Brigham City
Pretreatment Program
Local Limit
Development Document

Prepared by:

Bowen Collins and Associates

July 19, 2011

The following information can be found in this section:

INTRODUCTION

The Brigham City UPDES permit requires local limits to be evaluated. This is the initial development of local limits for Brigham City and is a result of the addition of the Proctor and Gamble paper processing facility and the corresponding expansion of the Wastewater treatment plant. Local limits were developed based on historic sampling for permit compliance and treatment plant design capacity information based on the expanded capacity. The limits were developed using the July 2004 EPA local limits development guidance manual along with the Region 8 April 2003 technically based local limits development strategy and guidance from the State and Central Davis Sewer District.

LEGAL AUTHORITY

United States Code of Federal Regulations 40 CFR 403.5.

Brigham City Pretreatment Standards

DEVELOPMENT BACKGROUND

This section includes information that was used to develop the local limits such as the water quality standards, biosolids method and criteria, treatment plant removal efficiencies, sampling information and also information regarding literature values and guidance that were used to develop local limits.

Water Quality Standard

The discharge point for the WWTP is Box Elder Creek above the confluence with Black Slough and the applicable water quality standards in R317-2 are 2B 3C and 4.

The water quality standards that were used in the development of the local limits were the State acute and chronic water quality standards and the wasteload allocation information found in the Brigham City POTW permit. Electronic spreadsheets were used to input the water quality data and prepare initial calculations. The calculation spreadsheets attached with this document list the water quality data.

Sludge Disposal Criteria

Biosolids from the WWTP are sold or given away and must therefore meet Class A criteria (exceptional quality biosolids limitations) as listed in the WWTP permit and included in the calculation spreadsheets. The molybdenum criteria comes from 40 CFR 503.13 Table 1, the other parameters come from 40 CFR 503.13 Table 3. These criteria values were used along with plant removal efficiency calculations to determine if biosolids were controlling for any of the limits.

Treatment Plant Removal Efficiencies and Sampling Criteria

Treatment plant removal efficiencies were calculated based on plant influent and effluent concentrations where data were adequate to make the calculations on that basis. The removals for copper and zinc are based on influent and effluent data. Removal efficiencies were then determined based on biosolids concentrations using a spreadsheet method recommended by Central Davis Sewer District (CDSD) the calculated efficiencies for nickel and silver were based on this method. The biosolids removals show several removals over 100%. These removal efficiencies were not used directly.

Data for Chromium, Cyanide, and Mercury were supplemented with literature values for similar plant removals provided by CDSD. The Chromium and Mercury values used are less than the biosolids removal calculated values. Because Cyanide data were not available, the value recommended by CDSD was used since it is lower than the literature value from Appendix K of the EPA Region 8 Technically Based Local Limits Development Strategy. The Appendix K values (median removal efficiencies for similar treatment process facilities) were used for Arsenic, Cadmium, Lead Molybdenum and Selenium removal efficiencies.

The sampling criteria that were used are the methods used by Brigham City for their Daily Monitoring Reporting and for the metals analysis they run for quarterly reporting. There was an outlying data point for Cadmium that was not included in the data set because there were not any indications in the influent data or other data points that have been taken that would indicate that the data was not an error. Brigham City is considering enhanced sampling for Mercury to develop better data for this parameter and is considering sampling for Aluminum and Phosphorous in the future.

Sampling Plan

To develop the local limits Bowen Collins and Associates used existing sampling data provided by Brigham City. The sampling dates were 8/22/2007, 12/9/2007, 2/26/2008, 5/8/2008, 9/24/2008 and 12/8/2008. The samples were taken at the WWTP. A new model is being prepared by the State for the receiving stream wasteload allocation. Brigham City anticipates that they will revise the local limit calculations to account for this new model when it is complete which is anticipated to be in July of 2011. The revised calculations will use data from 2007 through the present time. Some sampling may be made and analysis completed using more precise methods but it is not anticipated that this will be done on a regular basis since the City has not had issues that would suggest limits need to be developed for any reason other than to meet permitting requirements and there are no known industries that would require more detailed analysis at this time.

PRIORITY POLLUTANT ANALYSIS

Based on the plant history, industry and anticipated industry, and sampling information, the POTW reviewed the minimum pollutants of concern for evaluation including the following:

Arsenic	Mercury	5- Day Biochemical Oxygen Demand
Cadmium	Molybdenum	Total Suspended Solids
Chromium	Nickel	Ammonia
Copper	Selenium	pH
Cyanide	Silver	
Lead	Zinc	

Listed below are the pollutants and their maximum allowable headwork load (MAHL). Detailed information on the development can be found in the supporting documents.

POC	MAHL	
	Lbs/day	Controlling criteria
Arsenic	2.43	Biosolids
Cadmium	0.0725	Chronic wasteload

Chromium VI	2.46	Chronic wasteload
Copper	8.03	Chronic wasteload
Cyanide	1.31	Chronic wasteload
Lead	1.51	Chronic wasteload
Mercury	.011	Chronic wasteload
Molybdenum	7.5	Biosolids
Nickel	9.39	Chronic wasteload
Selenium	.369	Chronic wasteload
Silver	4.22	Acute wasteload
Zinc	30.99	Acute wasteload
5- Day Biochemical Oxygen Demand	11,310	Treatment plant
Total Suspended Solids	16,500	Treatment plant
Ammonia	2,181	Treatment plant

The MAHLs above are protective of the POTW without being overly conservative. Brigham City used standard conditions in developing the MAHL's.

LOCAL LIMITS DETERMINATION

To determine the maximum allowable influent loading, the MAHL's were adjusted with the removal efficiencies and a safety factor. The safety factors used should be adequate since the limits are only needed due to permitting requirements. Growth factors were not used since the treatment plant was recently upgraded and anticipated growth was factored into the design flowrate of the facility. The loading was also allocated based on existing domestic and commercial users, the new SIU and an allowance for future industries that represents more than any currently anticipated flows. The calculations are included in the spreadsheet in the separate local limits background information.

Metals

For metals a safety factor of 25% was used. The 25% factor was considered to be adequate because there have been no specific plant deficiencies or industrial loadings that lead to the development of the limits.

Arsenic

The arsenic MAHL is biosolids based and shows in the spreadsheet as a 30 day average limit. However, due to the sampling frequency and the nature of biosolids operations at the plant (solids are not wasted on a daily basis) the limit is used as a daily maximum limit in determining the local limit.

Non-Petroleum Oil and Grease Limitation

The Oil and Grease limit was based on Best Professional Judgement and plant capacity information.

Oil and grease refers to non-petroleum based oil and grease. The wastewater treatment plant removes at least 90% of the oil and grease entering the system. The UPDES permit for the facility allows a maximum discharge of 10 mg/l. The local limit for oil and grease is therefore set at 100 mg/l. The difference between the limit based on 90% removal and the plants actual performance exceeding 90% removal is reserved as a safety factor.

Compatible Pollutants

Compatible pollutant limit safety factors were based on one mechanical unit of the largest size being out of service. The safety factors should be adequate based on plant history and the design capacity being well beyond the currently used capacity. A growth factor was not included in the determination of the local limits because the plant was recently upgraded and growth was factored into the design flowrate of the facility.

BOD_5

The recently expanded WWTP includes 6 75 hp aerators. Based on industry standard oxygen transfer efficiency for aerators the oxygen available is between 2 and 3.9 pounds per horsepower per hour. A midpoint value of 3 lbs per hour per horsepower was used. Allowing for one aerator to be out of service for a design safety factor the plant has 5 active 75 hp aerators which deliver 27,000 lbs of oxygen per day.

Aeration capacity is required for BOD and Ammonia treatment. Using industry standard values, BOD requires 1.5 lbs O2 per lb BOD. The BOD allowable headworks load (AHL) is set at 11,310 pounds which requires (1.5*11,310 =) 16,965 lbs O2 per day. (See the ammonia limit calculation for more information.)

The BOD limit is calculated using the following conversion equation.

AHL (lbs/day) / Flow (mgd) * .12 = Limit (mg/l)

The loading is allocated to the users as indicated in the following table.

Category	Flow (mgd)	AHL (lbs/day)	Flow %	AHL %	Limit
Domestic	4.2	7691	70	68	7691 lbs/day
Proctor and Gamble	1.5	1875	25	16.6	150 mg/l
Remaining Industries	0.3	1744	5	15.4	697 mg/l
TOTAL	6.0	11,310	100	100	

The domestic allocation of 68% of the AHL exceeds the historical peak plant loading of 5154 lbs/day which included domestic and industrial flows and was recorded in June of 2008. Average loading is 2500 lbs/day.

Proctor and Gamble (P&G), is anticipated to contribute a large flow but have indicated that their BOD would typically be less than 30 mg/l. Special limits of 150 mg/l have been assigned to P&G in their permit.

Brigham City will set a 690 mg/l BOD limit.

Ammonia

The local limit for ammonia must be determined based on the plant oxygen available to treat BOD and ammonia. Ammonia removal must be considered after BOD removal.

Based on industry standard oxygen transfer efficiency for aerators the oxygen available is between 2 and 3.9 pounds per horsepower per hour. A midpoint value of 3 lbs per hour per horsepower was used. Allowing for one aerator to be out of service for a design safety factor the plant has 5 active 75 hp aerators which deliver 27,000 lbs of oxygen per day.

Using industry standard values, BOD requires 1.5 lbs O2 per lb BOD. Based on plant design parameters, BOD requires 1.5*11,310 = 16,965 lbs per day. After BOD is removed there are 10,035 lbs O2/day available to treat ammonia.

Industry standard values show that 4.6 lbs O_2 are required per lb of ammonia treated. The MAHL for ammonia is therefore 10,035/4.6 = 2181 lbs/day. No additional safety factor is needed since 1/6 of the aerator capacity was considered to be out of service in the calculation.

The local limit for ammonia based on a MAHL of 2181 lbs/day is calculated as follows: 70% of plant capacity is allocated to residential users (4.2 mgd) resulting in an allowable concentration from residential users of 30 mg/l. The typical concentration from residential users is 25 mg/l so the allocated load limit is adequate for this portion of the flow. The remaining 30% is allocated to commercial users (1.8 mgd) resulting in an allowable concentration of 72.6 mg/l. The local limit will be set at 72.6 mg/l. Brigham City may set lower surchargeable limits to manage discharges to the WWTP.

TSS

The design basis of the recent WWTP expansion indicates an average TSS capacity of 7460 lbs/day. In June 2010 due to groundwater flows and construction activities the plant recorded high TSS inflows without upset that indicate the plant has a minimum peak capacity of 22,000 lbs per day. Using this peak figure the TSS limit is calculated in the same manner as the BOD limit with 25% of the peak reserved for a safety factor.

The loading is allocated as indicated in the following table.

Category	Flow (mgd)	AHL (lbs/day)	Flow %	AHL %	Limit
Domestic	4.2	11550	70	70	11550 lbs/day
Proctor and Gamble	1.5	1375	25	8.3	110 mg/l
Remaining Industries	0.3	3575	5	21.7	1430 mg/l
TOTAL	6.0	16,500	100	100	

The domestic allocation exceeds the historical plant loading average from both domestic and industrial of 2400 lbs/day. The allocations result in a not to exceed limit of 1430 mg/l. Proctor and Gamble has been assigned special limits in their State discharge permit that reflect the

concentrations calculated above. The City may set lower surchargeable limits to manage discharges to the WWTP.

LOCAL LIMITS

Controlling criteria and standards used such as biosolids, water quality, BPJ, worker safety, process control or impact on the POTW along with which local limits were derived using literature values and/or guidance is covered in the separate local limit background information. A summary of the local limits is found in Table 2-1 of the pretreatment standards.

Temperature

Title 22 of the Brigham City code contains a current Temperature limit for discharges to the POTW of 150 degrees Fahrenheit. This limit is in place to protect the safety of workers who maintain the collection system. A local limit of 150 degrees Fahrenheit will be established to protect worker safety. There are no users that are known to be discharging high temperature wastewater so the limit is not anticipated to have an impact on the users.

pH

Because the POTW will not accept a hazardous waste the upper pH limit is set at 12.5.

LOCAL LIMITS – EFFECT ON INDUSTRY

Proctor and Gamble is the largest industrial user in terms of flow contributed to the POTW. The local limits are also not anticipated to have an impact on the operations of other industrial users. There are currently not any industrial users that the limits are anticipated to have an impact on.

LOCAL LIMITS SUMMARY TABLE

The following table is a summary of the local limits. The officially adopted local limits are found in Part 2.4 of the Pretreatment Standards.

Discharge Limitations to Brigham City POTW

Parameter	Units	Daily Maximum	30-day Avg
BOD	mg/l	690	
TSS	mg/l	1430	
Oil & Grease (total)	mg/l	100	n/a
Nitrogen (as ammonia)	mg/l	72.6	
Arsenic	mg/l	1.92	n/a
Cadmium	mg/l	.62	.058
Chromium (total or III)	mg/l	237.6	12.8
Chromium (VI)	mg/l	2.99	2.21
Copper	mg/l	8.96	5.65
Cyanide	mg/l	1.17	.317
Lead	mg/l	10.4	1.09
Mercury	mg/l	0.115	.006
Molybdenum	mg/l	6.69	n/a
Nickel	mg/l	66.7	8.38

Selenium	mg/l	1.06	.07
Silver	mg/l	3.72	n/a
Zinc	mg/l	24.4	n/a
Temperature	Degrees F	150	n/a

INFORMATION REGARDING PUBLIC NOTICING OF LOCAL LIMITS

Any permitted industrial users and the public in general will be made aware of changes in the pretreatment program and local limits which must be approved by the City Council. Any industries that are anticipated to be impacted will be sent a written notice. Other parties will be notified of the meeting agenda according to the City's current process. The City welcomes any comments on the limits at any time and will address any issues that arise or are brought to the City's attention by the public.

The City has publicly noticed and adopted the pretreatment program in December of 2010. When the revised program based on the State template is approved by the state it will be noticed again and the amended program approved by the City Council at a publicly noticed meeting. To date there have been no comments regarding the local limits or the program received from any industry or the public in response to the public notice or at the City Council meetings.