL		**Flow Equalization**			**$1,588,000**

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DRY CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
NEW SECONDARY CLARIFIER				
EARTHWORK				
Dewatering	1	LS	27000.00	$27,000
Excavation	10200	CY	9.00	$91,800
Structural Backfill	1000	CY	17.00	$17,000
Backfill	5500	CY	11.00	$60,500
CONCRETE				
Slab on grade	275	CY	400.00	$110,000
Sidewalks	1	LS	3000.00	$3,000
Walls	425	CY	500.00	$212,500
Suspended slab	60	CY	650.00	$39,000
Encasement	20	CY	225.00	$4,500
Fill Concrete	15	CY	110.00	$1,650
Drain & Dewatering Manholes	2	EA	9500.00	$19,000
METALS				
Handrail	300	LF	41.00	$12,300
New Scum baffle, weir plate	285	LF	28.00	$7,980
Grating	24	SF	31.00	$744
Miscellaneous Metals	2000	LB	4.50	$9,000
FINISHES				
Paint Piping & Equipment (not clarifier)	1	LS	8300.00	$8,300
Paint Clarifier	1	EA	61000.00	$61,000
EQUIPMENT				
Drive, sludge collector, center pier, baffle skirt & Rotating scum	1	EA	130000.00	$130,000
Equipment Installation	1	LS	13000.00	$19,500
INSTRUMENTATION				
SCADA System	1	LS	15000.00	$15,000
PIPING				
36" Influent	150	LF	225.00	$33,750
16" Sludge	175	LF	185.00	$32,375
12" Scum	90	LF	165.00	$14,850
12" Drain	75	LF	165.00	$12,375
Relief Valves	16	EA	85.00	$1,360
Foundation Drain System	1	EA	9000.00	$9,000
Drain & Dewatering Manholes	2	EA	9000.00	$18,000
Miscellaneous	1	LS	5500.00	$5,500
Heat Tracing & Insulation (foam spray system)	1	LS	3500.00	$3,500
VALVES				
12" PV	1	EA	3100.00	$3,100
ELECTRICAL				
Wiring, conduit	1	LS	25000.00	$25,000
MCC modifications, breakers	1	LS	40000.00	$40,000
RAW SUBTOTAL				**$1,049,000**

GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$157,400
Contaractor Overhead & Proffit (12% of total)		LS		$125,900
CONSTRUCTION SUBTOTAL				**$1,332,300**

TOTAL PROJECT COSTS				
Engineering (20%)				$266,460
CONTINGENCY (35% of total)		LS		$559,600
TOTAL		**NEW SECONDARY CLARIFIER**		**$2,158,000**

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DRY CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
New Influent Flow Metering				
YARD PIPING				
Demolition	1	LS	2500.00	$2,500
Bypass Pumping	1	LS	7500.00	$7,500
EARTHWORK				
Soil Excavation	370	CY	10.44	$3,862
Backfill	300	CY	13.05	$3,914
Structural Backfill	90	CY	19.57	$1,761
CONCRETE				
Fill Conc	25	CY	260.95	$6,524
Precast Vault	2	EA	12000.00	$24,000
Grout	1	LS	1500.00	$1,500
Flowable Fill	1	LS	1500.00	$1,500
METALS				
Access Manways	2	EA	4500.00	$9,000
Grating	80	SF	35.00	$2,800
FINISHES				
Vault Coating	600	SF	10.00	$6,000
EQUIPMENT				
Fiberglass Flume	2	EA	2500	$5,000
INSTRUMENTATION				
Sensors, SCADA		LS		$25,000
PIPING				
Vault Connections and Closure Pieces		LS		$10,000
ELECTRICAL				
Wiring, conduit		LS		$15,000
RAW SUBTOTAL				**$126,000**

GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$18,900
Contaractor Overhead & Proffit (12% of total)		LS		$15,100
CONSTRUCTION SUBTOTAL				**$160,000**

TOTAL PROJECT COSTS					
Engineering (20%)				$32,000	
CONTINGENCY (35% of total)		LS		$67,200	
TOTAL		**New Influent Flow Metering**			**$259,000**

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DRY CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
New Secondary Clarifier Launder and Weir Covers				
EQUIPMENT				
Fiberglass Covers for 80 ft. Diameter Units	1	EA	36500	$36,500
Cover Installation	1	EA	3500	$3,500
Fiberglass Covers 90 ft. Diameter Units	2	EA	41000	$82,000
Cover Installation	2	EA	4000	$8,000
RAW SUBTOTAL				**$130,000**
GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$19,500
Contaractor Overhead & Proffit (12% of total)		LS		$15,600
CONSTRUCTION SUBTOTAL				**$165,100**
TOTAL PROJECT COSTS				
Engineering (20%)				$33,020
CONTINGENCY (35% of total)		LS		$69,300
TOTAL	**New Secondary Clarifier Launder and Weir Covers**			**$267,000**

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DRY CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
Aeration Blower Standby Power				
EARTHWORK				
Soil Excavation	10	CY	10.44	$104
Backfill	7	CY	13.05	$91
CONCRETE				
Slab	10	CY	400.00	$4,000
Duct Bank	1	LS	5000.00	$5,000
METALS				
Misc Metals	1	LS	5000.00	$5,000
FINISHES				
Misc Coatings	1	LS	4000.00	$4,000
EQUIPMENT				
Generator w/ Subbase Fuel Tank and Enclosure	1	EA	75000	$75,000
Automatic Transfer Switch	1	EA	25000	$25,000
INSTRUMENTATION				
SCADA		LS		$10,000
ELECTRICAL				
Wiring, conduit		LS		$15,000
RAW SUBTOTAL				**$143,000**
GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$21,500
Contaractor Overhead & Proffit (12% of total)		LS		$17,200
CONSTRUCTION SUBTOTAL				**$181,700**
TOTAL PROJECT COSTS				
Engineering (20%)				$36,340
CONTINGENCY (35% of total)		LS		$76,300
TOTAL		**Aeration Blower Standby Power**		**$294,000**

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DRY CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
BioP Piping and Valves				
YARD PIPING				
12"DIP Spools	1	LS	8000.00	$8,000
12" DIP Fittings	6	LS	1500.00	$9,000
EARTHWORK				
Soil Excavation	20	CY	10.44	$209
Backfill	20	CY	13.05	$261
CONCRETE				
Core Drill	2	EA	1500.00	$3,000
Grout	1	LS	1000.00	$1,000
METALS				
Pipe Supports	7	EA	850.00	$5,950
FINISHES				
Coal Tar Pipe Coating	1	LS	750.00	$750
EQUIPMENT				
12" Plug Valve	2	EA	2500	$5,000
RAW SUBTOTAL				**$33,000**

GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$5,000
Contaractor Overhead & Proffit (12% of total)		LS		$4,000
CONSTRUCTION SUBTOTAL				**$42,000**

TOTAL PROJECT COSTS					
Engineering (20%)				$8,400	
CONTINGENCY (35% of total)		LS		$17,600	
TOTAL		**BioP Piping and Valves**			**$68,000**

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CROW CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
New Septage Receiving Station				
YARD WORK				
Paving	1	LS	15000.00	$15,000
EARTHWORK				
Soil Excavation	25	CY	10.44	$261
Backfill	5	CY	13.05	$65
CONCRETE				
Foundation Caisons	6	CY	750.00	$4,500
Slab	40	CY	400.00	$16,000
METALS				
Misc Metals	1	LS	10000.00	$10,000
Open Sided Shelter	1	LS	7000.00	$7,000
FINISHES				
Misc Coatings	1	LS	7500.00	$7,500
EQUIPMENT				
Receiving Station Equipment	1	EA	270000	$270,000
Equipment Installation	1	EA	40500	$40,500
INSTRUMENTATION				
SCADA		LS		$15,000
ELECTRICAL				
Lighting, switches, misc		LS		$15,000
Wiring, conduit & Duct Banks		LS		$35,000
MCC, service feeder, breakers		LS		$60,000
RAW SUBTOTAL				**$496,000**

GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$74,400
Contaractor Overhead & Proffit (12% of total)		LS		$59,500
CONSTRUCTION SUBTOTAL				**$629,900**

TOTAL PROJECT COSTS					
Engineering (20%)				$125,980	
CONTINGENCY (35% of total)		LS		$264,600	
TOTAL	**New Septage Receiving Station**				**$1,020,000**

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CROW CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
Sludge Drying Bed Rehabilitation				
YARD WORK				
Demolition	1	LS	15000.00	$15,000
Bypass Pumping	1	LS	7500.00	$7,500
EARTHWORK				
Soil Excavation	1500	CY	11.00	$16,500
Backfill	150	CY	13.00	$1,950
Granular Subgrade Fill	3000	CY	20.00	$60,000
CONCRETE				
Slabs	1200	CY	400.00	$480,000
EQUIPMENT				
Underdrain System		LS		$25,000
PIPING				
Small Dia PVC		LS		$10,000
RAW SUBTOTAL				**$616,000**

GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$92,400
Contaractor Overhead & Proffit (12% of total)		LS		$73,900
CONSTRUCTION SUBTOTAL				**$782,300**

TOTAL PROJECT COSTS				
Engineering (20%)				$156,460
CONTINGENCY (35% of total)		LS		$328,600
TOTAL	**Sludge Drying Bed Rehabilitation**			**$1,267,000**

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CROW CREEK

Item Description	Quantity	Unit	Unit Cost	Total Cost
Electrically Operated CCWRF Primary Sludge Discharge Valves				
Demolition	1	LS	1500.00	$1,500
FINISHES				
Misc. Coatings		LS		$1,250
EQUIPMENT				
6" Mag Meter	2	EA	2500	$5,000
INSTRUMENTATION				
SCADA Mods		LS		$15,000
PIPING				
Misc Piping and connectionss		LS		$10,000
ELECTRICAL				
Wiring, conduit		LS		$7,500
RAW SUBTOTAL				**$40,000**
GENERAL REQUIREMENTS				
Mobilization, Bonds and Insurance (15% of total)		LS		$6,000
Contaractor Overhead & Proffit (12% of total)		LS		$4,800
CONSTRUCTION SUBTOTAL				**$50,800**
TOTAL PROJECT COSTS				
Engineering (20%)				$10,160
CONTINGENCY (35% of total)		LS		$21,300
TOTAL CCWRF Primary Sludge Discharge Valves				**$82,000**