Vega Alta Wastewater Treatment Plant
Technically Based Local Limits

September 2023

Puerto Rico Aqueduct And Sewer Authority

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Abbreviations and Acronyms

%	percent
<	less than
≥	greater than or equal to
µg/L	microgram(s) per liter
ACGIH	American Conference of Government Industrial Hygienists
AHL	allowable headworks loading
BMP	best management practice
BOD_5	5-day biochemical oxygen demand
BPJ	best professional judgement
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
FOG	Fats, Oils, and Grease
lb/d	pound(s) per day
LEL	lower explosive limit
MAHL	Maximum Allowable Headworks Loading
MAIL	Maximum Allowable Industrial Loading
MBAS	methylene blue active substances
MDL	method detection limit
mg/L	milligram(s) per liter
mgd	million gallon(s) per day
ML	method limit
NO_2	nitrite
NO_3	nitrate
NPDES	National Pollutant Discharge Elimination System
POC	pollutant of concern
POTW	publicly owned treatment works
PRASA	Puerto Rico Aqueduct and Sewer Authority
PRWQSR	Puerto Rico Water Quality Standards Regulation
Pt-Co	platinum-cobalt (scale)
QA/QC	quality assurance and quality control
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
SIU	significant industrial user
TBLL	technically based local limit
TKN	total Kjeldahl nitrogen
TN	total nitrogen
TSS	total suspended solids
WWTP	wastewater treatment plant

Executive Summary

The U.S. Environmental Protection Agency (EPA) regulates compliance with the Clean Water Act (CWA), including section 307(b) pretreatment standards. As part of this function, EPA issues National Pollutant Discharge Elimination System (NPDES) permits to publicly owned treatment works (POTW). These permits contain provisions that require compliance with Title 40 of the Code of Federal Regulations Parts 403 through 471 (40 CFR 403–471) to ensure compliance with pretreatment standards by significant sources introducing pollutants subject to such standards to the POTW (CWA 402(b)(8), 33 U.S.C. § 1342(b)(8) *et seq.*). Requirements to develop technically based local limits (TBLLs) are specified in 40 CFR 403.5 (c).

This TBLL evaluation was prepared for Puerto Rico Aqueduct and Sewer Authority (PRASA) to meet NPDES requirements for the Vega Alta Wastewater Treatment Plant (WWTP). These limits have been developed according to EPA's Technical Support Document *Local Limits Development Guidance* (EPA 2004) and NPDES Permit No. PR0020923-Part IV (A)(1)(b).

In response to these standards, conditions, and requirements, the local limits in Table ES-1 have been developed for the Vega Alta WWTP.

Table ES-1. Local Limits Summary

Parameter	Local Limit	Page
Arsenic	0.35 mg/L	Refer to Note a
Cadmium	0.11 mg/L	Refer to Note a
Chromium	5.0 mg/L[b]	Refer to Note a
Copper	2.65 mg/L	Refer to Note a
Cyanide (Free)	0.22 mg/L	Refer to Note a
Silver	2.54 mg/L	Refer to Note a
Lead	0.06 mg/L	Refer to Note a
Mercury	0.0014 mg/L	Refer to Note a
Nickel	2.91 mg/L	Refer to Note a
Molybdenum	0.34 mg/L	Refer to Note a
Selenium	0.51 mg/L	Refer to Note a
Zinc	5.68 mg/L	Refer to Note a
Flow	SIU specific	6-1
BOD_5	250 mg/L[d]	6-1
TSS	250 mg/L[d]	6-1
Total Nitrogen (TKN+NO_3+NO_2)	40 mg/L	6-2
Phenols[c] (phenolic substances)	1.0 mg/L	6-2
pH	6.5–10.0 SU	6-2
Fats, Oils, and Grease (FOG)	50 mg/L total FOG	6-3

Table ES-1. Local Limits Summary

Parameter	Local Limit	Page
Temperature	40°C (104°F) at POTW; 60°C (140°F) at SIU discharge point	6-3
Flammability	Specified as no material with a closed cup flashpoint <60°C (140 °F) and No two consecutive readings at ≥5% LEL, and no reading of ≥10% LEL allowed	6-3
Total Toxic Organics	No Limit	6-4

[a] Local Limits Calc Page 2 on line 69 of "TBLL Calc-Vega Alta.xlsm" (Appendix C).

[b] The calculated limit is 14.9 mg/L. The Resource Conservation and Recovery Act (RCRA) sets a statutory limit of 5.0 mg/L for total chromium. Under RCRA, chromium concentrations above 5.0 mg/L are classified as a hazardous. While chromium in wastewater is not covered by RCRA because of the Domestic Sewer Exclusion, PRASA elects to not allow the discharge of waste at concentrations that would otherwise be classified as "hazardous;" therefore, a limit of 5.0 mg/L is adopted.

[c] Total phenols minus unsubstituted phenol.

[d] Concentrations are set as standards for surcharges and not local limits. PRASA reserves the right to base increased surcharges on concentrations above normal domestic waste strength which is set at 250 mg/L BOD_5 and 250 mg/L TSS. Surcharges up to 250 mg/L may be subject to the most current calculated cost of treatment per pound of BOD and TSS. High-strength waste above 250 mg/L may be subject to increased rates in accordance with accelerated need to improve or provide additional infrastructure to meet regulatory requirements for discharge. % = percent
≥ = greater than or equal to
BOD_5 = 5-day biochemical oxygen demand
mg/L = milligram(s) per liter
LEL = lower explosive limit
TKN = total Kjeldahl nitrogen
TSS = total suspended solids
NO_3 = nitrate
NO_2 = nitrite
SIU = significant industrial user

1. Introduction

The Vega Alta Wastewater Treatment Plant (WWTP) is located at PR Road 693, Km 5.6, Vega Alta, Puerto Rico. The plant operates under National Pollutant Discharge Elimination System (NPDES) permit number PR0020923.

This document uses recent test data to develop technically based local limits (TBLLs) that are specific to current conditions in the Vega Alta WWTP collection system. These TBLLs were established in response to NPDES permit No. PR0020923, Part IV (A)(1)(b).

The following appendices are provided:

- Appendix A Priority Pollutants Detected at or Above MDL
- Appendix B Guidance on the Selection of Pollutants of Concern
- Appendix C Data Sheets Used in “TBLL Calc-Vega Alta.xlsm”
- Appendix D 207 Matched Pairs Using Ultra Low Level Testing
- Appendix E Puerto Rico Water Quality Standards Worksheet
- Appendix F Phenolic Compounds Regulated by Puerto Rico Water Quality Standards
- Appendix G Long-hand Calculation of Lead Local Limits
- Appendix H Definitions

2. Local Limits Development Methodology

2.1 Guidance Documents

The following guidance was used to develop the TBLLs presented in this document:

- *Local Limits Development Guidance* (EPA 2004)
- *Guidance Manual on the Development and Implementation of Local Discharge Limitations under the Pretreatment Program*, EPA 833-B-87-202 (EPA 1987)

This document provides the rationale and legal support for local limits developed in relation to technically based environmental criteria using United States Environmental Protection Agency (EPA)-approved methodology. The methodology is intended to ensure full compliance at the treatment facility for all identified criteria. The following steps were taken to develop the Vega Alta WWTP TBLLs:

1. Characterize the Vega Alta WWTP treatment system in terms of regulatory requirements, plant capacity, treatment trains, unit processes, industrial users, and receiving stream characteristics.

2. Using the site characterization from step 1, select regulatory/operational criteria that apply to the specific treatment systems.

3. Select parameters that should be considered for local limit development, referred to as pollutants of concern (POCs).[1] Selection is based on review of historic data and includes a list of EPA-required pollutants. Pollutants selected may be individual elements or compounds, such as metals or halogenated organic compounds, and are discussed in Sections 4 through 6. Additionally, local limits may be aimed at controlling groups of substances that collectively exhibit negative characteristics, such as flammability or toxicity. This second category is discussed in Section 6, Other Limits and Concerns.

4. Upon selection of the POCs, collect and evaluate historic test data or generate new data from sampling and analysis to develop the rationale for the ability of the plant to treat these pollutants while remaining compliant with applicable criteria.

5. Compile test data and model the pollutant fate within the system using partitioning coefficients within the plant and physical properties, such as Henry's constants, in the collection system.

6. Conduct standard EPA-accepted calculations for individual elements and compounds discussed in Sections 4 through 6 to determine the maximum pollutant loading that can be allowed at the headworks (allowable headworks loading [AHL]) while remaining compliant with applicable criteria.

7. After applying all calculations for all criteria, use the smallest mass that ensures that environmental and regulatory criteria will be met. This is referred to as the maximum allowable headworks loading (MAHL).

8. Subtract the domestic loading and a safety and growth factor from the MAHL; the remaining allowable pollutant loading is the maximum allowable industrial loading (MAIL) available to industry.

[1] The *Local Limits Development Guidance Manual* (EPA, 2004) define and use the technical term "Pollutants of Concern (POC)" throughout the document. Consequently, to avoid confusion during the regulatory review process of the TBLL, the term "Pollutants", "Pollutants of Concern", and POC are used throughout this document when referring to parameters considered for local limits development.

9. Once the MAIL has been calculated, allocate the mass to the industries based on one of the prescribed methods found in the *Local Limits Development Guidance* (EPA 2004). These allocations form the basis of the local limits for these pollutants.

10. Develop criteria based on limitations that restrict the magnitude of the negative characteristics exhibited by each type of group for collective groups of pollutants in Section 6.

3. System Characterization, Industrial Users, Receiving Stream, and Applicable Criteria

3.1 Treatment System

The Vega Alta WWTP is permitted to discharge a maximum daily flow limit of 2.0 million gallons per day (mgd). Currently, the average monthly flow is approximately 1.16 mgd. Table 3-1 lists the estimated as-built design capabilities as established in the last plant upgrade.

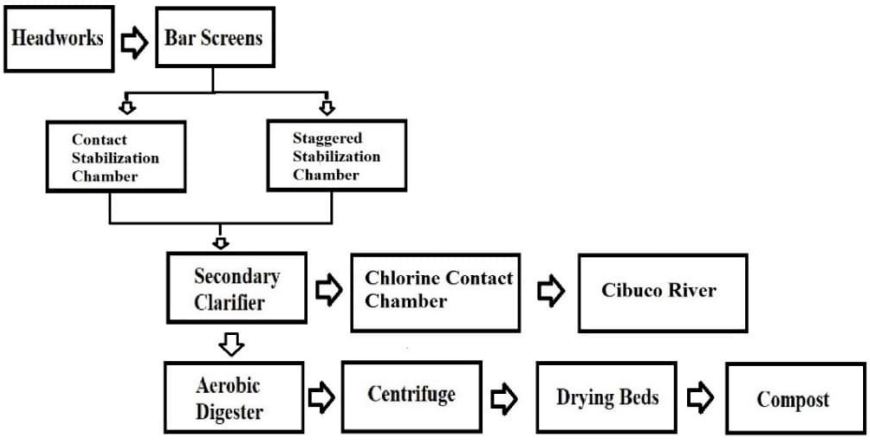
Table 3-1. Vega Alta WWTP Estimated Capacities

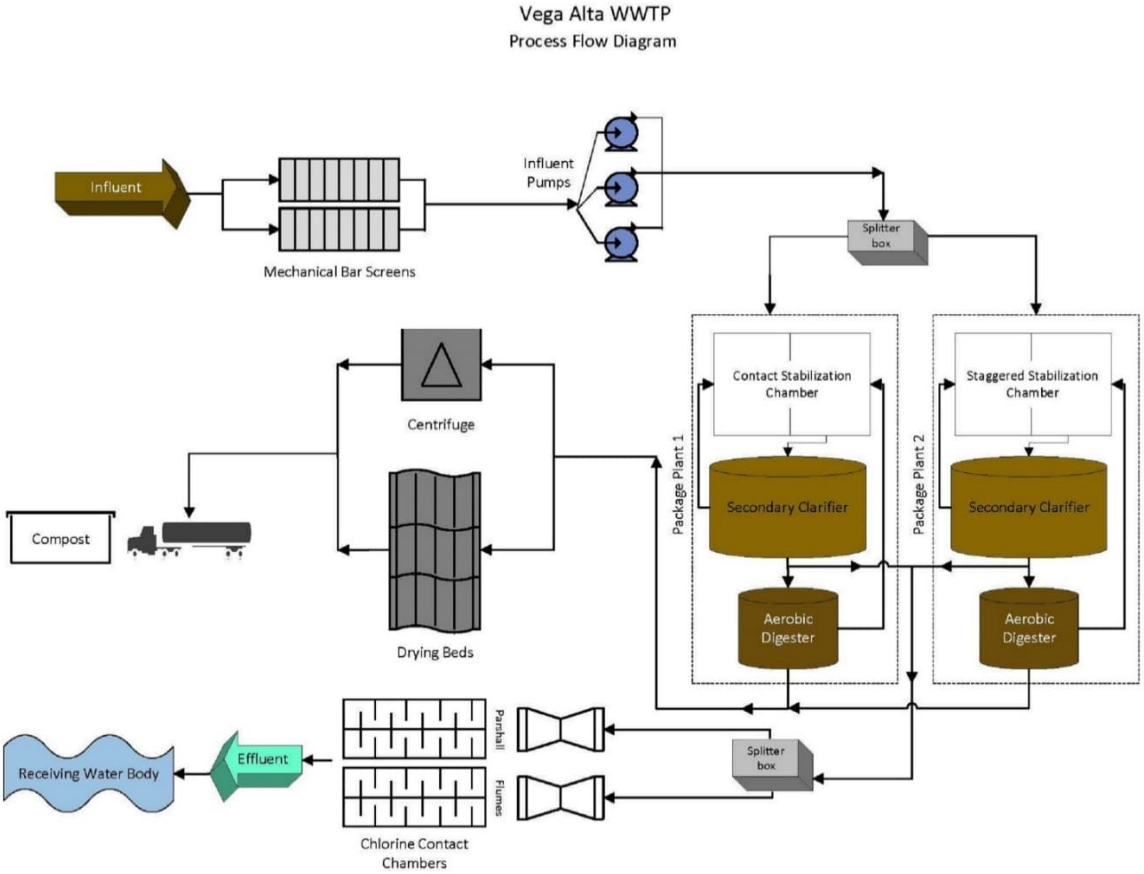
Item	Daily	Annual Average
Flow (mgd)	2.0	1.16
BOD_5 (lb/d)	4,170	3,230
TSS (lb/d)	4,170	1,740

lb/d = pound(s) per day
BOD_5 = 5-day biochemical oxygen demand
TSS = total suspended solids

The treatment process consists of mechanical bar screening, activated sludge contact stabilization, secondary clarification, then chlorination prior to discharge.

The sludge-handling facilities consist of aerobic digestion followed by a centrifuge and drying beds. The sludge cake is either transported by truck and disposed of as compost or sent to a landfill. Figure 3-1 shows the treatment train and a schematic of the plant's unit processes (including an aerial view of the facility). The block diagram included in Figure 3-1 shows one partitioning coefficient (removal factor) after total overall plant removal occurs in the system.





Vega Alta Wastewater Treatment Plant

Figure 3-1. Vega Alta WWTP, Treatment Unit Processes, and Site Aerial

3.2 Industrial Users

The Puerto Rico Aqueduct and Sewer Authority (PRASA) has issued a permit to one significant industrial user (SIU) that contributes flow to the Vega Alta WWTP. Table 3-2 provides identification data for this SIU, along with the permitted flow limit. Additional test data for this user are available from PRASA's Industrial Pretreatment Program.

Table 3-2. Significant Industrial User and Respective Permitted Flow

SIU	Permit Number	Process Description (SIC/NAICS)	Federal Category	Category Description	Authorized Flow (gpd)
Pan American Properties	GDA-19-708-003	311411 – Frozen fruits, fruit juices and vegetables manufacturing 312140 – Mixed drinks, alcoholic manufacturing 311421 – Canning fruits and vegetables	N/A	N/A	40,000
				Total Authorized Flow	40,000

gpd = gallon(s) per day
SIC = Standard Industrial Code
NAICS = North American Industrial Classification System

Pan American Properties is an SIU as defined in PRASA Rules and Regulations for the Supply of Water and Sewer Services, Section 1.04 (June 2003).

3.3 Receiving Stream

The Vega Alta WWTP effluent discharges to the Cibuco River. The Cibuco River is listed in the NPDES permit as a Class SD water. The NPDES permit has not authorized a mixing zone dilution allowance for this discharge, therefore, the dilution ratio is set at 1:1.

3.4 Applicable Criteria

Using the site characterization, industrial base, and regulatory/operational considerations applicable to this treatment system, the Vega Alta WWTP is subject to the following criteria:

- Water quality standards
- NPDES permit limits
- Biosolids regulations for disposal
- Worker health and safety (toxicity, flammability, and explosivity)
- Plant capacity
- Other applicable best professional judgment (BPJ)

These criteria were used to select the POCs and are further discussed in Section 4.

4. POC Selection, Sampling, and Analysis

4.1 POC Selection

Toxic pollutants selected for these derivations consist of the EPA national pollutant list of eleven metals plus cyanide. Chromium has been examined as total chromium. Additionally, EPA lists BOD_5, TSS, and ammonia as pollutants that should be discussed. Ammonia is discussed as total nitrogen (TN = TKN + NO_3 + NO_2) because TN is listed as an NPDES limit. Flow; pH; flammability; temperature; and fats, oils, phenols and grease (FOG) are discussed in relation to protecting the treatment works, the collection system, and workers. A criterion exists for phenolic compounds in the Puerto Rico General Limits; consequently, phenolic compound as a group are considered as a POC. The previous industrial limits used in Vega Alta also included ammonia, color, sulfide, and phosphorus. These potential POCs were added after the latest renewal of the NPDES permit included these parameters. Monitoring of these POCs was added to the industrial permit to gain a database of information to determine if local limits should be adopted to ensure compliance with the NPDES permit limits. This monitoring indicates that local limit for these pollutants are not needed. For manganese, the Islandwide General Limits included a limit. However, the general limit for manganese was dropped after the Puerto Rico water quality standard for manganese was discontinued. Consequently, a manganese local limit is no longer included.

Historical test data from May 19, 2020, to August 8, 2022, were reviewed for the Vega Alta WWTP effluent and sludge samples. This review did not identify POCs other than those discussed previously. Because the database contained limited testing for organic pollutants, priority pollutant scans were added to the site-specific testing to determine whether toxic organic pollutants were present in the system. Table 4-1 provides the full list of parameters selected for evaluation.

Table 4-1. Pollutants Selected for Local Limits Evaluation

Arsenic	Flammability	Selenium
BOD_5	Flow	Silver
Cadmium	FOG	Temperature
Chromium (Total)	Lead	Total Nitrogen (TKN+NO_3+NO_2)
Copper	Mercury	TSS
Cyanide (Free)	Molybdenum	Zinc
Phenols	Nickel	
	pH	

TKN = total Kjeldahl nitrogen
NO_3 = nitrate
NO_2 = nitrite

4.2 Sampling and Analysis

The historical database does not include concurrent sampling of influent and effluent locations. Concurrent sampling is necessary to develop partitioning coefficients (removal factors) for conservative pollutants (metals). Sampling must be conducted concurrently at specific sites in the treatment system (including in the collection system prior to the plant) to understand and determine how the pollutants will either be removed via sludge disposal or discharged into the receiving waters. This ratio of removal is known as *removal rate*, *removal coefficient*, or *partitioning coefficient*.

Concurrent influent and effluent sampling in the Vega Alta WWTP treatment system was conducted from January 15 to January 22, 2023. Tables 4-2 and 4-3 list the testing schedules. According to EPA's *Local Limit Development Guidance* document (EPA 2004), composite sampling was conducted for seven consecutive days for all tests except cyanide, which (as a non-conservative parameter) was taken as a series of grab samples. Table 4-4 lists pollutants included in the testing regimen. Laboratory analytical methods with the appropriate sensitivity and quality assurance and quality control (QA/QC)[2] were used. The laboratory analytical results exceeded data reporting requirements. Where the best testing methods available were insufficient to generate removal factors, the *Local Limits Development Guidance* document (EPA 2004), which provides default values (book values), was used as an alternative. Instances where book values were used are noted and discussed.

Table 4-2. Sample Schedule

Location	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Influent	1	1	1	1	1	1	1	
Final Effluent		1	1	1	1	1	1	1
Sludge			1		1			
Domestic		1				1		
Total	1	3	3	2	2	3	2	1

Table 4-3. Parameters Selected for Laboratory Analysis of Each Sample

Pollutant	Influent	Effluent	Sludge	Domestic
Arsenic	X	X	X	X
Cadmium	X	X	X	X
Chromium Total	X	X	X	X
Copper	X	X	X	X
Cyanide (Free)	X	X		X
Lead	X	X	X	X
Nickel	X	X	X	X
Mercury	X	X	X	X
Selenium	X	X	X	X
Silver	X	X	X	X
Zinc	X	X	X	X
Total Nitrogen (TKN + NO_3 + NO_2)	X	X		
% Solids			X	
Priority Pollutants	X	X		

[2] Original laboratory reports (more than 4,000 pages) have not been included herein but are available upon request.

% = percent
NH_3 = ammonia

Cyanide testing was not conducted in the sludge samples because of the non-conservative nature of cyanide and the lack of a disposal criterion.[3]

Appendix A provides influent and effluent priority pollutant test data that show results at or above the method detection limits (MDLs). Using guidance found in the *Guidance Manual on the Development and Implementation of Local Discharge Limitations under the Pretreatment Program* (EPA 1987) (summarized in Appendix B), no organic pollutant qualified as a POC.

Table 4-4 lists the laboratories that conducted the testing.

Table 4-4. Laboratories Used for Testing

Parameter	Laboratory
Cyanide	Specialty Analytical
Metals, Dioxin, Organic Pesticides, PAHs, PCBs, Priority Pollutants 624/625, Nitrogen	ALS Environmental

Notes:
PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls

[3] Cyanide does not collect in the sludge. Instead, cyanide reduction occurs in the wastewater treatment process because some micro-biota use it as a food source. When cyanide predominates over time, these organisms proliferate and the plant acclimatizes to the presence of cyanide, allowing for treatment of this toxic material. For this reason, 40 CFR 503 does not list a cyanide limit in its disposal criteria.

5. Data Compilation and Analysis

5.1 Data Compilation

Test data generated from each laboratory were reviewed and verified using data qualifiers and laboratory data QA/QC documentation. All data greater than the method limit (ML) (equivalent to the lowest standard used to calibrate the analytical method) were used to develop estimated removal efficiencies. If any data point for either the influent or the effluent was less than the ML, per EPA's guidance, one-half the ML was used. The lab reports a reporting limit (RL) for each parameter. Jacobs confirmed that the reported RLs followed the methodology to produce valid MLs using standards at the levels specified. Domestic samples are typically taken from low-flow areas, which are not representative of the flow entering the plant. As an alternative, the test data from the influent are used to represent domestic contributions. In this method, referred to as "domestic approximation," the data used for domestic consist of all dischargers, including domestic, commercial, and industrial. Use of these data is a conservative assumption. These data, along with data on other pollutants, were entered into a spreadsheet titled "TBLL Calc-Vega Alta.xlsm" that automates the calculation of limits as described herein. Appendix C provides all pages used from the "TBLL Calc-Vega Alta.xlsm".

5.2 Removal Efficiency

The Vega Alta WWTP requires calculating one removal factor; that is, one for the overall plant removal. Removal factors for each pollutant are automatically calculated in the "TBLL Calc-Vega Alta.xlsm" file. Each day's data points for influent, final effluent, and (for days available) sludge are entered as separate sample set "pairs" in the "TBLL Calc-Vega Alta.xlsm" on the Sample Data Page. Some data entered in the portion of the "TBLL Calc-Vega Alta.xlsm" section that calculates removal efficiencies are near the MDL, which reduces the accuracy of the calculated value. The reasonableness of each removal factor must be considered; therefore, the resulting values were compared to the *Local Limit Development Guidance* (EPA 2004) values shown in Table 5-1 as a cross-check. The removal factor for mercury is taken from data collected over 207 matched data sets conducted by Jacobs because of the variability shown in the site specific data and is shown in Appendix D.

Table 5-1. Pollutant Percent Removal Efficiencies (%) Through Activated Sludge Treatment

Pollutant	Second Decile[a]	Median[a]	Eighth Decile[a]	Generated by "TBLL Calc-Vega Alta.xlsm"	Adopted Removal Factor
Arsenic	NP	NP	NP	30	30
Cadmium	33	68	93	73	73
Chromium, Total	34	55	71	78	78
Copper	32	61	89	91	91
Cyanide	33	59	79	35	59
Lead	25	55	70	81	81
Mercury	33	50	62	84	92[b]
Molybdenum	NP	NP	NP	64	64
Nickel	11	29	57	70	70

Table 5-1. Pollutant Percent Removal Efficiencies (%) Through Activated Sludge Treatment

Pollutant	Second Decile[a]	Median[a]	Eighth Decile[a]	Generated by "TBLL Calc-Vega Alta.xlsm"	Adopted Removal Factor
Selenium	NP	NP	NP	75	75
Silver	38	66	86	91	91
Zinc	34	67	81	51	51

[a] Book value from *Local Limits Development Guidance* (EPA 2004).

[b] Taken from Appendix D, which shows removals across TBLL previously performed by Jacobs (207 data pairs).

NP = Book value not published or available

The QA/QC documentation is reviewed in calculating removal factors. The data pairs are then input into the "TBLL Calc-Vega Alta.xlsm" file, which calculates a removal factor for each data pair. When a data pair contains at least one non-detect, or when the effluent is greater than the influent, the spreadsheet indicates that a removal factor cannot be calculated. The data pairs for which a removal factor can be calculated are then averaged for the final removal factor used in later calculations. The average values of the individual data pair removal factors are shown in line 5 of the Sample Data Page 1 of Appendix C.

5.3 Calculation of Allowable Headworks Loadings

Using the adopted removal factors, the standard methodology from EPA's *Local Limits Development Guidance* (EPA 2004) is used to calculate the highest quantity of each pollutant that can be received at the headworks to the treatment plant and still comply with the applicable criteria. Each criterion is explained in the following sections in relation to water quality and sludge quality requirements.

5.3.1 Water Quality Criteria

To protect receiving stream water quality, Rule 1301.1 (J) (1) of the Puerto Rico Water Quality Standards Regulation (PRWQSR) sets metals limits derived from natural log functions that vary with water hardness. The formulas are similar to the translators described in Appendix J of EPA's Second Edition of the *Water Quality Standards Handbook* (EPA 1994). The values required to achieve compliance with PRWQSR criteria were calculated as shown in Appendix E. Because a hardness value was not available for Vega Alta, the hardness value used in Appendix E is 160 mg/L, which was measured in the City of Vega Baja near the Vega Alta plant. The values were then placed on line 16 of the Local Limits Calc Page 1 of Appendix C (note that for metals with NPDES limits more stringent than shown in Appendix E, the NPDES permit limit has been placed in line 16, as discussed in the next section). Line 16 typically is used to enter federal human health criteria; however, a comparison showed that in a few cases, the PRWQSR and/or, NPDES limits were more stringent.

In addition to the PRWQSR, the federal water quality limits are automatically calculated in the file "TBLL Calc-Vega Alta.xlsm" on the publicly owned treatment works (POTW) Limits page (which also uses hardness in a natural log function). Federal values are then automatically transferred in the spreadsheet to the acute and chronic criteria, which appear in lines 14 and 15 of the Local Limits Calc Page 1 in Appendix C. Once Water Quality Criteria are calculated, the AHLs based on water quality are calculated as follows:

$$L_{wq} = \underline{(8.34)(C_{wq})(Q_{potw})}$$

$$(1-R_{potw})$$

where:

L_{wq} = Maximum allowable headworks loading (lb/d) based on water quality criteria.

C_{wq} = Chronic or Acute Criteria

Q_{potw} = POTW average flow (mgd)

R_{potw} = POTW removal efficiency (as a decimal)

5.3.2 NPDES Criteria

NPDES permit limits for metals are typically developed based on water quality criteria and follow the same equation provided in the water quality section, except that the C_{wq} is replaced by the NPDES permit limit and a dilution factor is not allowed. Table 5-2 lists the pollutants with NPDES limits for the Vega Alta WWTP.

Table 5-2. Vega Alta WWTP NPDES Limits

Pollutant	Limit (µg/L)
Copper	10.96
Cyanide (Free)	4
Mercury	0.050

µg/L = microgram(s) per Liter

The NPDES permit limit for cyanide in Table 5-2 was less stringent than the calculated WQC criterion. The cyanide limit in Table 5-3, therefore, was manually entered in replacement of the PRWQSR criterion on line 16 Local Limits Calc Page 1 of the “TBLL Calc-Vega Alta.xlsm” file (Appendix C).

Once the NPDES limits are entered, the AHLs are calculated as follows:

$$L_{wq} = \frac{(8.34)(C_{npdes})(Q_{potw})}{(1-R_{potw})}$$

where:

L_{wq} = Maximum allowable headworks loading (lb/d) based on NPDES limit

C_{npdes} = NPDES limit

Q_{potw} = POTW average flow (mgd)

R_{potw} = POTW removal efficiency (as a decimal)

5.3.3 Sludge Quality

Treatment plants are required to prohibit nondomestic discharges in amounts that violate applicable sludge disposal or use regulations or restrict the plant from using its chosen sludge disposal option.

Currently, the sludge from the Vega Alta WWTP is sent to landfill or is sent for composting and beneficial reuse, which means the appropriate approach focuses on total metals in the sludge. This approach compares sludge quality to Table 3 of Title 40 of the Code of Federal Regulations Part 503.13 (40 CFR 503.13), which specifies pollutant concentrations as total metals. The following equation is used to calculate AHLs based on Table 3 criteria. Table 3 is replicated in line 19 of the Local Limits Calc Page 1 in Appendix C and is used to calculate local limits based on Sludge Disposal.

$$L_{in} = \frac{(8.34)(C_{slcrit})(PS/100)(Q_{sldg})}{R_{potw}}$$

where:

L_{in} = Maximum allowable headworks loading based on sludge criteria (lb/d)

PS = Percent solids in the sludge to disposal (%)

Q_{sldg} = Sludge flow to disposal (mgd)

C_{slcrit} = Limiting sludge criteria (milligrams per kilogram)

R_{potw} = POTW removal efficiency (as a decimal)

The data associated with sludge testing are one of the most reliable sources when considering local limits for conservative pollutants, such as metals. Sludge accumulation and treatment concentrates incoming pollutants and averages the pollutants received by the plant over time. Consequently, these data often provide the best estimate of the long-term average pollutant levels in the collection system. The results for the Vega Alta WWTP sludge sampled during the period of local limits testing is a small fraction of the Biosolids Class A (Table 3) limits, which is another indicator that these pollutants are present in low levels throughout the entire waste collection system.

5.3.4 Impact on Wastewater Treatment Plant

Treatment plants must protect against nondomestic discharges that inhibit the treatment processes or operations. Local limits are based on known or estimated inhibitory concentrations of toxic pollutants that may be received in the treatment process. These inhibitory concentration levels are taken from reference data available in the *Local Limits Development Guidance* (EPA 2004). For the Vega Alta WWTP, calculation of inhibitory AHLs must be conducted for secondary treatment inhibition (activated sludge). Activated waste inhibition levels are found on line 17 of the Local Limits Calc Page 1 in Appendix C and are used to calculate local limits on line 69 of the Local Limits Calc Page 2. The following equation is used to calculate inhibitory AHLs.

Secondary Treatment Inhibition:

$$L_{inhib2} = \frac{(8.34)(C_{crit})(Q_{potw})}{(1-R_{prim})}$$

where:

L_{inhib2} = Maximum allowable headworks loading (lbs/d) based on inhibition of secondary process

C_{crit} = Inhibition level (mg/L)

R_{prim} = Primary removal efficiency (decimal); because primary removal is not available, the denominator in the equation is 1

Q_{potw} = POTW average flow

5.4 Limit Selection

The "TBLL Calc-Vega Alta.xlsm" spreadsheet automates the calculation of limits so that a limit is generated for each criterion. Table 5-3 displays the MAHL[4] selection process, followed by calculation of the MAIL as mass loadings. This format facilitates verification that the smallest AHL has been selected.

Table 5-3 presents the AHLs calculated in pounds for each limiting criterion considered. The smallest of the AHLs is referred to as the MAHL because it is the highest loading that may be seen at the headworks for which all criteria will be met.

Table 5-3 also presents the current domestic loading. This domestic loading is subtracted from the MAHL along with a safety factor (10% of the MAHL) to calculate the MAIL. The mass remaining is used, along with known industrial discharges, to calculate the maximum concentrations that can be discharged.

Table 5-3. Selection Table Using AHL, MAHL, and MAIL

Pollutant	AHL Federal Water Quality Criteria Acute [WQC-A] (lb/d)	AHL PRWQSR Water Quality Criteria Chronic [WQC-C] (lb/d)	AHL NPDES Water Quality Limits [NPDES] (lb/d)	Activated Sludge Inhibition (lb/d)	AHL Sludge Based on Table 3 40 CFR 50 [SD] (lb/d)	Domestic Loading (lb/d)	MAIL[a] (lb/d)	Basis
Arsenic	4.95	2.61	0.14	0.97	0.23	0.01	0.13	NPDES
Cadmium	0.24	0.07	0.04	9.67	0.10	0.001	0.04	NPDES
Chromium	111	13.3	5.52	96.7	N/A	0.16	5.51	NPDES
Copper	3.12	2.00	1.24	9.67	2.54	0.23	1.01	NPDES

[4] The MAHL is shown in line 63 of the Local Limits Calc Page 2 Appendix C, but the spreadsheet calculates a concentration limit for each AHL and selects the smallest value.

Table 5-3. Selection Table Using AHL, MAHL, and MAIL

Pollutant	AHL Federal Water Quality Criteria Acute [WQC-A] (lb/d)	AHL PRWQSR Water Quality Criteria Chronic [WQC-C] (lb/d)	AHL NPDES Water Quality Limits [NPDES] (lb/d)	Activated Sludge Inhibition (lb/d)	AHL Sludge Based on Table 3 40 CFR 50 [SD] (lb/d)	Domestic Loading (lb/d)	MAIL[a] (lb/d)	Basis
Cyanide	0.52	0.12	0.09	0.97	N/A	0.01	0.08	NPDES
Lead	7.73	0.30	0.03	9.67	0.67	0.01	0.02	NPDES
Mercury	0.30	0.001	0.006	0.97	0.03	0.0008	0.0006	PRWQSR
Molybdenum	N/A	N/A	N/A	N/A	0.14	0.01	0.13	SD
Nickel	69.2	7.69	N/A	9.67	1.10	0.02	1.08	PRWQSR
Selenium	0.77	0.19	N/A	N/A	0.24	0.005	0.19	PRWQSR
Silver	0.95	N/A	N/A	2.42	N/A	0.002	0.94	WQC-A
Zinc	3.41	3.09	N/A	2.90	8.69	0.72	2.19	Inhib

[a] The MAIL in this column has had 10% of the MAHL subtracted.

Inhib = Inhibition of plant biological process

N/A = not applicable

SD = sludge disposal

WQC-A = Federal Acute Water Quality Standard

WQC-C = Federal Chronic Water Quality Standard

5.5 Allocation to Permitted Industrial User

Local limits developed for this document are based on the allocation of the full available pollutant loading applied to the permitted industrial user. Derivation of the limits is driven by inputs for industrial flow on line 13 of the Basic Data Page 1 of Appendix C and the MAIL on line 64 on the Local Limits Page 2 of Appendix C. Table 5-4 presents the selected limits found in line 69 of the Local Limits Calc Page 2 in Appendix C. The resulting limits in Table 6-1 are compared to the generally applicable local limits found in Section 2.05 of the Puerto Rico Rules and Regulations for the Supply of Water and Sewer Service.

Table 5-4. Comparison of Previous Local Limits with New Limits

Parameter	Puerto Rico General Limits[a]	Current Calculated Technically Based Limit and Proposed Limit
Arsenic	No Limit	0.35 mg/L
Cadmium	0.1 mg/L	0.11 mg/L
Chromium (Total[b])	1.0 mg/L	5.0 mg/L
Copper	1.0 mg/L	2.65 mg/L
Cyanide	0.1 mg/L	0.22 mg/L
Lead	0.2 mg/L	0.06 mg/L

Table 5-4. Comparison of Previous Local Limits with New Limits

Parameter	Puerto Rico General Limits[a]	Current Calculated Technically Based Limit and Proposed Limit
Manganese	4.0 mg/L	No Limit
Mercury	0.05 mg/L	0.0014 mg/L
Molybdenum	No Limit	0.34 mg/L
Nickel	0.5 mg/L	2.91 mg/L
Selenium	0.2 mg/L	0.51 mg/L
Silver	0.05 mg/L	2.54 mg/L
Zinc	0.5 mg/L	5.68 mg/L
Flow	No Limit	SIU Specific
BOD_5	No Limit	250 mg/L[c]
TSS	No Limit	250 mg/L[c]
Ammonia	Monitor Only	Monitoring No Longer Required
Color	Monitor Only	Monitoring No Longer Required
pH	5.0–10.0 SU	6.5–10.0 SU
Phosphorus	Monitor Only	Monitoring No Longer Required
Sulfide	Monitor Only	Monitoring No Longer Required
TN	No Limit	40 mg/L
Phenols[d] (phenolic substances)		1.0 mg/L
FOG	50 mg/L Total FOG	50 mg/L Total FOG
Temperature	60°C (140°F)	40°C (104°F) at the POTW 60°C (140°F) at SIU discharge point
Flammability	No Limit	Specified as no material with a closed cup flashpoint < 60°C (140°F) And No two consecutive readings at ≥ 5% LEL, and no reading of ≥10% LEL allowed
Total Toxic Organics	No Limit	--

[a] PRASA Rules and Regulations for the Supply of Water and Sewer Services, Section 2.05 (June 2003)

[b] The calculated limit is 14.9 mg/L. The Resource Conservation and Recovery Act (RCRA) sets a limit of 5.0 mg/L for chromium, which is not technically based but statutorily is classified as hazardous waste. While wastewater is not covered by RCRA because of the Domestic Sewer Exclusion, PRASA elects to not allow the discharge of waste that would otherwise be classified as hazardous; therefore, a limit of 5.0 mg/L is adopted.

[c] Concentrations are set as standards for surcharges and not local limits. PRASA reserves the right to base increased surcharges on concentrations above normal domestic waste strength, which is set at 250 mg/L BOD5 and 250 mg/L TSS. Surcharges up to 250 mg/L may be subject to the most current calculated cost of treatment per pound of BOD and TSS. High strength waste above 250 mg/L may be subject to increased rates in accordance with accelerated need to improve or provide additional infrastructure to meet regulatory requirements for discharge.

[d] Total phenols minus unsubstituted phenol

≥ = greater than or equal to
< = less than

°C = degree(s) Celsius

°F = degree(s) Fahrenheit

Table 5-4. Comparison of Previous Local Limits with New Limits

Parameter	Puerto Rico General Limits[a]	Current Calculated Technically Based Limit and Proposed Limit

LEL = lower explosive limit

SU = standard unit(s)

6. Other Limits and Concerns

In keeping with EPA recommendations, the need for local limits for flow, BOD_5, TSS, pH, and FOG was also evaluated. Worker health and safety limits for temperature, flammability, and toxicity were also considered. Table 6-1 summarizes resultant local limits for this second group of parameters. A discussion of all evaluated pollutants and groups of compounds follows.

Table 6-1. Local Limits for Other Parameters

Pollutant	Minimum Limit	Maximum Limit
Temperature	N/A	40°C (104°F) at the POTW 60°C (140°F) at SIU discharge point
Flammability	N/A	Specified as no material with a closed cup flashpoint < 60°C (140 °F) and No two consecutive readings at ≥ 5% LEL, and no reading of ≥ 10% LEL allowed
pH	6.5 SU	10.0 SU
Phenols[a] (phenolic substances)	1.0 mg/L	General Limit (Refer to Section 6.5)
Total Nitrogen	N/A	40 mg/L
FOG	N/A	50 mg/L Total FOG
Total Toxic Organics	No Limit	--

[a] Total phenols minus unsubstituted phenol

6.1 Flow

The Vega Alta WWTP is designed to treat a daily average flow of 2.0 mgd. The plant currently receives a monthly average daily flow of approximately 1.16 mgd. Consequently, the Vega Alta WWTP currently has additional capacity available for industrial use and a local limit is not needed. It is recommended, however, that industry-specific limits be established if a high-flow industry is added to the collection system. The limits should be based on a case-by-case technical review of the industry's actual needs, as demonstrated by historical monitoring records and a review of the industry's best management practices (BMPs). This approach should be considered for all existing and new industries.

6.2 BOD_5 and TSS

Using the estimated as-built design capacity of 4,170 lbs/d capacity for both BOD_5 and TSS in Section 3.1, the Vega Alta WWTP has excess capacity for both pollutants. Average monthly influent BOD_5 from January 1, 2022, to February 1, 2022, was calculated at 1,877 lbs/day; for TSS during the same period, the loading was 1,782 lbs/day.

Local limits for BOD_5 and TSS are not adopted because establishing such limits using the uniform allocation method implies that discharges may not be accepted above such a limit, even if capacity is available. Because of economic incentives, when adequate capacity is available, surcharges are a better way to control these POCs. When industrial discharges contain BOD and TSS concentrations are not

greater than 250 mg/L, a surcharge system that charges the actual cost per pound of BOD and TSS as the actual cost for treatment provides for industry to pay an equitable share of the cost of treatment. When industrial waste exceeds 250 mg/L for either parameter, a higher surcharge is warranted due to contributions that accelerate the need to increase treatment plant capacity. PRASA reserves the right to establish surcharges that account for the cost of industrial waste treatment.

PRASA will also use industry-permit-specific technically based limits whenever an industry is found to have significant potential to discharge waste with BOD or TSS in significant quantities. Industry-specific limits help to reduce unnecessary loadings to the WWTP and extend the time periods between costly facility upgrades to meet NPDES permit limits and requirements. Industry-specific limits will be based on available capacity at the WWTP, technically achievable limits using industry-supplied pretreatment, and industrial BMPs.

6.3 Total Nitrogen

TN is defined by the PRWQSR as the sum of TKN plus NO_3 plus NO_2. TKN is the sum of nitrogen from protein plus ammonia. The NPDES permit has not authorized a mixing zone dilution allowance for this discharge; therefore, the dilution ratio is set at 1:1, with a TN limitation of 1,700 µg/L.

The PRWQSR limit of 1,700 µg/L is the limiting factor for local limits. When a treatment plant has been designed to remove nitrogen, the removal is based on proper operation. The Vega Alta plant is not designed to remove nitrogen. TN is ubiquitous to industrial, commercial, and residential discharges to the system and nitrogen control cannot be achieved through the use of local limits. According to the Metcalf and Eddy reference “Wastewater Engineering,” typical domestic waste contains a medium level of 40 mg/L of TN. Consequently, a local limit set to medium domestic strength of 40 mg/l is used in this document.

6.4 pH

The lower local limit for pH recommended at the Vega Alta WWTP is more stringent than the Puerto Rico General Limits.[5] This is warranted to protect the collection system because low pH discharges could degrade the infrastructure. Therefore, a pH range of 6.5 to 10.0 SU is adopted.

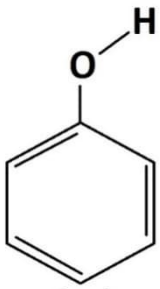
6.5 Phenols

The PRWQSR regulates phenol and a subset of phenolic derivatives. Appendix F lists these compounds and their limits. The phenol molecule consists of a six-carbon ring, with a hydroxyl (OH) group bonded (substituted) at one of the carbons. This substance is significantly less toxic than other phenolic compounds and is even the active ingredient in some throat sprays. The PRWQSR limits phenol at 10 mg/L for freshwater discharges and 860 mg/L for marine discharges. Derivatives of phenol occur when another substance (such as a halogen) is bonded (substituted) at one of the carbons in the ring. As more chlorine (or other halogen) substitution occurs, the toxicity of the resulting compounds becomes increasingly higher.

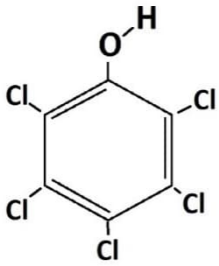
[5] Pretreatment limits are set island-wide (referred to herein as the “general limits”) for metals at all wastewater treatment plants in Puerto Rico, as contained and specified in the *Rules and Regulations for the Supply of Water and Sewer Service*.

As an example, pentachlorophenol is formed when each of the open points in the ring is attached to a chlorine. Pentachlorophenol has all available points substituted and is limited by the PRWQSR to 1 µg/L.

A reference value for unsubstituted phenol is available for both domestic concentration (0.025 µg/L) and for a removal factor (median value 90%) across activated sludge treatment. Based on these references, a local limit could significantly exceed 90 mg/L.



Phenol



Pentachlorophenol

Reference data for the more toxic forms of substituted phenols are not available. Consequently, it is not possible to develop a local limit for each compound in Appendix F based on reference data.

Currently, the general limit in the PRASA Rules and Regulations for the Supply of Water and Sewer Services, Section 2.05, contains a limit of 1.0 mg/L for phenolic compounds. This limit is applied to the sum of the individual concentrations of toxic phenolic substances on the list of priority pollutants, analyzed using procedures in accordance with 40 CFR 136, Table 1C. This limit will be retained with the modification that the limit applies to phenolic compounds, excluding unsubstituted phenol.

6.6 Fats, Oils, and Grease

A local limit of 50 mg/L for fats, oils, and grease is established in the Puerto Rico General Limits. This limit is protective and is retained.

6.7 Temperature

Prior to this TBLL evaluation, local limits for temperature were established in the Puerto Rico Pretreatment Limits[6] at 60°C (140°F).

A 104°F (40°C) limit at the headworks of the sewage treatment plant is a specific requirement of the federal pretreatment regulations (cf. 40 CFR 403.5(b)(5)).

The 60°C (140°F) limit at the point of discharge into the Vega Alta WWTP sanitary sewer system is both in keeping with the general limit and with a BPJ limit (which has been observed in other TBLLs to be set as high as 65°C [150°F]). The rationale is based on worker health and safety concerns and helps to achieve the other temperature limit. The 60°C (140°F) limit is retained.

6.8 Flammability

Local Limits for flammability were previously adopted prohibiting any discharge with a closed-cup flashpoint less than 60°C (140°F). An additional LEL Local Limit is added in this evaluation that prohibits two successive readings of an LEL meter in the headspace of the collection system below an industry's discharge into the sanitary sewer that exceed 5 percent, with no single LEL meter reading of 10% or greater.

[6] *Ibid*.

The closed-cup flashpoint limit is based on federal pretreatment regulations (40 CFR 403.5 (b)(1)). The LEL limits are established based on worker/community health and safety; they are much easier to monitor in the system and consequently enforce than the closed-cup flashpoint limit.

6.9 Toxic Organic Pollutants

No toxic organic POCs were identified in this system by reviewing the priority pollutant scans. Therefore, system-wide local limits were not developed for toxic organic pollutants. Instead, PRASA will address toxic organic pollutants using industry-permit-specific technically based limits whenever a toxic compound is identified in an industrial discharge. Developing such a limit is similar to development of TBLLs as applied from the waste discharge from the industry to the effluent discharge from the Vega Alta WWTP. Establishing limits will be based on permissible exposure limits, time weighted averages, any additional information from toxicological references (such as the American Conference of Governmental Industrial Hygienists [ACGIH]), and (as appropriate) Henry's constant.

7. Local Limits Implementation

The new local limits will apply to all non-domestic users. It is the intent of this document that only users that have been issued industrial wastewater discharge permits, such as SIUs and other users with a potential to discharge pollutants for which local limits have been developed, will be required to routinely monitor for compliance with local limits.

8. References

OECD SIDS. 2005. Linear Alkylbenzene Sulfonate (LAS), 20th SIAM, Paris, France. Sponsor Country USA. US EPA main reviewer. UNEP Publications. 19–21 April. http://www.chem.unep.ch/irptc/sids/OECDSIDS/LAS.pdf

Scott, Matthew J. and Malcom N. Jones. 2000. "The biodegradation of surfactants in the environment." School of Biological Sciences, University of Manchester, Oxford Road, Manchester M13 9PT, UK. Elsevier Science B.V. August. http://www.sciencedirect.com/science/article/pii/S0304415700000137

Terzic, D. Hršak, and M. Ahel. 1992. "Primary biodegradation kinetics of linear alkylbenzene sulphonates in estuarine waters." *Water Res.* 26 (1992) 585–591. http://www.sciencedirect.com/science/article/pii/004313549290231R

U.S. Environmental Protection Agency Office of Wastewater Management. 2004. *Local Limits Development Guidance*. EPA Publication EPA 833-R-04-002A. July.

U.S. Environmental Protection Agency Office of Water Enforcement and Permits. 1987. *Guidance Manual on the Development and Implementation of Local Discharge Limitations under the Pretreatment Program*. EPA Publication EPA 833-B-87-202. December.

U.S. Environmental Protection Agency. 1994. Office of Water. *Water Quality Standards Handbook: Second Edition.* EPA Publication EPA-823-B-12-002. August.

Tchobanoglous G., F. Burton, and D. Stensel. 2003. *Wastewater Engineering Treatment and Reuse*. Third Edition. p. 109. Metcalf and Eddy, Inc.

Appendix A
Priority Pollutants Detected at or Above MDL

List of Priority Pollutants found at or above MDL

One Scan Each Influent and Effluent

For All reports organic compounds are not listed if results were at or below MDL

Sample Date	Method	Number of Results Above MDL		Result Influent µg/l	Result Effluent µg/l	MDL	RL
	5/19/2020						
624	Volatile Organic Compounds (GC/MS)	1	Chloroform	6.2		1.2	
		1	Toluene	6.2		1.2	
625	Semivolatile Organic Compounds	1	Di(2-ethylhexyl)phthalate	5.61		0.2	
608.3	Organochlorine Pesticides						
8082A	PCB						
622	Organophosphorous Pesticides						
625	PAH Semi Volatile						
1613B	Tetra Chlorinated Dioxins & Furans ID HRGC/HRMS						

F - Detected but too low to quantify
m - matrix effect was present
J - Result is an estimated value
P - GC or HPLC confirmation criteria was exceeded; RPD >40%

List of Priority Pollutants found at or above MDL

One Scan Each Influent and Effluent

For All reports organic compounds are not listed if results were at or below MDL

Sample Date	Method	Number of Results Above MDL		Result Result Influent µg/l	Result Result Effuent µg/l	MDL	RL
5/25/2021							
624	Volatile Organic Compounds (GC/MS)	1	1,4-Dichlorobenzene	6.7		1.2	
		1	Chloroform	9.5		1.2	
625	Semivolatile Organic Compounds	1	Di(2-ethylhexyl)phthalate	15.8		0.2	
		1	Diethyl phthalate	7.41		0.2	
		1	Phenol	1.98		0.25	
608.3	Organochlorine Pesticides						
8082A	PCB						
622	Organophosphorous Pesticides						
625	PAH Semi Volatile						
1613B	Tetra Chlorinated Dioxins & Furans ID HRGC/HRMS						

F - Detected but too low to quantify
m - matrix effect was present
J - Result is an estimated value
P - GC or HPLC confirmation criteria was exceeded; RPD >40%

List of Priority Pollutants found at or above MDL

One Scan Each Influent and Effluent

For All reports organic compounds are not listed if results were at or below MDL

Sample Date	Method	**1/15/2023**	Number of Results Above MDL		Result Result Influent µg/l	Result Result Effuent µg/l	MDL	RL
624	Volatile Organic Compounds (GC/MS)		1	1,4-Dichlorobenzene	1.9	0.45	0.09	5
			1	Benzene	0.07		0.06	5
			1	Chlorobenzene	0.09		0.05	5
			1	Chloroform	4.4	7.1	0.07	5
			1	Chloromethane	0.25		0.06	5
			1	Dibromochloromethane	0.48		0.2	5
			1	Bromodichloromethane	0.94	1.3	0.2	5
			1	Methylene Chloride	0.81		0.3	5
			1	Toluene	9.9		0.07	5
625	Semivolatile Organic Compounds		1	Bis(2-ethylhexyl) Phthalate	5.2		2.6	10
			1	Butyl Benzyl Phthalate		0.025	0.021	0.1
			1	Di-n-butyl Phthalate		0.032	0.023	0.1
			1	Diethyl Phthalate	1.8	0.05	3	2
			1	Phenol	6.6		1.3	5
608.3	Organochlorine Pesticides		1	Endosulfan II	0.0091		0.0011	0.003
			1	Perthane		0.011	0.01	0.02
8082A	PCB							
622	Organophosphorous Pesticides		1	Ethyl Parathion		0.006	0.004	0.05
625	PAH Semi Volatile		1	Anthracene	0.17		0.02	0.04
			1	Dibenz(a,h)anthracene	0.029		0.02	0.04
			1	Fluorene	0.026	0.011	0.02	0.04
			1	Indeno(1,2,3-cd)pyrene	0.35		0.02	0.04
			1	Naphthalene	0.035		0.02	0.04
			1	Phenanthrene	0.027		0.02	0.04
1613B	Tetra Chlorinated Dioxins & Furans ID HRGC/HRMS							

F - Detected but too low to quantify
m - matrix effect was present
J - Result is an estimated value
P - GC or HPLC confirmation criteria was exceeded; RPD >40%

Appendix B
Guidance on the Selection of Pollutants of Concern

Guidance on the Selection of Pollutants of Concern

Guidance Manual on the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program, EPA 833-B-87-202, December 1987

Also, EPA guidance directs that a toxic pollutant may be classified as a POC if it meets the following screening criteria:

- *The maximum concentration of the pollutant in a grab sample from the POTW's influent is more than half the inhibition threshold for the biological process; or the maximum concentration of the pollutant in a 24-hour composite sample from the POTWs influent is more than one-fourth of the inhibition threshold for the biological process.*
- *The maximum concentration of the pollutant in the POTW's influent is more than 1/500* of the applicable sludge criteria.*
- *The maximum concentration of the pollutant in the POTW's influent is more than the maximum allowable effluent concentration.*
- *The maximum concentration of the pollutant in the POTW's effluent is more than one half the allowable effluent concentration.*
- *The maximum concentration of the pollutant in the POTW's sludge is more than one half of the allowable sludge concentration.*

The maximum measured concentration of the pollutant was greater than the ACGIH screening level for fume toxicity.

Appendix C
Data Sheets Used in
“TBLL Calc-Vega Alta.xlsm”

Line Number

Basic Data

1	Name of Facility:	**Vega Alta WWTP**	
2	Point of Contact:	Dara Osborne	
3	Person Entering Data:	Dara Osborne	
4	Reviewer:	Wayne Heinemann	
5	**GENERAL INFORMATION:**	(Data in colored cells below required)	
6	Receiving Water Hardness (if fresh)	**160**	<----- Number must be between 25 and 400
7	(M)arine, (F)resh, or (B)oth Discharges	**F**	<----- Enter only letters "M", "F", or "B"
8	Sludge: Class A (A) or (C)eiling level	**A**	<----- Enter only letters "A" or "C"
9	Plant: (A)ctivated sludge or (O)ther	**A**	<----- Enter only letters "A" or "O"
10			
11	Total Plant Flow (in MGD)	**1.16 MGD**	<----- For flows typically the most critical situation (one that
12	Domestic & Commercial Flow (in MGD)	**1.12 MGD**	yields the lowest local limits) is the lowest flow month, but run
13	Industrial Flow (in MGD)	**0.04 MGD**	several scenarios if there is any doubt. Adopt the lowest limits.
14	Infiltration/Inflow (by subtraction)		
15	Acute Dilution Factor	**1. : 1**	<----- Based on 1Q10+avg plnt flow
16	Chronic Dilution Factor	**1. : 1**	<----- Based on 7Q10 + avg plnt flow
17	Dilution Factor for _Health___	**1. : 1**	<----- Enter Chronic DF if not otherwise determined
18	Digester Flow (in MGD)	**0.0104 MGD**	<----- recommend: 0.01038 MGD @ 2% solids
19	Dry Sludge Production Rate (US Tons/day)	**0.9433 T/D**	<----- recommend: 0.94325 T/D
20			
21	**Default Method for Calculating Limits**	**Customize as needed for specific pollutants at "LOCLIMIT.XLS" Rows 45-49**	
22	Sampling Data Available (inf, eff, sludge) (Y/N)	**Y**	<--- "Y" if sampling data available, otherwise defaults presumed
23	Credit present loading of existing sources (Y/N)	**N**	<-- reduce influent to domestic using "loclimit.xls" row 28
24	Adjust for receiving water pollution (Y/N)	**N**	<-- requires receiving water data in "loclimit.xls" row 29
25	Use Observed Overall Removal Rate (Y/N)	**N**	<-- Always say "Y" if good data available from the POTW
26	Use Observed Primary Removal Rate (Y/N)	**N**	<-- If primary effluent sample data is obtained say "Y"
	Fraction of Loading Reserved for Safety	**5.00%**	< --Recommend 5%
	Fraction of loading Reserved for Growth	**5.00%**	< -- Unless system is near capacity, or rapid City growth, recommend 5%
27	Total Fraction of Loading Capacity held in reserve	**10.00%**	<-- Enter .1 for 10%, etc.

Line Number

Basic Data

1	**Which Conservative Pollutants to Limit? (Bold = Required by EPA)**	
2	**Check (or Un-Check) for Each Pollutant**	Develop Local Limit? (check for YES)
3	Antimony	☐
4	**Arsenic (T)**	☑
5	Arsenic (penta or +5)	☐
6	Beryllium	☑
7	**Cadmium**	☑
8	**Chromium(+6)**	☐
9	Chromium (T)	☑
10	**Copper**	☑
11	**Cyanide**	☑
12	**Lead**	☑
13	**Mercury**	☑
14	**Molybdenum**	☑
15	**Nickel**	☑
16	**Selenium**	☑
17	**Silver**	☑
18	Thallium	☑
19	TributylTin	☐
20	**Zinc**	☑
21	Add #1	☐
22	Add #2	☐
23	Add #3	☐
24	Add #4	☐
25		

ENTER DATA FROM PLANT SAMPLING IN THIS SPREADSHEET

	Negative MAIL (Y or N)	N	**Arsenic**	Negative MAIL (Y or N)	Y	**Cyanide**	N	**Mercury**			Negative MAIL (Y or N)	N
	Influent As modeled	**0.06 ug/l**		Influent CN modeled	**1.4 ug/l**	Adopt as Limit	**0.03 ug/l**				Influent Zn modeled	**60. ug/l**
Line Number	Influent As Calculated	0.8857 ug/l		Influent CN Calculated	2.6414 ug/l		0.0883 ug/l				Influent Zn Calculated	76.7857 ug/l
	Result	**0.35 mg/l**		Result	0.22 mg/l		0.001 mg/l	NP	29		Result	5.68 mg/l

Sample Data

Enter ADRE or MRE all lines in 5-8 will reflect the chosen method based on entry: ADRE

			Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
1	SUMMARY DATA	Anti												
2	Ave. Influent Conc.		0.886 ug/L	0.059 ug/L	1.670 ug/L	24.443 ug/L	1.400 ug/L	0.793 ug/L	0.088 ug/L	0.989 ug/L	1.990 ug/L	0.486 ug/L	0.214 ug/L	76.786 ug/L
3	Ave. Effluent Conc.		0.533 ug/L	0.014 ug/L	0.326 ug/L	1.969 ug/L	4.873 ug/L	0.153 ug/L	0.008 ug/L	0.363 ug/L	0.564 ug/L	0.886 ug/L	0.016 ug/L	35.871 ug/L
7	Ave. Overall Removal (ADRE)		29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
8	Ave. Overall Removal (MRE)		29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
9	Effluent Variation (COV)		0.13 ug/L	0.61 ug/L	0.08 ug/L	0.1 ug/L	0.77 ug/L	1.9 ug/L	1.54 ug/L	0.3 ug/L	0.04 ug/L	0.38 ug/L	0.29 ug/L	0.1 ug/L
10	Average Sludge Conc.		6.74 mg/Kg	0.67 mg/Kg	30.90 mg/Kg	381.50 mg/Kg	#DIV/0!	12.95 mg/Kg	2.53 mg/Kg	9.09 mg/Kg	16.50 mg/Kg	7.50 mg/Kg	3.96 mg/Kg	663.00 mg/Kg
11	Ambient Receiving Water Conc.		0.00 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L
12	AVE Industrial Conc.		0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L
13	SUMMARY (ABOVE)		Click the "+" button to the left of row numbers to review or input data.											
14	SAMPLE 1		Enter only dates and sampling results (white boxes in default pallate) mdl-RL 0.010 mg/L											
15	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
16	1/15/2023	Influent	0.53 ug/l	0.047 ug/l	1.02 ug/l	21.2 ug/l	3. ug/l	0.556 ug/l	0.0225 ug/l	0.92 ug/l	2.16 ug/l	0.4 ug/l	0.109 ug/l	67.1 ug/l
17	1/16/2023	Effluent	0.49 ug/l	0.029 ug/l	0.36 ug/l	2.25 ug/l	3.96 ug/l	0.099 ug/l	0.0044 ug/l	0.37 ug/l	0.53 ug/l	1. ug/l	0.013 ug/l	38. ug/l
18		Prim._Clar.												
19		Sludge												
20		Sludge Wet												
21	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
22	Sludge	ML/RL												
23	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	**Can't Do**	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
24	Overall Removal Rate		7.55%	38.30%	64.71%	89.39%	Can't Do	82.19%	80.62%	59.78%	75.46%	Can't Do	88.07%	43.37%
25														
26	SAMPLE 2		Enter only dates and sampling results (white boxes in default pallate)											
27	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
28	1/16/2023	Influent	1.59 ug/l	0.076 ug/l	1.8 ug/l	24.5 ug/l	2.6 ug/l	1.08 ug/l	0.101 ug/l	1.3 ug/l	2.54 ug/l	0.8 ug/l	0.334 ug/l	88.3 ug/l
29	1/17/2023	Effluent	0.62 ug/l	0.008 ug/l	0.32 ug/l	2.03 ug/l	5.42 ug/l	0.598 ug/l	0.0034 ug/l	0.58 ug/l	0.55 ug/l	0.2 ug/l	0.02 ug/l	29.2 ug/l
30		Prim._Clar.												
31	1/17/2023	Sludge	6.74 mg/kg	0.6 mg/kg	32.1 mg/kg	386. mg/kg		13.5 mg/kg	2.88 mg/kg	9.4 mg/kg	15.1 mg/kg	7.6 mg/kg	4.15 mg/kg	564. mg/kg
32		Sludge Wet												
33	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
34	Sludge	ML/RL	6.74 mg/kg	0.75 mg/kg	29.7 mg/kg	377. mg/kg		12.4 mg/kg	0.0072/0.036	8.77 mg/kg	17.9 mg/kg	7.4 mg/kg	3.77 mg/kg	762. mg/kg
35	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
36	Overall Removal Rate		61.01%	89.47%	82.22%	91.71%	Can't Do	44.63%	96.62%	55.38%	78.35%	75.00%	94.01%	66.93%
37														
38	SAMPLE 3		Enter only dates and sampling results (white boxes in default pallate)											
39	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
40	1/17/2023	Influent	0.74 ug/l	0.036 ug/l	1.05 ug/l	18.2 ug/l	2.26 ug/l	0.445 ug/l	0.0378 ug/l	0.86 ug/l	1.55 ug/l	0.6 ug/l	0.187 ug/l	51.7 ug/l
41	1/18/2023	Effluent	0.55 ug/l	0.01 ug/l	0.35 ug/l	2.07 ug/l	11.8 ug/l	0.08 ug/l	0.003 ug/l	0.35 ug/l	0.56 ug/l	1. ug/l	0.02 ug/l	32.3 ug/l
42		Prim._Clar.												
43		Sludge												
44		Sludge Wet												
45	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
46	Sludge	ML/RL	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l
47	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
48	Overall Removal Rate		25.68%	72.22%	66.67%	88.63%	Can't Do	82.02%	92.01%	59.30%	63.87%	Can't Do	89.30%	37.52%
49														

ENTER DATA FROM PLANT SAMPLING IN THIS SPREADSHEET

	Negative MAIL (Y or N)	N	**Arsenic**	Negative MAIL (Y or N)	Y	**Cyanide**	N	**Mercury**			Negative MAIL (Y or N)	N	
	Influent As modeled	**0.06 ug/l**		Influent CN modeled	**1.4 ug/l**	Adopt as Limit	**0.03 ug/l**				Influent Zn modeled	**60. ug/l**	
Line Number	Influent As Calculated	0.8857 ug/l		Influent CN Calculated	2.6414 ug/l		0.0883 ug/l				Influent Zn Calculated	76.7857 ug/l	
	Result	**0.35 mg/l**		Result	0.22 mg/l		0.001 mg/l	NP	29		Result	5.68 mg/l	

Sample Data

Enter ADRE or MRE all lines in 5-8 will reflect the chosen method based on entry: ADRE

			NP	68	55	61	59	55	e Domestic Approximation Y or N	Y	NP	66	67
1	**SUMMARY DATA**	Anti	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
2	Ave. Influent Conc.		0.886 ug/L	0.059 ug/L	1.670 ug/L	24.443 ug/L	1.400 ug/L	0.793 ug/L	0.088 ug/L	0.989 ug/L	1.990 ug/L	0.486 ug/L	0.214 ug/L	76.786 ug/L
3	Ave. Effluent Conc.		0.533 ug/L	0.014 ug/L	0.326 ug/L	1.969 ug/L	4.873 ug/L	0.153 ug/L	0.008 ug/L	0.363 ug/L	0.564 ug/L	0.886 ug/L	0.016 ug/L	35.871 ug/L
7	Ave. Overall Removal (ADRE)		29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
8	Ave. Overall Removal (MRE)		29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
9	Effluent Variation (COV)		0.13 ug/L	0.61 ug/L	0.08 ug/L	0.1 ug/L	0.77 ug/L	1.9 ug/L	1.54 ug/L	0.3 ug/L	0.04 ug/L	0.38 ug/L	0.29 ug/L	0.1 ug/L
10	Average Sludge Conc.		6.74 mg/Kg	0.67 mg/Kg	30.90 mg/Kg	381.50 mg/Kg	#DIV/0!	12.95 mg/Kg	2.53 mg/Kg	9.09 mg/Kg	16.50 mg/Kg	7.50 mg/Kg	3.96 mg/Kg	663.00 mg/Kg
11	Ambient Receiving Water Conc.		0.00 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L
12	AVE Industrial Conc.		0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L
13	**SUMMARY (ABOVE)**		Click the "+" button to the left of row numbers to review or input data.											
50	**SAMPLE 4**		Enter only dates and sampling results (white boxes in default pallate)											
51	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
52	1/18/2023	Influent	0.62 ug/l	0.047 ug/l	1.23 ug/l	20. ug/l	2.78 ug/l	0.504 ug/l	0.0373 ug/l	0.87 ug/l	1.75 ug/l	0.4 ug/l	0.118 ug/l	58.1 ug/l
53	1/19/2023	Effluent	0.61 ug/l	0.009 ug/l	0.29 ug/l	2.08 ug/l	2.97 ug/l	0.077 ug/l	0.004 ug/l	0.27 ug/l	0.59 ug/l	1. ug/l	0.02 ug/l	37. ug/l
54		Prim._Clar.												
55	1/19/2023	Sludge	6.74 mg/kg	0.75 mg/kg	29.7 mg/kg	377. mg/kg		12.4 mg/kg	2.17 mg/kg	8.77 mg/kg	17.9 mg/kg	7.4 mg/kg	3.77 mg/kg	762. mg/kg
56		Sludge Wet												
57	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
58	Sludge	ML/RL	0.06/0.5	0.007/0.750	0.06/0.20	0.04/0.1	0. ug/l	0.02/0.05	0.0075/0.038	0.02/0.05	0.03/0.2	0.09/1	0.004/0.02	0.2/0.5
59	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
60	Overall Removal Rate		1.61%	80.85%	76.42%	89.60%	Can't Do	84.72%	89.30%	68.97%	66.29%	Can't Do	83.05%	36.32%
61														
62	**SAMPLE 5**		Enter only dates and sampling results (white boxes in default pallate)											
63	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
64	1/19/2023	Influent	0.6 ug/l	0.053 ug/l	1.93 ug/l	22.8 ug/l	3.5 ug/l	0.776 ug/l	0.0452 ug/l	0.89 ug/l	2.26 ug/l	0.4 ug/l	0.219 ug/l	81.6 ug/l
65	1/20/2023	Effluent	0.53 ug/l	0.02 ug/l	0.31 ug/l	1.65 ug/l	2.26 ug/l	0.052 ug/l	0.0281 ug/l	0.28 ug/l	0.56 ug/l	1. ug/l	0.02 ug/l	37.1 ug/l
66		Prim._Clar.												
67		Sludge												
68		Sludge Wet												
69	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
70	Sludge	ML/RL	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l
71	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
72	Overall Removal Rate		11.67%	62.26%	83.94%	92.76%	35.43%	93.30%	37.83%	68.54%	75.22%	Can't Do	90.87%	54.53%
73														
74	**SAMPLE 6**		Enter only dates and sampling results (white boxes in default pallate)											
75	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
76	1/20/2023	Influent	0.65 ug/l	0.054 ug/l	1.89 ug/l	24.5 ug/l	2.23 ug/l	0.657 ug/l	0.106 ug/l	0.89 ug/l	1.48 ug/l	0.4 ug/l	0.159 ug/l	74.7 ug/l
77	1/21/2023	Effluent	0.43 ug/l	0.009 ug/l	0.34 ug/l	1.78 ug/l	3. ug/l	0.072 ug/l	0.0051 ug/l	0.31 ug/l	0.59 ug/l	1. ug/l	0.013 ug/l	37.6 ug/l
78		Prim._Clar.												
79		Sludge												
80		Sludge Wet												
81	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
82	Sludge	ML/RL	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l
83	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
84	Overall Removal Rate		33.85%	83.33%	82.01%	92.73%	Can't Do	89.04%	95.18%	65.17%	60.14%	Can't Do	91.82%	49.67%
85														

ENTER DATA FROM PLANT SAMPLING IN THIS SPREADSHEET

	Negative MAIL (Y or N)	N	**Arsenic**	Negative MAIL (Y or N)	Y	**Cyanide**	N	**Mercury**			Negative MAIL (Y or N)	N	
	Influent As modeled	**0.06 ug/l**		Influent CN modeled	**1.4 ug/l**	Adopt as Limit	**0.03 ug/l**				Influent Zn modeled	**60. ug/l**	
Line Number	Influent As Calculated	0.8857 ug/l		Influent CN Calculated	2.6414 ug/l		0.0883 ug/l				Influent Zn Calculated	76.7857 ug/l	
	Result	**0.35 mg/l**		Result	0.22 mg/l		0.001 mg/l	NP	29		Result	5.68 mg/l	

Sample Data

Enter ADRE or MRE all lines in 5-8 will reflect the chosen method based on entry: ADRE

Enter Domestic Approximation Y or N: Y

			NP	68	55	61	59	55				NP	66	67
1	**SUMMARY DATA**	Anti	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
2	Ave. Influent Conc.		0.886 ug/L	0.059 ug/L	1.670 ug/L	24.443 ug/L	1.400 ug/L	0.793 ug/L	0.088 ug/L	0.989 ug/L	1.990 ug/L	0.486 ug/L	0.214 ug/L	76.786 ug/L
3	Ave. Effluent Conc.		0.533 ug/L	0.014 ug/L	0.326 ug/L	1.969 ug/L	4.873 ug/L	0.153 ug/L	0.008 ug/L	0.363 ug/L	0.564 ug/L	0.886 ug/L	0.016 ug/L	35.871 ug/L
7	Ave. Overall Removal (ADRE)		29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
8	Ave. Overall Removal (MRE)		29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
9	Effluent Variation (COV)		0.13 ug/L	0.61 ug/L	0.08 ug/L	0.1 ug/L	0.77 ug/L	1.9 ug/L	1.54 ug/L	0.3 ug/L	0.04 ug/L	0.38 ug/L	0.29 ug/L	0.1 ug/L
10	Average Sludge Conc.		6.74 mg/Kg	0.67 mg/Kg	30.90 mg/Kg	381.50 mg/Kg	#DIV/0!	12.95 mg/Kg	2.53 mg/Kg	9.09 mg/Kg	16.50 mg/Kg	7.50 mg/Kg	3.96 mg/Kg	663.00 mg/Kg
11	Ambient Receiving Water Conc.		0.00 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L
12	AVE Industrial Conc.		0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L	0.0 ug/L
13	**SUMMARY (ABOVE)**		Click the "+" button to the left of row numbers to review or input data.											
86	**SAMPLE 7**		Enter only dates and sampling results (white boxes in default pallate)											
87	Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
88	1/21/2023	Influent	1.47 ug/l	0.097 ug/l	2.77 ug/l	39.9 ug/l	2.12 ug/l	1.53 ug/l	0.268 ug/l	1.19 ug/l	2.19 ug/l	0.4 ug/l	0.37 ug/l	116. ug/l
89	1/22/2023	Effluent	0.5 ug/l	0.014 ug/l	0.31 ug/l	1.92 ug/l	4.7 ug/l	0.093 ug/l	0.0095 ug/l	0.38 ug/l	0.57 ug/l	1. ug/l	0.009 ug/l	39.9 ug/l
90		Prim._Clar.												
91		Sludge												
92		Sludge Wet												
93	Aqueous	ML/RL	0.09/0.50	0.008/0.020	0.03/0.20	0.05/0.10	1.50/3.00	0.006/0.020	0.00006/0.0005	0.03/0.10	0.04/0.020	0.2/1.0	0.009/0.020	0.5/2.0
94	Sludge	ML/RL	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l	0. ug/l
95	Primary Removal Rate:		Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do	Can't Do
96	Overall Removal Rate		65.99%	85.57%	88.81%	95.19%	Can't Do	93.92%	96.47%	68.07%	73.97%	Can't Do	97.57%	65.60%

Vega Alta

Note: Line 7,8 are hand entered from the lab reported data

	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenun	Nickel	Selenium	Silver	Zinc

Report ID

Date:	LOCATION	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
16-Jan	Domestic	1.040 ug/L	0.237 ug/L	2.970 ug/L	80.400 ug/L	5.490 ug/L	1.560 ug/L	0.068 ug/L	1.700 ug/L	3.600 ug/L	0.700 ug/L	0.391 ug/L	317.000 ug/L
20-Jan	Domestic	0.46	0.085	0.97	45.3	5.32	0.474	0.0371	1.17	2.38	0.5	0.397	152
	Domestic												
	Domestic												
	Domestic												
	Domestic												
	Domestic												
	Domestic												
	Domestic												
	Domestic												
Average	Domestic	0.75	0.161	1.97	62.85	5.405	1.017	0.0527	1.435	2.99	0.6	0.394	234.5
	ML												
	RL												
Typical Domestic Concentrations		0.003 mg/l	0.003 mg/l	0.05 mg/l	0.061 mg/l	0.041 mg/l	0.049 mg/l	0.0003 mg/l	0.01 mg/l	0.021 mg/l	0.001 mg/l	0.005 mg/l	0.175 mg/l
> of book value or tested value mg/L		0.003 mg/l	0.003 mg/l	0.05 mg/l	0.063 mg/l	0.041 mg/l	0.049 mg/l	0.0003 mg/l	0.01 mg/l	0.021 mg/l	0.001 mg/l	0.005 mg/l	0.235 mg/l

	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Ave. Influent Conc.	0.88571	0.05857	1.67000	24.44286	1.40000	0.79257	0.08826	0.98857	1.99000	0.48571	0.21371	76.78571
Difference (INF-DOM)	0.1357143	-0.102429	-0.3	-38.407143	-4.005	-0.224429	0.0355571	-0.446429	-1	-0.114285714	-0.180286	-157.714286
Variance (Inf-Dom)/Inf %	15.3%	-174.9%	-18.0%	-157.1%	-286.1%	-28.3%	40.3%	-45.2%	-50.3%	-23.5%	-84.4%	-205.4%

total flow

1.16

Industrial flow

0.04

	Arsenic (T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenun	Nickel	Selenium	Silver	Zinc
Influent µg/L	0.89	0.06	1.67	24.44	1.40	0.79	0.09	0.99	1.99	0.49	0.21	76.79
Total Mass at Influent in pounds	0.009	0.001	0.016	0.236	0.014	0.008	0.001	0.010	0.019	0.005	0.002	0.743
Domestic Mass (from above) in lb	0.007	0.002	0.018	0.587	0.050	0.009	0.000	0.013	0.028	0.006	0.004	2.190
Mass attributed to industry in lb	0.002	-0.001	-0.002	-0.351	-0.037	-0.002	0.000	-0.004	-0.009	-0.001	-0.002	-1.448
Industry converted to mg/L	0.005	-0.003	-0.007	-1.051	-0.111	-0.005	0.001	-0.012	-0.026	-0.003	-0.005	-4.339
industry ug/L	4.69	-2.81	-6.73	-1050.96	-110.74	-5.49	1.08	-11.51	-26.01	-2.71	-4.83	-4339.21

Local Limits Calculation Page

Line Number	Pollutant:	Arsenic(T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
2	**Part II: PLANT DATA - OPEN AND CHANGE "BASICDATA.XLS" VALUES IF FLOWS CONTRIBUTING FOR A PARTICULAR POLLUTANT VARY**												
3	Total Plant Flow (in MGD)	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD	1.16 MGD
4	Domestic Flow (in MGD)	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD	1.12 MGD
5	Industrial Flow (in MGD)	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD
6	Infiltration/Inflow (by subtraction)	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD	0. MGD
7	Acute Dilution Factor	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1
8	Chronic Dilution Factor	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1
9	Dilution Factor for HH Limits	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1	1. : 1
10	Digester Flow (in MGD)	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD	0.0104 MGD
11	Dry Sludge Production Rate (US Tons/day)	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D	0.9433 T/D
12	Nitrification	1.5	5.2	.25-1.9,1-100	.05-.48	.34-.5	0.5			.25-.5, 5			.08-.5
13	**Part III: CONCENTRATIONS LIMITING THE POTW DUE TO PASS THROUGH OR INTERFERENCE**												
14	WQ Acute criteria, aquatic life (mg/L)	0.36 mg/l	0.0067 mg/l	2.55 mg/l	0.0276 mg/l	0.022 mg/l	0.1485 mg/l	0.00247 mg/l	NA	2.11 mg/l	0.02 mg/l	0.0091 mg/l	0.1743 mg/l
15	WQ Chronic criteria, aquatic life (mg/L)	0.19 mg/l	0.0018 mg/l	0.304 mg/l	0.0177 mg/l	0.005 mg/l	0.00579 mg/l	0.00001 mg/l	NA	0.2347 mg/l	0.005 mg/l	NA	0.1578 mg/l
16	Other Water Criteria-Human Health	0.01 mg/l	0.0012 mg/l	0.127 mg/l	0.011 mg/L	0.004 mg/L	0.001 mg/l	0.00005 mg/l	NA	0.078 mg/l	0.005 mg/l	0.0085 mg/l	0.17843 mg/l
17	Activated Sludge Inhibition Level	0.1 mg/l	1. mg/l	10. mg/l	1. mg/l	0.1 mg/l	1. mg/l	0.1 mg/l	NA	1. mg/l	NA	0.25 mg/l	0.3 mg/l
18	Anaerobic Digestor Inhibition Level	1.6 mg/l	20. mg/l	NA	40. mg/l	4. mg/l	340. mg/l	NA	NA	10. mg/l	NA	13. mg/l	400. mg/l
19	Class A Sludge standards (40 CFR 503)	41. mg/l	39. mg/l	NA	1,500. mg/l	NA	300. mg/l	17. mg/l	75. mg/l	420. mg/l	100. mg/l	NA	2,800. mg/l
20	Sludge ceiling concentration for beneficial use	75. mg/l	85. mg/l	NA	4,300. mg/l	NA	840. mg/l	57. mg/l	75. mg/l	420. mg/l	100. mg/l	NA	7,500. mg/l
21		Other Water Criteria-Color Code at Input-	Values in Grey Acute Federal WQS						Values in orange are PRWQS		Values in green are NPDES		
22	**Part IV: POLLUTANT CONCENTRATION ----- SUMMARY**												
23	Estimated Average Industrial Conc.	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l	0. mg/l
24	Ambient Concentration (receiving water)	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L	0.0000 mg/L
25	Adjusted Domestic concentration	0.00089 mg/l	0.00006 mg/l	0.00167 mg/l	0.02444 mg/l	0.0014 mg/l	0.00079 mg/l	0.00009 mg/l	0.00099 mg/l	0.00199 mg/l	0.00049 mg/l	0.00021 mg/l	0.07679 mg/l
26	Typical Domestic Concentrations	0.003 mg/l	0.003 mg/l	0.05 mg/l	0.061 mg/l	0.041 mg/l	0.049 mg/l	0.0003 mg/l	0.01 mg/l	0.021 mg/l	0.001 mg/l	0.005 mg/l	0.175 mg/l
27	Average Sludge Level (mg/Kg - Dry)	6.74 mg/kg	0.673 mg/kg	30.9 mg/kg	381.5 mg/kg	#DIV/0!	12.95 mg/kg	2.525 mg/kg	9.085 mg/kg	16.5 mg/kg	7.5 mg/kg	3.96 mg/kg	663. mg/kg
28	Average Influent Level (mg/l)	0.0009 mg/l	0.0001 mg/l	0.0017 mg/l	0.0244 mg/l	0.0014 mg/l	0.0008 mg/l	0.0001 mg/l	0.001 mg/l	0.002 mg/l	0.0005 mg/l	0.0002 mg/l	0.0768 mg/l
29	Average Effluent Level (mg/l)	0.0005 mg/l	0. mg/l	0.0003 mg/l	0.002 mg/l	0.0049 mg/l	0.0002 mg/l	0.00001 mg/l	0.0004 mg/l	0.0006 mg/l	0.0009 mg/l	0. mg/l	0.0359 mg/l
30													
31	**Part V: REMOVAL RATES**												
32	Average Primary Removal Rate	0.00%	0.00%	0.00%	0.00%								
33	Average Overall Removal Rate	29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
34	Reference Primary Removal Rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
35	Reference 2d Decile Plant Removal	31.00%	33.00%	68.00%	67.00%	41.00%	39.00%	50.00%		25.00%	33.00%	50.00%	64.00%
36	Reference Ave Plant Removal	29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
37	Reference 8th Decile Removal	53.00%	91.00%	91.00%	95.00%	84.00%	76.00%	79.00%		62.00%	67.00%	88.00%	88.00%
38													
39	**Part VI: HOW TO CALCULATE LIMITS:**												
40	Sampling Data Available (inf, eff, sludge) (Y/N)	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
41	Credit present loading of existing sources (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
42	Adjust for receiving water pollution	N	N	N	N	N	N	N	N	N	N	N	N
43	Use Observed Overall Removal Rate (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
44	Use Observed Primary Removal Rate (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
45													
46	**Part VII: LOCAL LIMITS CORRESPONDING TO THE CRITERIA ABOVE BASED ON COMPLIANCE WITH:**												
47	Acute WQ Standards (in mg/l)	14.809 mg/l	0.718 mg/l	333.68 mg/l	8.656 mg/l	1.517 mg/l	23.139 mg/l	0.893 mg/l	NA	207.236 mg/l	2.306 mg/l	2.826 mg/l	8.07 mg/l
48	Chronic WQ Standards (in mg/l)	7.804 mg/l	0.194 mg/l	39.731 mg/l	5.294 mg/l	0.329 mg/l	0.88037 mg/l	0.00188 mg/l	NA	22.989 mg/l	0.566 mg/l	NA	7.11 mg/l
49	Other Water Criteria-Color Code at Input	0.387 mg/l	0.123 mg/l	16.51 mg/l	3.025 mg/l	0.244 mg/l	0.068 mg/l	0.016 mg/l	NA	7.568 mg/l	0.566 mg/l	NA	8.317 mg/l
50	Sludge Application Limits (in mg/l)	0.654 mg/l	0.296 mg/l	NA	6.918 mg/l	NA	1.994 mg/l	0.089 mg/l	0.377 mg/l	3.238 mg/l	0.697 mg/l	NA	23.9 mg/l
51	Activated Sludge Inhibition (in mg/l)	2.875 mg/l	28.998 mg/l	289.95 mg/l	28.316 mg/l	2.861 mg/l	28.978 mg/l	2.898 mg/l	NA	28.944 mg/l	NA	7.244 mg/l	6.55 mg/l
52	Anaerobic Digestor Inhibition (in mg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
53													

Local Limits Calculation Page

Line Number													
31	**Part V: REMOVAL RATES**												
32	Average Primary Removal Rate	0.00%	0.00%	0.00%	0.00%								
33	Average Overall Removal Rate	29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
34	Reference Primary Removal Rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
35	Reference 2d Decile Plant Removal	31.00%	33.00%	68.00%	67.00%	41.00%	39.00%	50.00%		25.00%	33.00%	50.00%	64.00%
36	Reference Ave Plant Removal	29.62%	73.14%	77.82%	91.43%	59.00%	81.40%	92.00%	63.60%	70.47%	75.00%	90.67%	50.56%
37	Reference 8th Decile Removal	53.00%	91.00%	91.00%	95.00%	84.00%	76.00%	79.00%		62.00%	67.00%	88.00%	88.00%
38													
39	**Part VI: HOW TO CALCULATE LIMITS:**												
40	Sampling Data Available (inf, eff, sludge) (Y/N)	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
41	Credit present loading of existing sources (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
42	Adjust for receiving water pollution	N	N	N	N	N	N	N	N	N	N	N	N
43	Use Observed Overall Removal Rate (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
44	Use Observed Primary Removal Rate (Y/N)	N	N	N	N	N	N	N	N	N	N	N	N
45													
46	**Part VII: LOCAL LIMITS CORRESPONDING TO THE CRITERIA ABOVE BASED ON COMPLIANCE WITH:**												
47	Acute WQ Standards (in mg/l)	14.809 mg/l	0.718 mg/l	333.68 mg/l	8.656 mg/l	1.517 mg/l	23.139 mg/l	0.893 mg/l	NA	207.236 mg/l	2.306 mg/l	2.826 mg/l	8.07 mg/l
48	Chronic WQ Standards (in mg/l)	7.804 mg/l	0.194 mg/l	39.731 mg/l	5.294 mg/l	0.329 mg/l	0.88037 mg/l	0.00188 mg/l	NA	22.989 mg/l	0.566 mg/l	NA	7.11 mg/l
49	Other Water Criteria-Color Code at Input	0.387 mg/l	0.123 mg/l	16.51 mg/l	3.025 mg/l	0.244 mg/l	0.068 mg/l	0.016 mg/l	NA	7.568 mg/l	0.566 mg/l	NA	8.317 mg/l
50	Sludge Application Limits (in mg/l)	0.654 mg/l	0.296 mg/l	NA	6.918 mg/l	NA	1.994 mg/l	0.089 mg/l	0.377 mg/l	3.238 mg/l	0.697 mg/l	NA	23.9 mg/l
51	Activated Sludge Inhibition (in mg/l)	2.875 mg/l	28.998 mg/l	289.95 mg/l	28.316 mg/l	2.861 mg/l	28.978 mg/l	2.898 mg/l	NA	28.944 mg/l	NA	7.244 mg/l	6.55 mg/l
52	Anaerobic Digestor Inhibition (in mg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
53													
54	**Part VIII: SAMPLE QUALITY: COMPARISON OF LOADINGS AND REMOVAL RATES IMPLIED BY SAMPLE DATA**												
55	Pollutants in Influent (per sampling)	0.009 lbs	0.001 lbs	0.016 lbs	0.236 lbs	0.014 lbs	0.008 lbs	0.001 lbs	0.01 lbs	0.019 lbs	0.005 lbs	0.002 lbs	0.743 lbs
56	Pollutants in biosolids (per sampling)	0.013 lbs	0.001 lbs	0.058 lbs	0.72 lbs	#DIV/0!	0.024 lbs	0.005 lbs	0.017 lbs	0.031 lbs	0.014 lbs	0.007 lbs	1.251 lbs
57	Pollutants in effluent (per sampling)	0.005 lbs	0. lbs	0.003 lbs	0.019 lbs	0.047 lbs	0.001 lbs	0. lbs	0.003 lbs	0.005 lbs	0.008 lbs	0. lbs	0.344 lbs
58	% Influent load accounted for: (eff/inf)	208.01%	247.99%	380.14%	312.33%	#DIV/0!	337.74%	567.10%	215.58%	189.79%	481.82%	368.94%	214.67%
59	Current HW Load Implied by Sludge Data:	31.23%	4.19%	1.36%	63.62%	#DIV/0!	99.68%	356.79%	19.97%	4.02%	9.75%	0.87%	85.23%
60	Local Limit implied by %max Biosolids level	0.131 mg/L	0.097 mg/L	NA	2.078 mg/L	NA	0.509 mg/L	0.015 mg/L	0.208 mg/L	1.411 mg/L	0.174 mg/L	NA	7.177 mg/L
61													
62	**PART IX: MASS BASED ANALYSIS**												
63	Limiting MAHL (Dom Load + LL*IUflow)	0.1375 lb/d	0.04 lb/d	5.52 lb/d	1.24 lb/d	0.09 lb/d	0.03 lb/d	0.0015 lb/d	0.13 lb/d	1.1 lb/d	0.19 lb/d	0.94 lb/d	2.9 lb/d
64	Domestic and 10.% reserve for safety and growth	0.022 lb/d	0.0047 lb/d	0.5679 lb/d	0.352 lb/d	0.0225 lb/d	0.0104 lb/d	0.00097 lb/d	0.0227 lb/d	0.1285 lb/d	0.0239 lb/d	0.0965 lb/d	1.0075 lb/d
	Septage	0. lb/d	0. lb/d	0. lb/d	0. lb/d	0. lb/d	0. lb/d	0. lb/d		0. lb/d		0. lb/d	0. lb/d
65	Max. Allowable Industrial Loading (MAIL)	0.1154 lb/d	0.0367 lb/d	4.9553 lb/d	0.8853 lb/d	0.07187 lb/d	0.0197 lb/d	0.0005 lb/d	0.1122 lb/d	0.9703 lb/d	0.1696 lb/d	0.8482 lb/d	1.8948 lb/d
66													
67	**Part X: LOCAL LIMIT RECAP:**	**Arsenic(T)**	**Cadmium**	**Chrome (T)**	**Copper**	**Cyanide**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Zinc**
68	Industrial Flow (in MGD)	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD
69	Local Limit = MAIL/(8.34*Industrial Flow)	0.346 mg/l	0.110 mg/l	14.85 mg/l	2.654 mg/l	0.215 mg/l	0.059 mg/l	0.0014 mg/l	0.336 mg/l	2.909 mg/l	0.508 mg/l	2.543 mg/l	5.680 mg/l
70													

Local Limits Calculation Page

Line Number	Pollutant:	Arsenic(T)	Cadmium	Chrome (T)	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
54	**Part VIII: SAMPLE QUALITY: COMPARISON OF LOADINGS AND REMOVAL RATES IMPLIED BY SAMPLE DATA**												
55	Pollutants in Influent (per sampling)	0.009 lbs	0.001 lbs	0.016 lbs	0.236 lbs	0.014 lbs	0.008 lbs	0.001 lbs	0.01 lbs	0.019 lbs	0.005 lbs	0.002 lbs	0.743 lbs
56	Pollutants in biosolids (per sampling)	0.013 lbs	0.001 lbs	0.058 lbs	0.72 lbs	#DIV/0!	0.024 lbs	0.005 lbs	0.017 lbs	0.031 lbs	0.014 lbs	0.007 lbs	1.251 lbs
57	Pollutants in effluent (per sampling)	0.005 lbs	0. lbs	0.003 lbs	0.019 lbs	0.047 lbs	0.001 lbs	0. lbs	0.003 lbs	0.005 lbs	0.008 lbs	0. lbs	0.344 lbs
58	% Influent load accounted for: (eff/inf)	208.01%	247.99%	380.14%	312.33%	#DIV/0!	337.74%	567.10%	215.58%	189.79%	481.82%	368.94%	214.67%
59	Current HW Load Implied by Sludge Data:	31.23%	4.19%	1.36%	63.62%	#DIV/0!	99.68%	356.79%	19.97%	4.02%	9.75%	0.87%	85.23%
60	Local Limit implied by %max Biosolids level	0.131 mg/L	0.097 mg/L	NA	2.078 mg/L	NA	0.509 mg/L	0.015 mg/L	0.208 mg/L	1.411 mg/L	0.174 mg/L	NA	7.177 mg/L
61													
62	**PART IX: MASS BASED ANALYSIS**												
63	Limiting MAHL (Dom Load + LL*IUflow)	0.1375 lb/d	0.04 lb/d	5.52 lb/d	1.24 lb/d	0.09 lb/d	0.03 lb/d	0.0015 lb/d	0.13 lb/d	1.1 lb/d	0.19 lb/d	0.94 lb/d	2.9 lb/d
64	Domestic and 10.% reserve for safety and growth	0.022 lb/d	0.0047 lb/d	0.5679 lb/d	0.352 lb/d	0.0225 lb/d	0.0104 lb/d	0.00097 lb/d	0.0227 lb/d	0.1285 lb/d	0.0239 lb/d	0.0965 lb/d	1.0075 lb/d
	Septage	0. lb/d	0. lb/d	0. lb/d	0. lb/d	0. lb/d	0. lb/d	0. lb/d		0. lb/d		0. lb/d	0. lb/d
65	Max. Allowable Industrial Loading (MAIL)	0.1154 lb/d	0.0367 lb/d	4.9553 lb/d	0.8853 lb/d	0.07187 lb/d	0.0197 lb/d	0.0005 lb/d	0.1122 lb/d	0.9703 lb/d	0.1696 lb/d	0.8482 lb/d	1.8948 lb/d
66													
67	**Part X: LOCAL LIMIT RECAP:**	**Arsenic(T)**	**Cadmium**	**Chrome (T)**	**Copper**	**Cyanide**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Zinc**
68	Industrial Flow (in MGD)	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD	0.04 MGD
69	Local Limit = MAIL/(8.34*Industrial Flow)	0.346 mg/l	0.110 mg/l	14.85 mg/l	2.654 mg/l	0.215 mg/l	0.059 mg/l	0.0014 mg/l	0.336 mg/l	2.909 mg/l	0.508 mg/l	2.543 mg/l	5.680 mg/l

FACILITY: Vega Alta WWTP
RUN DATE: 6/28/2023

Line Number

WATER QUALITY CRITERIA CALCULATIONS (in ug/L unless otherwise noted)

1	Receiving Water: (F)resh, (M)arine, (B)oth	F
2	Hardness for Use in Calculations:	160.00

3		PRIOR	CAR	WATER QUALITY STANDARD				TOTAL	TOTAL	Total	Conv. Fact.
4		ITY	CIN	FRESH				LIMITING	LIMITING	LIMITING	Marine
5	*POLLUTANT*	PLTNT?	GEN?	ACUTE	CHRONIC	Hhealth	COMMENTS	ACUTE	CHRONIC	HH	dis/tot
7	ARSENIC Inorganic	Y	Y	360. ug/l	190. ug/l	0.018 ug/l	Federal, NTR	360. ug/l	190. ug/l	0.018 ug/l	1.00
10	CADMIUM - Dependent on Hardness in B6	Y	N	6.2 ug/l	1.5 ug/l		Federal	6.6645 ug/l	1.8138 ug/l	0. ug/l	0.99
12	CHROMIUM(T) - Dependent on hardness in $I	N	N	806.4 ug/l	261.6 ug/l			2,551.8334 ug/l	304.1641 ug/l	0. ug/l	1.00
13	COPPER - Dependent on Hardness in B6	Y	N	26.5 ug/l	17. ug/l		Federal	27.6004 ug/l	17.6677 ug/l	0. ug/l	0.83
14	CYANIDE	Y	N	22. ug/l	5.2 ug/l	700. ug/l	Federal	22. ug/l	5.2 ug/l	700. ug/l	1.00
15	LEAD - Dependent on hardness in B6	Y	N	107.3 ug/l	4.2 ug/l		Federal	148.5165 ug/l	5.7875 ug/l	0. ug/l	0.95
16	MERCURY	Y	N	2.1 ug/l	0.012 ug/l	0.14 ug/l	Federal	2.4706 ug/l	0.012 ug/l	0.14 ug/l	0.85
17	Molybdenum	N	N							NA	
18	NICKEL - Dependent on hardness in B6	Y	N	2,106.5 ug/l	233.9 ug/l	610. ug/l	Federal	2,110.7467 ug/l	234.6505 ug/l	610. ug/l	0.99
19	SELENIUM	Y	N	20. ug/l	5. ug/l		Federal	20. ug/l	5. ug/l	0. ug/l	1.00
20	SILVER - Dependent on hardness in B6.	Y	N	7.7 ug/l	NA		Federal	9.1093 ug/l	NA	0. ug/l	0.85
23	ZINC- Dependent on hardness in B6	Y	N	170.4 ug/l	155.6 ug/l		Federal	174.2681 ug/l	157.842 ug/l	0. ug/l	0.95

Appendix D
207 Matched Pairs Using Ultra Low Level Testing

Appendix D

The removal factors found in EPAs Local Limits Development Manual (LLDM) Appendix R were published in the manuals first addition in 1982 and relied on data gathered in the decade proceeding its publication. At the bottom of each type of treatment the footnotes indicate the following[1]:

> * Pollutant removals between POTW influent and secondary effluent (including secondary clarification). Based on a computer analysis of POTW removal efficiency data (derived from actual POTW influent and effluent sampling data) provided in U.S. EPA's Fate of Priority Pollutants in Publicly Owned Treatment Works, Volume II (EPA 440/1-82/303), September 1982.
>
> ** For the purpose of deriving removal efficiencies, effluent levels reported as below detection were set equal to the reported detection limits. All secondary activated sludge treatment plants sampled as part of the study were considered.

The methods used at the time this data collection lacked the sensitivity needed to properly measure the full removal and comparatively high detection levels in many cases yielded lowered removal factors than the true removal. This led to lower removal rates for almost all parameters because removal was limited to the detection level of these older methods. The lower the concentration of a pollutant (at both the influent and effluent) the more pronounced the effect of the use of detection levels in lieu of non-detect values. Mercury has the most pronounced truncation due to its normal low concentration throughout the system. Even today the use of method 245.1 leads to many non-detect values. Only with the use of the very sensitive method 1631 e can the true removal factors of mercury begin to be accurate measured. Jacobs over time has collected the information in this appendix to find the actual removal rates. These have been collected for systems with various treatment units ranging form 301 H exempt plants were only chemically enhance primary treatment is present to secondary, tertiary and even a quaternary plant where GAC treatment was added after membrane filtration. The data for the most part forms a fairly tight bell curve and provides an average removal.

The LLDM also does not provide a removal factor for molybdenum. Consequently, the same data base of treatment plants covered was used to derive and average removal rate for use as a reference in future local limits developed by Jacobs.

[1] Source: U.S. EPA's Guidance Manual on the Development and Implementation of Local Discharger Limitations Under the Pretreatment Program, December 1987, p. 3-56.

Mercury

Total Data Pairs (inf/eff): 216

Year Tested

Year Tested	Project	# of data pairs	% primary	% total	
2014	Cayey, PR	7	NA	98.95%	S
2014	Fajardo	8	NA	93.48%	S
2014	Jayuya	7	NA	97.48%	S
2014	Santa Isabel	7	NA	74.65%	S
2014	Vega Baja	7	NA	97.87%	S
2014	Swainsboro, GA	7	-	-	S
2018	Yauco	6	NA	96.67%	S
	Secondary Treatment Only	**49**	**NA**	**93.18%**	
2011	Walla Walla, Washington	16	65.60%	97.22%	P&S
2014	Guayama	7	50.38%	87.28%	P&S
2014	Stephenville	7	-	96.28%	P&S
2017	Camuy-Hatillo	7	45.53%	87.10%	P&S
2017	Abonito	7	67.54%	90.84%	P&S
2017	Baton Rouge NWWTP	17	64.41%	62.17%	P&S
2017	Baton Rouge SWWTP	17	14.83%	91.40%	P&S
2018	Mayaguez	13	35.87%	99.76%	P&S
2018	Camas	8	41.63%	96.57%	P&S
2019	Farmington	7	-	78.44%	P&S
2020	Troutdale	7	33.56%	91.05%	P&S
2021	Hood River	7	77.86%	95.97%	P&S
	Primary and Secondary Treatment	**76**	**58.69%**	**86.82%**	
2014	Carolina	7	72.39%	NA	301 H
2014	Bayamon	7	67.36%	NA	301 H
2014	Puerto Nuevo	7	69.62%	NA	301 H
2015	Aguadilla	7	76.47%	NA	301 H
2015	Arecibo	7	90.69%	NA	301 H
2019	Ponce	14	74.43%	NA	301 H
	301H Enhance Primary	**125**	**75.16%**	**NA**	
	Overall Pairs/Average Removal	**216**	**59.26%**	**90.73%**	

Note: The Baton Rough mercury results (all pairs) were considered to be contaminated and the final number is an outlier using the Grubb outlier tests at the 0.05 significance level. This value has been retained in the average for the sake of transparency.

Molybdenum

Total Data Pairs (inf/eff): 216

Year Tested

Year Tested	Project	# of data pairs	% primary	% total	
2014	Cayey	7	NA	37.99%	S
2014	Fajardo	8	NA	31.72%	S
2014	Jayuya	7	NA	27.67%	S
2014	Santa Isabel	7	NA	48.24%	S
2014	Vega Baja	7	NA	40.98%	S
2014	Swainsboro	7	NA	29.42%	S
2018	Yauco	6	NA	46.17%	S
	Secondary Treatment Only	**49**	**NA**	**37.46%**	
2011	Walla Walla, Washington	16	31.99%	52.38%	P&S
2014	Guayama	7	14.31%	27.63%	P&S
2014	Stephenville	7	-	43.64%	P&S
2017	Camuy-Hatillo	7	13.89%	16.28%	P&S
2017	Abonito	7	CNC	CNC	P&S
2017	Baton Rouge NWWTP	17	28.00%	35.83%	P&S
2017	Baton Rouge SWWTP	17	28.00%	26.64%	P&S
2018	Mayaguez	13	46.56%	82.11%	P&S
2018	Camas	8	9.12%	8.17%	P&S
2019	Farmington	7	-	17.31%	P&S
2020	Troutdale	7	30.85%	21.00%	P&S
2021	Hood River	7	-	50.57%	P&S
	Primary and Secondary Treatment	**120**	**25.34%**	**34.69%**	
2014	Bayamon	7	NA	NA	301 H
2014	Carolina	7	NA	NA	301 H
2014	Puerto Nuevo	7	-	NA	301 H
2015	Aguadilla	7	33.75%	NA	301 H
2015	Arecibo	7	23.60%	NA	301 H
2019	Ponce	14	23.78%	NA	301 H
	301H Enhance Primary	**49**	**27.04%**	**NA**	
	Overall Pairs/Average Removal	**216**	**25.34%**	**35.06%**	

Appendix E
Puerto Rico Water Quality Standards Worksheet

Puerto Rico Water Quality Standards (WQS) Worksheet
Vega Alta

Vega Alta

	Based on Puerto Rico Water Quality Standard Regulation Rule 1301.1.J.1 Calculation of WQS Based On Hardness	Note: Class SD Designation Hardness = 160		
		Receiving Stream		Vega Alta
Arsenic		10.000	µg/l	HH
Cadmium	= (e (0.7977[ln(hardness)] - 3.909) µg/L	1.150	µg/l	AL
Chromium	= (e (0.8190[ln(hardness)] + 0.6848) µg/L	126.642	µg/l	AL
Copper	= (e (0.8545[ln(hardness)] - 1.702)) µg/L	13.940	µg/l	AL
Cyanide		4.000	µg/l	AL
Lead	= (e (1.273[ln(hardness) - 4.705) µg/L	5.787	µg/l	AL
Mercury		0.050	µg/l	HH
Nickel	= (e (0.8460[ln(hardness)] + 0.0584)µg/L	77.633	µg/l	Al
Silver	= (e (1.72[ln(hardness)] - 6.59)µg/L	8.493	µg/l	AL
Selenium		5.000	µg/l	AL
Thallium		0.240	µg/l	HH
Zinc	= (e (0.8473[ln(hardness)] + 0.884))µg/L	178.430	µg/l	AL

Appendix F
Phenolic Compounds Regulated by Puerto Rico Water Quality Standards

Phenol and Phenolic Compounds

	Subtance	Classes SB (ug/L)	Class SD (ug/L)	Class SG (ug/L)[a]
+, *	Pentachlorophenol	0.4 (HH)	0.3 (HH)	0.3 (HH)
	2,4,5-Trichlorophenol	600 (HH)	300 (HH)	300 (HH)
+, *	2,4,6-Trichlorophenol	28 (HH)	15 (HH)	15 (HH)
+	2,4-Dichlorophenol	60 (HH)	10 (HH)	10 (HH)
+	2,4-Dimethylphenol	3,000 (HH)	100 (HH)	100 (HH)
+	2-Chlorophenol	800 (HH)	30 (HH)	30 (HH)
+	2-Methyl-4,6-Dinitrophenol	30 (HH)	2 (HH)	2 (HH)
+	3-Methyl-4,6-Dinitrophenol	2,000 (HH)	500 (HH)	500 (HH)
+	2,4-Dinitrophenol	300 (HH)	10 (HH)	10 (HH)
	Nonyphenol	1.7 (AL)	6.6 (AL)	---
+	Phenol	300,000 (HH)	4,000 (HH)	4,000 (HH)

PUERTO RICO WATER QUALITY STANDARDS REGULATION

Rule 1303, as Amended on April 2019

AL = Protection of the water body for the propagation and preservation of aquatic species or species dependent on the water body.
DW = Protection of the water body for use as source of drinking water supply.
HH = Protection of the water body or aquatic life for reasons of human health.

* = Identifies a substance that may be a carcinogen. The HH Criteria is base on a carcinogenicity risk of 10.5-5
+ = Identifies a priority pollutant.
a = For the protection of ground waters with the potential to be used or that are used as source of drinking water supply, the applicable water quality standard is the Drinking Water (DW) or Human Health (HH) criteria. For those ground waters that flow into other water bodies, the applicable water quality standard for ground waters is the most stringent criteria resulting from the comparison between the standard applicable to the classification of the water body into which it flows and the DW or HH criteria applicable to ground waters.

Appendix G
Long-hand Calculation of Lead Local Limits

Vega Alta WWTP

Long Hand Calculation of Local Limit - Lead

Allowable Headwork Loading (AHL) Based on Protection of Water Quality

Acute WQS, Chronic WQS, PRWQSR, and NPDES Permit Limits

POTWs are required to prohibit nondomestic user discharges in amounts that result in violation of Water Quality Standards and/or NPDES Limits.

Federal WQ criteria are found at: http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm
Puerto Rico WQS are found at: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-puerto-rico
NPDES Limits are found in NPDES Permit # PR0020923
Where a dilution factor has been approved, the factor applies to the Water Quality Standards but not to NPDES limits.
Dilution Factor Applied are derived from: NPDES Permit

	Y or N
Use Federal	N

Hardness Utilized: 160

Lead

			Dissolved to Total Conversion Factor (CF)
Federal WQS Acute =	NA	NA µg/L	1.00
Federal WQS Chronic =	NA	NA µg/L	1.00
Acute =	148.5	148.5 µg/L	0.99
Chronic =	5.788	5.788 µg/L	1.00
PRWQS =	0.5787	0.6 µg/L	1.00
NPDES =	NA	NA µg/L	1.00

The Allowable Headworks Loadings in Table A are calculated using the following equation:

$$Lwqs = \frac{(8.34)(Ccrit)(Qpotw * Dilution\ Factor)}{(1-Rpotw)}$$

Where:

Lwqs = Maximum allowable headworks loading (lbs/day) based on NPDES permit limits or Water Quality Criteria
Ccrit= (NPDES effluent limits or WQ criteria expressed as mg/L)
Qpotw= (POTW average flow in mgd)
Dilution Factor = (1 is equivalent to no dilution factor)
Rpotw = (Overall Removal Factor as a decimal)

Table A

Federal Acute	Federal Chronic	Acute	Chronic	PRWQS	NPDES
Lead	Lead	Lead	Lead	Lead	Lead
		0.149	0.006	0.001	
1.16	1.16	1.16	1.16	1.16	1.16
1.00	1.00	1.00	1.00	1.00	1.00
81.4%	81.4%	81.4%	81.4%	81.4%	81.4%
Water Quality Based AHLs		lb/d			
		7.73	0.30	0.03	

Lead

Calculation of most Stringent WQS AHL

$$Lwqs = \frac{(8.34\ lb/gal\ X\ 0.00058\ mg/L\ X\ 1.16\ mgd\ X\ 1\ :1)}{1\ -\ 0.8140} = .03\ lb/d$$

Allowable Headwork Loading (AHL) Based on Sludge Criteria **Lead**

Maximum headwork loadings to protect sludge quality are derived based on criteria found in 40 CFR 503 in Table 1
The Allowable Headworks Loading in Table B are calculated using the following equation:

$$Lin = \frac{(8.34)(Cslcrit)(SGsldg)(PS/100)(Qsldg)}{Rpotw}$$

Where:

Lin = Allowable Headwork Pounds per Day
Cslcrit = Limiting sludge criteria (mg/kg)(Table 3)
SGsldg = Specific Gravity of the Sludge kg/L
PS = Percent solids in the sludge to disposal (%)
Qsldg = Sludge flow to disposal (mgd)
Rpotw = POTW removal efficiency (as a decimal)

The daily sludge flow and percent solids is not available
Values used are based on standard design estimation methods.

Table B

	40 CFR 503 Pollutant	Table 3 Clean Sludge (mg/kg)	Table 1 Ceiling Sludge (mg/kg)
	Arsenic	41	75
	Cadmium	39	85
Lead	**Chromium**	NA	NA
300	**Copper**	1500	4300
1.05	**Cyanide**	NA	NA
2	**Lead**	300	840
0.01038	**Mercury**	17	57
81.4%	**Molybdenum**	NA	75
	Nickel	420	420
	Selenium	100	100
	Silver	NA	NA
	Zinc	2800	

Sludge Quality Based AHL
0.67 lb/d

Lead

$$Lin = \frac{(8.34 \text{ lb/g} \times 300 \text{ mg/L} \times 1.05 \text{ kg/L} \times 2\% \text{ solids} \times 0.010 \text{ mgd} =}{0.8140} = .67 \text{ lb/d}$$

Allowable Headwork Loading (AHL) Based On Inhibition **Lead**

Literature Values for inhibition are found in the EPA Local Limits Guidance 2004 Appendix G.
The criteria used to calculate inhibition are shown in Table C for: Activated Waste
The following equation was used to derive the allowable headwork loadings shown in Table C.

For Secondary Treatment Inhibition the equation is:

$$Linhib2 = \frac{(8.34)(Ccrit)(Qpotw)}{(1-Rprim)}$$

Where:

Linhib2 = Maximum allowable headworks loading (lbs/d) based on inhibition of secondary process
Ccrit = Inhibition level (mg/L) for Activated Sludge
Rprim = Primary removal efficiency as a decimal, (if no primary - zero)
Qpotw = POTW average flow

Note: When a range has been indicated the low range value has been selected.

Table C

Pollutant	Inhibition Secondary Activated Sludge	Nitrogen Inhibition
Arsenic	0.1	1.5
Cadmium	1-10	5.2
Chromium	1-100	.25-1.9
Copper	1	.05-.48
Cyanide	0.1-5	.34-.5
Lead	1.0-5.0	0.5
Mercury	0.1-1	
Nickel	1.0-5.0	.25-.5
Selenium		
Silver		
Zinc	.3-10	.08-.5

Lead
1
81.4%
1.16

Activated Waste Inhibition Based AHL
52.02 lb/d

Lead

$$Linhib2 = \frac{(8.34 \text{ lb/gal} \times 1.00 \text{ mg/L} \times 1.16 \text{ mgd})}{1 - 0.8140} = 52.0 \text{ lb/d}$$

Vega Alta

For Anaerobic Inhibition the equation is:

Literature Values for inhibition are found in the EPA Local Limits Guidance 2004 Appendix G.
The criteria used to calculate inhibition are shown in Table D for: Anaerobic Digestion
The following equation was used to derive the allowable headwork loadings shown in Table D

$$Linhibdgstr = \frac{(8.34)*(Ccrit)(Qdig)}{Rpotw}$$

Where:

Linhibdgstr = Maximum allowable headworks loading (lbs/d) based on inhibition of Anaerobic Digestion
Ccrit = Inhibition level (mg/l) for Anaerobic Digestion
Qdig = Sludge flow to disposal (mgd)
Rpotw = POTW removal efficiency (as a decimal)

Table D

	Pollutant	Inhibition Anaerobic Sludge
	Arsenic	1.6
	Cadmium	20
Lead	**Chromium**	130
	Copper	40
340	**Cyanide**	4
0.01038	**Lead**	340
81.40%	**Mercury**	NA
	Nickel	10
	Selenium	NA
	Silver	13
	Zinc	400

Anaerobic Digestion Based AHL
36.157 lb/d

Lead

$$Linhibdgstr = \frac{(8.34 \text{ lb/gal} \times 340 \text{ mg/L} \times 0.010 \text{ MGD})}{81.40\%} = 36.157 \text{ lb/d}$$

Lead

Selection of Lowest AHL Representing Maximum Allowable Headworks Loading (MAHL)

The smallest of the above calculated values is selected as the MAHL.

Selection of MAHL lb/d										
	Federal Acute	Federal Chronic	Acute	Chronic	PRWQS	NPDES	Sludge Quality	Secondary Inhibition	Anaerobic Inhibition	Maximum Allowable Headworks Loading (MAHL)
Lead			7.73	0.30	0.030		0.670	52.02	36.1572088	0.030

Calculation of the Maximum Allowable Industrial Loading (MAIL)

The domestic (uncontrollable) sources and a safety/growth factor are subtracted from the MAHL to calculate the MAIL as follows:

$$MAIL = (MAHL)(1-SF) - L_{unc}$$

Where:

MAIL = Maximum available industrial loading, lbs/day

	Lead
MAHL = Maximum allowable headworks loading, lbs/day	0.030
SF = Safety and Growth factor, as a decimal	10%
L_{unc} = Loadings from uncontrolled sources	0.007

Using conservative approach L_{unc} has been established using (domestic flow =average plant influent-permitted industrial flow) and average influent concentration as follows:

L_{unc} = (average Influent concentration in mg/L)(average domestic flow to POTW)(8.34)

Lead

L_{unc} = 0.7925714 ug/L./1000ug/mg X 1.12 mgd X 8.34) = 0.007 lb/d

MAIL = (0.030 lb/d X (1 - 10%) - 0.007 lb/d) = 0.020 lb/d

Calculation of Industrial Local Limit mg/l using Uniform Allocation Method

The uniform allocation method divides the MAIL by the industrial flow and a factor of 8.34 to convert to a concentration based limit using the following equation:

$$\text{Local Limit} = \frac{\text{MAIL lb/d}}{(8.34 \times Q_i)}$$

Q_i = Total Industrial Flow, mgd 0.04 mgd

Lead

Lead Local Limit = 0.02 lb/d divided by (8.34 X 0.04 MGD) = **0.059 mg/L**

Appendix H
Definitions

Appendix H. Definitions

Allowable Headworks Loading (AHL)	The estimated maximum loading of a pollutant that can be received at a publicly owned treatment works (POTW) headworks that should not cause a POTW to violate a treatment plant or environmental criterion. AHLs are developed to prevent process interference or pass-through of pollutants of concern (POCs).
Applicable Criteria	A regulation, standard, or theoretically derived detrimental concentration that must be considered in developing a local limit.
Best Management Practice (BMP)	Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices used to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. (EPA definition)
Best Professional Judgment (BPJ)	Use of experience and technical expertise to determine a course of action for which a clear-cut direction is not available in statutory or research literature.
Biological Treatment	A treatment process that depends on using microbiological processes to remove pollutants or transform them to a less objectionable state.
Book Values	Numeric values that have been determined in research studies to apply to similar processes. Most information is taken from EPA's 2004 Guidance Manual on Development of Local Limits (EPA Publication EPA 833-R-04-002A). Refer also to Reference Values.
Categorical User	An industry subject to a category listed in 40 CFR 405-471. By definition, Categorical Users are also listed as Significant Industrial Users.
Chemical Treatment	A treatment process that uses a chemical reaction to reduce pollutants, make pollutants easier to treat, or render them less objectionable. An example includes pH adjustment.
Chemically Enhanced	The addition of chemicals to the waste stream to enhance the actions of a treatment process that is already present in the system.
Composting	The process of adding vegetable matter and accelerating decomposition into a humus-like substance by various micro-organisms including bacteria, fungi, and actinomycetes in the presence of oxygen. The resulting product is used for soil amendment.
Concurrent Sampling	Sampling conducted at the same time, or with a lag period approximately equivalent to the time that the flow is resident in any portion of the system. Concurrent sampling estimates how any given characteristic changes as flow moves through the system.
Conservative Pollutant	Pollutants that are presumed not to be destroyed, biodegraded, chemically transformed, or volatilized within POTW. Conservative pollutants introduced to a POTW ultimately exit the POTW solely through the POTW's effluent and sludge. Most metals are considered conservative pollutants.
Control Efficiency	The percent capture of a pollutant that is removed by a control measure installed specifically to remove that pollutant.

Criteria	Regulations or standards that may be applicable to the development of a local limit.
Design Capacity, Design Flow	The theoretical treatment capacity based on engineering studies that is typically engineered into the original design. During construction, changes may be made for a variety of reasons, which results in the final "As-Built Capacity."
Dispersion Factor	A factor that describes how air emissions mix with the ambient air after being emitted from the original source.
Domestic Waste	Domestic waste describes waste that is generated by residential and light commercial use. In practice, the calculations typically treat domestic waste as the flow that remains after all permitted industrial flow is removed from the waste stream, which does not apply a factor for non-permitted commercial waste. Refer to Domestic Approximation.
Domestic Approximation	Domestic sampling typically is taken from low-flow areas; as an alternative influent test data are used to represent domestic contributions. These data include all dischargers (domestic, commercial, and industrial). Use of these data is a conservative assumption.
Domestic Strength	Waste generated solely from residential use varies appreciably between communities (for example, average biochemical oxygen demand [BOD] ranges from <180 mg/L to >300 mg/L). Using BPJ, the most typical concentration used in local limits and ordinances is 250 mg/L for BOD and for total suspended solids (TSS).
Emission Standards	Emission standards are legal requirements governing air pollutants released into the atmosphere.
General Limit(s)	Limits that are taken from the Puerto Rico Aqueduct and Sewer Authority Rules and Regulations for Supply of Water and Sewer Services.
Guidance Document	Unless otherwise denoted, indicates the use of the U.S. Environmental Protection Agency Office of Wastewater Management. 2004. Local Limits Development Guidance. EPA Publication EPA 833-R-04-002A. (July 2004).
Headworks	The point at which wastewater enters a wastewater treatment plant (WWTP). The headworks may consist of bar screens, comminutor, wet wells, and/or pumps.
Headworks Analysis	The process of taking concurrent samples at the influent and the effluent of a plant, as well as at other key sites in the system, to determine how much of a pollutant is removed by the treatment system. This information is used to calculate the maximum quantity of each pollutant that can be received at the wastewater treatment plant (WWTP) and still meet all applicable criteria.
Implementation	Specification of how Technically Based Local Limits will be applied and which users will require routine monitoring.
Industrial Test Data	Monitoring data collected from the discharge point for each industry. For use in local limits, flow is also required to convert to the mass of pollutants contributed to the treatment system.
Industrial User	Any user that is involved in commercial business practice that discharges wastewater that was generated as part of the commercial process at a rate that exceeds domestic strength or volume to the point that its effluent requires regulation to protect the POTW treatment process.

Industry-specific Limit	A limit established in individual industrial permits to limit discharge of pollutants that could interfere with WWTP processes or excessively use WWTP treatment capacity. Industry-specific limits are placed directly into industrial permits, as specified in the Guidance Manual (Table 6-2, row three) and are based on a non-uniform allocation of the capacity or maximum allowable industrial loading (MAIL) available to industry. Limits may be based on a range of rationales, from implementation of BMPs to requirements to install treatment equipment sufficient to protect the WWTP. Ideally, the POTW owner allocates pollutant loadings in a manner that does not favor any one industry or group of industries, considers the economic impacts, maintains compliance with the National Pollutant Discharge Elimination System (NPDES) permit, and otherwise achieves the environmental goals of the program.
Inhibition	Inhibition occurs when pollutant levels in a POTW's wastewater or sludge cause operational problems for biological treatment processes involving secondary or tertiary wastewater treatment and alter the POTW's ability to adequately remove BOD, TSS, and other pollutants.
Interference (positive/negative)	Laboratory test methods are based on attributes of the parameters being tested. Other materials or sample attributes can interfere with achieving an accurate assessment of the parameter being tested. When the result that is obtained is higher than the actual value, this is referred to positive interference. When the result is lower than the actual value, the interference is referred to as negative interference.
Land Application	Land application is the process of spreading treated wastewater sludge onto land for agricultural purposes, improving the land's nutrient and organic matter content. Land application is subject to regulatory requirements under 40 CFR 503.
Landfill Option	Disposal of sludge in an approved landfill. The landfilling of sludge is subject to regulations in 40 CFR 257.
Lower Explosive Limits (LEL)	The minimum concentration in air at which a gas or vapor will explode or burn in the presence of an ignition source.
Maximum Allowable Headworks Loading (MAHL)	The estimated maximum loading of a pollutant that can be received at a POTW's headworks without causing pass-through of POCs or interference with treatment processes. The most protective (lowest) of the AHLs estimated for a pollutant.
Maximum Allowable Industrial Loading (MAIL)	The estimated maximum loading of a pollutant that can be received at a POTW's headworks from all permitted industrial users and other controlled sources without causing pass-through of POCs or interference with treatment processes. The MAIL is usually calculated by applying a safety factor to the MAHL and discounting for uncontrolled sources, hauled waste, and growth allowance.
Method Detection Limit (MDL)	The minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is present as determined by a specific laboratory method in 40 CFR Part 136, Appendix B.

Minimum Level (ML)	Minimum Level (ML) is the term used by EPA instead of LOQ; it is defined as the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all of the method-specified sample weights, volumes, and processing steps have been followed.
Non-conservative Pollutant	Pollutants that are presumed to be destroyed, biodegraded, chemically transformed, or volatilized within the POTW to some degree.
Non-domestic Discharge	Any discharge to the collection system from a permitted source.
Other Permitted User	A source of discharge to the POTW that has been given a discharge permit, but does not fit the definition of categorical or significant industrial user.
Overall Removal Rate	The percent removal of a specific pollutant that occurs from the point of industrial waste discharge to the NPDES-specified WWTP discharge point.
Partition Coefficient	The percent of a specific pollutant removed across a process or the system, synonymous with “Removal Factor” and “Removal Coefficient.”
Physical Treatment	Treatment that uses a physical process to reduce pollutants, make pollutants easier to treat, or render them less objectionable. Examples include settling of particles and shredding of rags and debris.
Platinum-Cobalt (Pt-Co) Scale	The Platinum-Cobalt (Pt-Co) scale is a measure of color where each unit of the scale is defined as the color induced by dissolving 1 mg/L of platinum in water using cobalt platinate as the solute.
Plug Flow	Plug flow is the flow of materials through a pipe or treatment processes that does not appreciably mix contents with flow that occurred earlier or later in time.
Pollutant of Concern (POC)	Any pollutant that might reasonably be expected to be discharged to the POTW in sufficient amounts and/or concentrations to pass through treatment in objectionable concentrations, interfere with the treatment process, contaminate sludge, cause problems in the collection system, or jeopardize workers.
Positive Interfering Material	A substance that causes a higher than accurate result in a laboratory tests.
Primary Removal Rate	The percent removal of a specific pollutant that occurs from the point of entry to the point of exit from a primary clarifier. For a system with multiple treatment processes, the primary removal rate is used in calculating biological treatment inhibition.
Reference Values	Numeric values that have been determined in research studies to apply to similar processes. Most information is taken from EPA’s 2004 Guidance Manual on Development of Local Limits (EPA Publication EPA 833-R-04-002A). Also refer to Book Values.
Removal Coefficient	The percent of a specific pollutant removed across a process or the system, synonymous with “Removal Factor” and “Partition Coefficient.”
Removal Factor	The percent of a specific pollutant removed across a process or the system, synonymous with “Removal Coefficient” and “Partition Coefficient.”

Scrubber Equipment	Equipment installed specifically to remove a pollutant from the waste stream. In the context of local limits, scrubber equipment is used to remove metals from emissions from incinerated waste.
Significant Industrial User (SIU)	As defined in 40 CFR 403.3, all users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N; and any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, non-contact cooling and boiler blowdown wastewater); contributes a process waste stream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].
Site (System) Characterization	A description of the wastewater system including size, capacity, unit processes used, and industries that discharge to the system and receiving stream. The purpose of the site characterization is to create a record of what was present at the time of local limits development for future comparison when determining whether new limits are needed.
Sludge Disposal Option	The method selected to dispose of the solid materials removed from wastewater. The most frequently used options include, but are not limited to, burial in a landfill site, application to land for agricultural purposes, incineration, or conversion to commercial fertilizer.
Sludge Removal Step	Any step in a wastewater treatment plant that removes solid or semi-solid materials from the waste stream.
Standard Calculations	Calculations that follow exact equations specified in EPA's 2004 Local Limits Development Guidance (EPA Publication EPA 833-R-04-002A) for each of the treatment processes found within a WWTP.
Surfactant	Surfactants are compounds that lower the surface tension between two liquids or between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants. Surfactants may be anionic or cationic, with the vast majority being cationic. Surfactant limits are based on methylene blue active substances, which are anionic and are chiefly introduced into the wastewater stream from detergents.
Surrogate	A value adopted to complete a calculation when a true value is not available because the test data are below the ML. In such cases, EPA guidance indicates that the ML, one-half of the ML, or zero may be used. Unlike book values, surrogates are not based on previous studies or data and can cause very high differences in the removal rates calculated and consequently the final local limit. Surrogates are not used in this local limits derivation except when the effluent is below the ML and the influent is high enough to indicate that a removal rate is present.