City of Arts & Innovation

PUBLIC WORKS DEPARTMENT

City of Riverside Public Works Department

Riverside Regional Water Quality Control Plant Local Limit Study

Local Limit Study

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ACRONYMS AND ABBREVIATIONS

ADRE	Average Daily Removal Efficiency
AHL	Allowable Headworks Loading
BOD_5	5-day Biochemical Oxygen Demand
CFR	Code of Federal Regulations
COD	Chemical Oxygen Demand
CWA	Clean Water Act
DAF	Dissolved Air Floatation
gpd	Gallons per Day
IPP	Industrial Pretreatment Program
IU(s)	Industrial User(s)
MAHL(s)	Maximum Allowable Headworks Loading(s)
MAIL(s)	Maximum Allowable Industrial Loading(s)
MGD	Million Gallons per Day
MRE	Mean Removal Efficiency
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
POC(s)	Pollutant(s) of Concern
POTW	Publicly Owned Treatment Works
RWQCB	Regional Water Quality Control Board
SAF	Suspended Air Floatation
SIU(s)	Significant Industrial User(s)
STEL(s)	Short-Term Exposure Limit(s)
SUO	Sewer Use Ordinance
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
TOC	Total Organic Carbon
TWA-TLV	Time-Weighted Average Threshold Limit Value
UCL(s)	Uniform Concentration Limit(s)
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
VOC	Volatile Organic Compounds
WQBEL(s)	Water Quality-Based Effluent Limitation(s)
WQS(s)	Water Quality Standard(s)
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

1.1. Background

The City of Riverside's Wastewater Division is responsible for the collection and treatment of wastewater flows generated within the City of Riverside (City) as well as the community services districts of Jurupa, Rubidoux, Edgemont, and the community of Highgrove. The City's sewer collection system consists of over 800 miles of gravity sewers ranging from 4 to 51 inches in diameter, 414 miles of sewer laterals that are City owned, and 20 wastewater pump stations. Sewage collected by this system is treated at the City of Riverside's Regional Water Quality Control Plant (RWQCP), which provides preliminary, primary, secondary, and tertiary treatment.

To protect the RWQCP and other Publicly Owned Treatment Works (POTWs), the U.S. Environmental Protection Agency (USEPA) developed the National Pretreatment Program, as a core part of the National Pollutant Discharge Elimination System (NPDES) Pretreatment Standards, to protect water quality by reducing the level of pollutants discharged by industries and other nondomestic wastewater sources into POTWs. This National Pretreatment Program is required by the Clean Water Act (CWA) and codified in the General Pretreatment Regulations (40 Code of Federal Regulations (CFR) Part 403 – General Pretreatment Regulations for Existing and New Sources of Pollutants).

As such, these Federal Regulations (40CFR Part 403.8) require the City to develop and implement technically-based local discharge limits (local limits) to control discharge of conventional and toxic pollutants entering the RWQCP from industrial users (i.e., controllable sources). These local limits are based on a treatment plant's headworks analysis of maximum allowable pollutant loadings and the identification and characterization of contributing sources. The objectives of local limit assessment and application are to prevent:

- interference with WWTF treatment operations
- pass-through of conventional and toxic pollutants
- contamination of municipal biosolids, and
- worker exposure to chemical hazards.

These local limits are needed to eliminate serious problems that can occur when industrial wastewaters are discharged into the sewage system. Toxic industrial pollutants may pass through the RWQCP and pollute a receiving water body, thus posing a threat to public health and the environment. To that end, this Local Limit Study has been prepared to identify, analyze, and present updated Local limits for the City's use. These local limits will be developed to protect the City's treatment plant, the sewer system, sludge, and receiving water from potentially harmful pollutants in industrial and commercial discharges.

1.2. Scope

The purpose of this Local Limits Study (LL Study) is to develop and recommend local limits for the City of Riverside in accordance with the USEPA pretreatment regulations and continue the City of Riverside's compliance with their NPDES discharge permit. This LL Study expands on the Sampling Plan prepared for the City and will focus on the identification of pollutants of concern (POCs), flow and load analysis, maximum allowable headworks loadings (MAHL) analysis, as well as summarize the methodology used for the development of these local limits.

Additionally, the City's existing local limits will be reviewed and updated to incorporate the new findings. This LL Study will examine opportunities to relax or remove currently adopted limit levels while still providing the necessary protections to public safety, City staff, treatment processes, City assets, and beneficial reuse. The findings herein will ensure that the limit levels are updated to reflect the City's current industrial landscape and regional needs.

1.3. Wastewater Treatment and Collection System Summary

The General Pretreatment Regulations require that POTWs develop and implement their local limits based on site-specific conditions. To accomplish this, a careful understanding of the RWQCP treatment processes and sewer landscape along with the pollutant concentrations must first be examined. The City's collection system landscape is identified herein.

1.3.1. Riverside RWQCP

The RWQCP has a rated capacity of approximately 46 million gallons per day (mgd) and currently discharges treated effluent pursuant to Order No. R8-2013-0016 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0105350. The RWQCP resides within Region 8 of the governing Regional Water Quality Control Board (RWQCB) and discharges into Reach 3 of the Santa Ana River.

The RWQCP consists of two secondary treatment plants (Plants 1 and 2), a tertiary treatment train that treats the flow from both Plants, and solids handling facilities for biosolids treatment. Plant 1 consists of an MBR treatment train while Plant 2 consists of an activated sludge treatment (ACT) train. Preliminary treatment consists of bar screening and vortex bar screening where the flow is then diverted to the two treatment trains to the primary clarifiers. Plant 1's secondary treatment consists of five (5) aeration basins and eight (8) membrane bioreactors (MBR). Plant 2's secondary treatment consists of six (6) aeration basins, and four (4) secondary clarifiers. Tertiary treatment consists of equalization basins, dual media filtration (16 filter), and three (3) chlorine contact basins.

Finally, solids handling includes dissolved air flotation (DAF) thickeners, four (4) anaerobic digesters, and final dewatering via two (2) belt presses and two (2) centrifuges. Currently, the dewatered biosolids are being land applied off-site in Arizona. The waste activated sludge (WAS) from the secondary treatment processes from both the solids separated via membranes from the MBR treatment train (Plant 1) and clarifiers from the ACT treatment train (Plant 2) are combined and thickened in the DAF to a solids concentration of about 6 percent. The solids are then blended and transported to the digesters. RWQCP also uses a Fats, Oils, and Grease (FOG) Receiving and Rendering Station (Co-Digestion Station) to screen and subsequently pump to the sludge blending tanks. The receiving station is a packaged system where trucks hauling septic waste can deliver FOG to the RWQCP. The digesters then process the blended solids from primary treatment, the DAF thickeners, and FOG receiving station in the absence of air. Stabilized sludge after digestion is stored in a digested sludge storage tank before it is transferred to the screw presses, dewatering belt presses, and centrifuge for further processing.

1.3.2. Industrial and Non-Industrial Users

Non-industrial users consist of residential and commercial dischargers which make up most of the influent flow to the RWQCP. The City owns and operates a wastewater collection system that receives wastewater from approximately 5,400 commercial and residential wastewater accounts. These non-industrial users are classified as "uncontrolled sources" along with inflow and infiltration (I&I). They are considered uncontrolled sources since pretreatment regulations do not regulate domestic sources. Knowing the relative contributions of uncontrolled sources is important to determining the amount of loading allowable to industrial users.

The City currently permits 12 industrial users to discharge into its treatment works that contribute to the overall flow entering the RWQCP. The RWQCP receives wastewater from the following significant dischargers:

1. Corona College Heights
2. Evergreen
3. Garden Highway Foods
4. J.C. Grease Buyers
5. Kroger Company Creamery
6. OSI Industry
7. Pepsi Beverages
8. Prudential Overall Supply
9. Rohr Groundwater
10. Stremicks Heritage
11. Triple H Food Processors
12. Von Zabern Surgical

Although there are additional industries within the City's service area that contribute to industrial flow, these have been identified as significant industrial users (SIUs). These SIUs have the biggest impact on pollutant loadings due to their industrial processes.

1.4. Project Methodology

To determine the appropriate local limit implementation procedures, a MAHL must be identified for each pollutant of concern. A MAHL is the estimated maximum loading of a pollutant that can be received at the headworks and is based on the most stringent allowable headworks loading (AHL). This is identified by first calculating the various AHL for that pollutant which is dependent on multiple regulatory and environmental criterion. An allowable headworks loading is the estimated loading of a pollutant that can be received without causing the treatment plant to violate a particular operational restriction or environmental criterion. The most stringent AHL becomes the MAHL.

Developing and implementing the local limits using the MAHL approach will be accomplished by the following five (5) steps recommended in the 2004 Local Limit Guidance.

1) <u>Determine the Pollutants of Concern (POCs)</u>: As a first step, the pollutants to be evaluated to determine the need for local limits will be identified. The known environmental criteria (e.g. NPDES limits, water quality criteria, sludge quality criteria, etc.) will be applied to screening pollutants.

2) Collect and Analyze Data: After identifying the POCs, the data used in MAHL calculations will be collected by sampling and analysis of selected wastewater streams, sludge, commercial and domestic discharge (Refer to Appendix I).

3) Calculate MAHLs for each POC: AHLs for each POC will be calculated based on WWTP removal efficiency and on environmental criteria for pass-through and interference. The most stringent AHL will determine the MAHL.

4) Designate and Implement Local Limits: The MAHLs will be compared with the actual and potential loadings for determination of local limits. If needed, appropriate local limits will be developed. The process includes determining the amount of each pollutant that can be allocated to industrial users (IUs), submitting a development package to the Approval Authority for review and approval, incorporating the local limits into local law, and applying the local limits to the IUs.

5) Address Collection System Concerns: Collection system concerns such as fires and explosions, corrosion, flow obstructions, high temperature, and toxic gases, vapor or fumes will be addressed, and limits set as necessary.

2. LOCAL LIMITS DEVELOPMENT

This section addresses the applied methodology, assumptions, and approach used during development of the local limits for industrial dischargers to the RWQCP. The primary reference for conducting this analysis was the USEPA's 2004 Local Limits Development Guidance (2004 Local Limits Guidance). These local limits were derived from identifying POCs that need to be addressed, evaluation of sample data received, and calculation of pollutant criteria to support analysis of the maximum allowable pollutant loadings for the RWQCP.

2.1. Identification of Pollutants of Concern

In accordance with the 2004 Local Limits Guidance, a POC is defined as any pollutant that might reasonably be expected to be discharged to the wastewater treatment plant in sufficient amounts to cause pass-through or interfere with the treatment process; cause problems in the collection system; jeopardize its workers; cause operational problems; or exceed the California Water Quality Standards (WQS) or NPDES permit effluent limitations.

In addition, the USEPA has identified 15 national POCs often found in POTWs that should commonly be included in all preliminary screening investigations. Moreover, the City also has existing local limits for pollutants it has determined to be of concern. These existing local limits will be included in the screening investigations to ensure that the limit levels are updated to reflect the City's current industrial landscape and treatment processes.

In summary, a pollutant is considered a potential POC if it meets any of the following screening criteria.

1. A pollutant is on USEPA's list of 15 pollutants that a WWTP should assume to be of concern.
2. A pollutant has a pre-existing local limit.
3. A pollutant is limited by a permit or applicable environmental criteria.
4. A pollutant has caused operational problems in the past.
5. A pollutant has important implications for the protection of the treatment works, collection system, or the health and safety of WWTP workers.

Analysis of these POCs, once identified, will determine which POCs need to be controlled to meet these federal, state, and local requirements.

2.2. Regulatory Review

To determine the environmental standards and statutory requirements specific to the RWQCP, the following regulatory standards were reviewed:

- NPDES Permit No. CA0105350 (2013)
- 40 CFR Part 131, Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California (2000)
- Federal Sewage Sludge Standards (1995)
- Process Inhibition Threshold Values for Activated Sludge and Nitrification
- Discharge Screening Levels based on Explosivity and Fume Toxicity (2002)
- OSHA, ACGIH and NIOSH Exposure Levels (2002 and 2003)

An in-depth review of these regulatory requirements along with the allowable thresholds for each potential contaminant is provided in the following sections.

2.2.1. NPDES Permit

The current NPDES permit for the City regulates the treatment plant discharge effluent for BOD5, TSS, total ammonia (as nitrogen), and cyanide. The effluent limitations for both BOD5 and TSS are 20 mg/L as an average monthly and 30 mg/L as an average weekly. The average monthly percent removal of BOD5 and TSS should not be less than 85 percent. The effluent limitation for total ammonia is 5.0 mg/L as a monthly average. Cyanide (free) in the effluent must not exceed a daily maximum of 8.5 ug/l with a monthly average limit of 4.2 ug/L. These effluent limitations are without 20:1 Dilution in the receiving water. **Table 1** below presents a summary of the NPDES final effluent limitations.

Table 1: Summary of NPDES Effluent Limitations

Parameters	Effluent Limitations			
	Units	Average Monthly	Average Weekly	Maximum Daily
BOD_5 at 20°C	mg/L	20	30	-
TSS	mg/L	30	30	-
Total Ammonia as Nitrogen	mg/L	5.0	-	
Cyanide (free)	µg/L	4.2	-	8.5

2.2.2. Water Quality-Based Effluent Limitations (WQBELs)

The Current NPDES permit does not contain effluent limitations for toxic pollutants other than cyanide; however, the final effluent quality is governed by the California Surface WQSs and should meet WQBELs applicable to Reach 3 of the Santa Ana River, which is the ultimate discharge point of treatment plant effluent. WQSs have been established for protection of freshwater aquatic life, human health, and wildlife. For all parameters that have the reasonable potential to cause or contribute to a concentration above a WQS, numeric WQBELs are established.

For the applicable water quality standards pollutants, two (2) sources were referenced: City's 1995 Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) and Clean Water Act Priority Pollutants and the Federal Water Quality Criteria within Appendix D of USEPA's LL Guidance. **Table 2** below summarizes the water quality criteria established for priority pollutants that have been detected in the effluent of the WWTP.

Additionally, UESPA's current enforceable drinking water standard for Fluoride was added to the criteria. This limit was taken as 2.0 mg/L per their secondary drinking water standards for surface waters.

Table 2: Water Quality-Based Effluent Limitation – Basin Plan

Pollutant	mg/L
TDS	700
Hardness	350
Sodium	110
Chloride	140
Total Inorganic Nitrogen	10
Sulfate	150
COD	30
Boron	0.75

Source: 1995 Water Quality Control Plan for the Santa Ana River Basin.

Table 3: Summary of Pertinent Water Quality-Based Effluent Limitation

Parameter	Most Stringent Criteria µg/L	Fresh Water		Human Health for Consumption of Organisms Only µg/L
		Acute µg/L	Chronic µg/L	
Arsenic	150	340	150	-
Cadmium	2.2	4.3	2.2	-
Copper	31	52	31	-
Lead	19	477	19	-
Mercury	0.051	-	-	0.050
Nickel	169	1,516	169	610
Selenium	5	20	5	-
Silver	44	44	-	-
Zinc	340	388	388	9,100

Source: Appendix D of the 2004 Local Limits Guidance.

2.2.3. Sludge Quality Standards

The sludge generated at the RWQCP is hauled off site and is being land applied off-site in Arizona. The sludge quality standards for land application are established by federal sludge regulations (40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge), as presented in **Table 4** below. Each state can establish its own sludge use and disposal standards as long as they are at least as stringent or protective as the federal requirement. USEPA recommends that wastewater treatment facilities consider the attainment of the "Clean Sludge" standards from 40 CFR 503, and that achievement of these standards is consistent with the objectives of the National Pretreatment Program.

Table 4: Sludge Land Application Limits

Pollutant	Ceiling Concentration mg/kg	Monthly Average Pollutant Concentration (Clean Sludge) mg/kg	Cumulative Pollutant Loading Rate kg/hectare	Annual Pollutant Loading Rate kg/hectare/365 days
Arsenic	75	41	41	2
Cadmium	85	39	39	1.9
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum	75	-	-	-
Nickel	420	420	420	21
Selenium	100	100	100	5
Zinc	7,500	2,800	2,800	140

Source: 40 CFR 503.13, Tables 1-4 and Appendix E of the 2004 Local Limits Guidance.

2.2.4. Process Inhibition Criteria

In addition to pollutants with NPDES effluent limitations, USEPA recommends that a WWTP consider pollutants that may interfere with POTW operation to be potential POCs. The RWQCP operates an activated sludge process train to remove organics, solids, and ammonia (i.e. nitrification) in the wastewater. Inhibition threshold levels for activated sludge, nitrification, and digesters were obtained from the 2004 Local Limits Guidance. **Table 4** summarizes the inhibition threshold levels pertinent to RWQCP.

Table 5: Literature Inhibition Values (Most Stringent Values)

Pollutants	Activated Sludge Inhibition Threshold (mg/L)	Nitrification Inhibition Threshold (mg/L)	Digester Inhibition Threshold (mg/L)
Ammonia	480	-	8,000
Arsenic	0.1	1.5	1.6
Cadmium	1 - 10	5.2	20
Chloride	-	180	-
Chromium (Total)	1 - 100	0.25 - 1.9	110
Copper	1	0.05 - 0.48	40
Cyanide	0.1 - 5	0.34 - 0.5	100
Lead	1 - 5	0.5	340
Mercury	0.1 - 1	-	-
Nickel	1.0 - 2.5	0.25 - 0.5	136
Zinc	0.3 - 5	0.08-0.5	400

Source: Appendix G of the 2004 Local Limits Guidance.

2.2.5. Collection System Criteria

Explosive and flammable pollutants discharged to the RWQCP can accumulate and threaten the collection system, as well as the health and safety of plant workers; therefore, local limits should regulate the discharge of these pollutants. In Appendix I of the 2004 Local Limits Guidance, discharge screening levels for explosivity and fume toxicity are evaluated.
The fume toxicity of pollutants discharged to the RWQCP can cause an adverse health effect if the plant worker is exposed to these pollutants. The time-weighted average threshold limit value (TWA-TLV) and short-term exposure limits (STELs) for gases that pose the threat of acute or chronic health effects in people can be found in Appendix I of the 2004 Local Limits Guidance.

Additionally, volatile organic compound (VOC) vapors can be toxic and carcinogenic, potentially leading acute and chronic health effects when plant workers are exposed to these VOC vapors. Also, acidic discharges can combine with nonvolatile substances which then produce toxic gases and vapors (e.g. sulfide and cyanide to hydrogen sulfide and hydrogen cyanide). To respond to this, local limits based on the maximum recommended levels of these POCs should be established. A list of pollutants and the NIOSH, OSHA, and ACGIH guidelines and exposure levels can be found in Appendix J of the 2004 Local Limits Guidance.

2.3. Screening

LEE+RO conducted a preliminary screening investigation of potential POCs specific to the RWQCP. Initial screening included review of USEPA's 15 national pollutants and review of available City data to investigate which of the above pollutants were observed at the facility. Identification of these pollutants would be followed by an extensive sampling period to confirm the continued presence of the pollutant along with its concentration level.

2.3.1. Methodology

To identify POCs, various types of pollutant information were reviewed. Most of the data provided by the City for review were readily available from monitoring data collected by the City for regulatory compliance. The following data were compiled and reviewed to identify the pollutants that should be evaluated further to determine the need for local limits:

- Annual RWQCP priority pollutants analysis data for 2016 to 2020
- Annual and Bi-Monthly Biosolids Report for 2019 and 2020
- Monthly influent and effluent self-monitoring reports for 2019 and 2021

The data were also reviewed to ensure that the influent and/or effluent priority pollutant scans contained the following pollutants:

- Toxic pollutants designated in the NPDES permit and/or State WQSs that apply to the RWQCP effluent or receiving water stream segment (i.e. Santa Ana River)
- Organic toxic pollutants and toxic metals listed in 40 CFR Part 122, Appendix D, Table II and Table III
- Any toxic pollutants and hazardous substances required to be identified by existing dischargers if expected to be present, as listed in 40 CFR Part 122, Appendix D, Table V
- Any pollutants that are present and may cause a potential impact to the collection system, treatment works, worker health and safety, or air quality
- Any pollutants that may impact treatment performance (i.e. process inhibition criteria)
- Any pollutants in sludge listed in 40 CFR 503 Standards for the Use or Disposal of Sewage Sludge
- Any pollutants that are recommended by the Regional Water Quality Control Board (RWQCB)

2.4. Selection of POCs

Based on the above pollutant screening analysis, the following **29 pollutants** were identified as potential POCs and selected for further evaluation.

1. <u>National POCs</u>

The USEPA has identified 15 pollutants often found in WWTP sludge and effluent that it considers potential POCs. The following are national POCs listed in 2004 Local Limits Guidance.

○ Arsenic	○ Cadmium	○ Molybdenum
○ Chromium	○ Copper	○ Selenium
○ Cyanide	○ Lead	○ BOD5
○ Mercury	○ Nickel	○ TSS
○ Silver	○ Zinc	○ Ammonia

The USEPA recommends that each POTW, at a minimum, screen for the presence of these 15 national pollutants using data collected from samples of influent, effluent, and sludge.

2. Pre-Existing Local Limits

The City also has existing local limits for pollutants it has adopted since 2018. These limits are per the City Resolutions 20295, 21185, and 23286.

- Arsenic
- Boron
- Cadmium
- Chloride
- Chromium
- Copper
- Cyanide
- Fluoride
- Lead
- Manganese
- Mercury
- Nickel
- Silver
- Sodium
- Sulfate
- Zinc
- COD
- Oil/Grease
- TSS
- TDS
- Total hardness
- Total Nitrogen
- Flashpoint
- pH

3. Pollutants Limited by Permit or Other Environmental Criteria

As discussed, the NPDES permit contains effluent limitations for BOD5, TSS, ammonia-nitrogen, and cyanide (free). Additionally, the NPDES has requirements for influent and effluent monitoring of certain pollutants. Additional pollutants observed from the process inhibition, and biosolid restrictions were included for this analysis culminating in the summary table below, **Table 6**.

Table 6: Summary of POCs to be Sampled and Evaluated

#	*Pollutant*	National POCs	NPDES Permit	EPA Priority Pollutants	Existing Local Limit	Process Inhibition	Biosolids Restrictions
Conventional							
1.	Ammonia as N	X	X			X	
2.	Biochemical Oxygen Demand (BOD)	X	X				
3.	Chemical Oxygen Demand (COD)		X[1]		X		
4.	Chloride				X	X	
5.	Fluoride				X		
6.	Oil and Grease		X		X		
7.	Sulfate		X[1]		X	X	
8.	Total Dissolved Solids (TDS)		X		X		
9.	Total Inorganic Nitrogen (TIN)		X				
10.	Total Nitrogen				X		
11.	Total Suspended Solids (TSS)	X	X		X		
12	Total Hardness		X[1]		X		
Metals & Cyanide							
13.	Arsenic	X	X	X	X	X	X
14.	Boron				X		
15.	Cadmium	X	X	X	X	X	X
16.	Chromium (Total)	X			X		
17.	Copper	X	X	X	X	X	X
18.	Lead	X	X	X	X	X	X
19.	Manganese				X		
20.	Mercury	X	X	X	X	X	X
21.	Molybdenum	X					X
22.	Nickel	X	X	X	X	X	X
23.	Selenium	X	X	X			X
24.	Silver	X	X	X	X	X	
25.	Sodium		X[1]		X		
26.	Zinc	X	X	X	X	X	X
27.	Cyanide (Total)	X	X	X	X	X	
Other Site-Specific Pollutants							
28.	Bromide[2]						

[1]Limit obtained from Basin Plan.

[2]Pollutant identified by staff as a site-specific potential concern.

These pollutants were included in the Sampling Plan prepared for the City and lab samples were obtained for analysis herein as described in greater detail in the following section. Varying analytical methods were evaluated for TDS including the typical SM 2540C for compliance with the NPDES Permit. The analytical method SM 1030E for TDS by Summation was also included to provide additional sampling data to have the option to discount Ca2+ and Mg2+ from the calculations for facilities which the POTW requests a reagent substitution which would benefit the treatment works. The intent herein is that facilities could be credited for using Ca2+ or Mg2+ as replacements in their reagents (these cations provide necessary alkalinity and potentially enhance settling properties during treatment). Thus, using SM 1030E and then utilizing a credit for Ca2+ and Mg2+ at some facilities will allow to reduce their calculated "Total Dissolved Inorganic Solids" yet provide stabilization of waste in the collection system and beneficial alkalinity to the RWQCP. As such, DIS through this analytical method will serve as an alternative limit to impose on industrial dischargers and for incorporation into permits that would accomplish the necessity of controlling their discharges to protect the POTW from those discharges that would actually contribute to pass-through, yet not include dissolved organics which would be removed by the treatment process.

Moreover, it is noteworthy to address that although the City's NPDES permit requires monitoring of the Basin Plan pollutant constituents, the NPDES Fact Sheet for Order No. 01-3, NPDES No. CA 0105350 (refer to Appendix C) for the City's application for the renewal of waste discharge requirements concluded that there is no reasonable potential for the waste discharge to cause or contribute to violations of water quality objectives for individual mineral constituents: boron, chloride, fluoride, sodium, sulfate, and total hardness. As such, the NPDES issuance reflects there are no effluent limitations for these constituents, and consequently, the City of Riverside is currently amending their existing local limits to remove sodium, sulfate, and chloride from their local limits as part of these changes. Accordingly, these pollutants are also removed from further analysis within this LL Study since these pollutants were only included due to their effluent limitations in the Basin Plan.

2.5. Sampling of Identified POCs

USEPA recommends that the POTW conduct lab sampling for any pollutant found in the priority pollutant preliminary scans of the influent, effluent, or sludge to determine whether the pollutant should be listed as a POC. Although a pollutant is initially considered as a potential POC, the POTW may determine, based on the pollutant's concentration and allowable loading analysis, that the pollutant need not be selected as a POC for the RWQCP.

As such, a thorough sampling plan was prepared for the City providing the sampling guidelines to determine the presence of each pollutant in the Project. Using this sampling plan, the City conducted two (2) separate sampling events in June and December of 2023. These sampling collection efforts were processed and the lab results were provided for use in the following MAHL analysis. Refer to the Sampling Plan attached as **Appendix A** of this Study.

These sampling results hold the foundation of the following analysis. This sampling was used to support the determination of current pollutant loadings, calculate pollutant-removal efficiencies, and determine site-specific inhibition thresholds.

3. FLOW AND LOAD ANALYSES

This section will discuss the flow and loading evaluation to determinate the pollutant load distribution by residential, commercial, and industrial dischargers. Current wastewater flow and loading were based on RWQCP's influent flow data and the 2013 Sewer Master Plan to determine the flow distribution between residential, commercial, and industrial flows that are not directly metered.

3.1. Flow Analyses

This flow analysis was used to identify the respective flow proportions to determine the source loading for each sector. A breakdown of the various sources is discussed below.

3.1.1. Influent Flow

The influent flow was determined from measurement of the total wastewater flow into the treatment works. The measurement of wastewater flow includes all sources: residential, commercial, and industrial. This data was provided by the City's influent meter and was approximately 26.79 MGD.

3.1.2. Controlled Flow

Controlled flow includes industrial dischargers, hauled waste, and specific commercial users that the City intends to regulate with numerical local limits. Since these major dischargers are equipped with meters and self-monitoring requirements, the wastewater flow generated by these industrial users is considered the controlled flow.

The recorded wastewater flow from these SIU's for FY 2023 was approximately 0.779 MGD.

3.1.3. Uncontrolled Flow

Non-industrial users consist of residential and commercial dischargers including I&I which make up most of the influent flow to the RWQCP. As discussed, these are considered uncontrolled sources since pretreatment regulations do not meter or regulate the discharge from these sources.

To determine the relative contribution from each source, uncontrolled flow was separated into residential and commercial flows based on land use percentages from the Master Plan. These percent flows were used to determine the pollutant loading from each source.

Volume 3 of the 2013 Master Plan provides a breakdown of land use acreage and respective flow per land use type. These land use acreages and flow for residential and commercial were grouped to identify the percentage breakdown for the City. Based on this, residential land use was observed as 85% of the City's allocation with Commercial being 15% when accounting for total industry and open space land uses. Applying this percent breakdown to the RWQCP's influent flow minus the SIU recorded flow resulted in approximately 22.07 MGD for residential dischargers and 3.94 MGD for commercial dischargers.

3.1.4. Summary of Flow

The following table summarizes the total influent flow, comprising flow from controlled and uncontrolled sources, for RWQCP.

Table 7: Influent Flow Summary

Dischargers	Wastewater Flow (mgd)
RWQCP Influent Flow	26.79
Controlled Flow	0.78
Uncontrolled Flow	26.02
Wastewater Flow from Residential Users	22.07
Wastewater Flow from Commercial Users	3.94

3.2. Load Analyses

The pollutant loadings for uncontrolled wastewater were calculated for use in determining the maximum allowable industrial loading (MAIL), which is the maximum loading that can be received at the RWQCP's headworks from all permitted industrial users. To estimate the MAIL, pollutant loadings from uncontrolled sources need to be subtracted from the MAHL. Residential and commercial loadings were calculated by multiplying the average residential and commercial pollutant concentrations obtained during the sampling period from the respective residential and commercial sampling locations, by estimated wastewater flow (see **Table 7**). Refer to **Table 8** for the summary of the uncontrolled source loadings for the RWQCP.

Sampling representative of typical residential wastewater was conducted at four (4) different locations selected by the City. Similarly, the sampling for commercial wastewater was also conducted at four (4) locations selected by the City to represent the various commercial dischargers. Sampling frequencies, procedures, and analytical methods followed the recommendations of the 2004 Local Limits Guidance, 40 CFR Part 136, and Guidelines Establishing Test Procedures for the Analysis of Pollutants. The Local Limits Sampling Plan prepared for the City is presented in **Appendix A**.

RWQCP influent loadings are also presented in **Table 8**. WWTP influent loadings will be compared to the MAHL for each POC to determine the need for local limits. When the average influent loading of pollutants exceeds 60 percent of the MAHL or when the maximum daily influent loading of pollutants exceeds 80 percent of the MAHL, local limits are needed. Further detail will be discussed in Chapter 5.

Table 8: Pollutant Concentration and Loading Summary – Uncontrolled Sources

Pollutants	Uncontrolled Sources				WWTP Influent	
	Residential		Commercial			
	Conc. (mg/L)	Loading (lb/day)	Conc. (mg/L)	Loading (lb/day)	Conc. (mg/L)	Loading (lb/day)
1. Ammonia-Nitrogen	42	7,736	38	1,238	39	8,808
2. Arsenic	0.0034	0.62	0.0045	0.15	0.0033	0.74
3. BOD_5	258	47,499	573	18,856	305	68,095
4. Boron	0.40	74	0.25	8	0.41	92
5. Bromide	0.11	21	0.11	4	0.12	27
6. Cadmium	ND	-	ND	-	ND	-
7. COD_5	518	95,435	1,022	33,635	716	159,959
8. Chromium (total)	ND	-	0.0056	0.18	0.0045	0.99
9. Copper	0.09	17	0.10	3	0.11	24
10. Cyanide (Total)	0.0084	2	ND	-	ND	-
11. Fluoride	0.59	108	0.63	21	0.59	132
12. Inorganic Nitrogen (Total)	42	7,751	38	1,237	39	8,808
13. Lead	ND	-	ND	-	ND	-
14. Manganese	0.0185	3	0.0257	0.85	0.0315	7
15. Mercury	0.0002	0.03	0.00021	0.01	0.00015	0.03
16. Molybdenum	0.0042	0.78	0.0043	0.14	0.0055	1.24
17. Nickel	ND	-	0.0043	0.14	0.0038	0.84
18. Selenium	ND	-	ND	-	ND	-
19. Silver	ND	-	ND	-	ND	-
20. Total Dissolved Solids	561	103,181	708	23,298	580	129,609
21. TDS by Summation	611	112,410	600	19,727	624	139,478
22. Total Hardness	210	38,680	175	5,758	218	48,603
23. Total Nitrogen	52	9,506	54	1,791	52	11,639
24. Total Suspended Solids	218	40,210	216	7,113	251	56,150

Pollutants	Uncontrolled Sources				WWTP Influent	
	Residential		Commercial			
	Conc. (mg/L)	Loading (lb/day)	Conc. (mg/L)	Loading (lb/day)	Conc. (mg/L)	Loading (lb/day)
25. Zinc	0.12	21	0.10	3	0.17	38
26. Oil and Grease	26	4,717	34	1,120	25	5,615

4. REMOVAL EFFICIENCIES

The removal efficiency is the fraction or percentage of the influent pollutant loading that is removed from the waste stream across the entire wastewater treatment works or specific wastewater treatment unit within the works. To calculate MAHLs, the removal efficiency values for each POC must be determined.

4.1. Summary of Removal Efficiency Formulas

There are three main types of removal efficiency calculation methodologies: 1) Average Daily Removal Efficiency (ADRE), 2) Mean Removal Efficiency (MRE), and 3) Decile Method. The appropriate removal efficiency methodology depends upon data quantity and quality.

4.1.1. Average Daily Removal Efficiency (ADRE)

The ADRE is calculated by first determining the daily removal efficiency for each pair of influent and effluent values (i.e., an influent value and an effluent value from the same sampling day). These sets of daily removal efficiencies are then averaged to determine the ADRE for a pollutant. To use the ADRE method, both an influent and an effluent data point for each specific sampling day are required, and the influent value must be greater than zero.

$$R_{WWTP} = \frac{\sum(I_N - E_{WWTP,N})/I_N}{N}$$

$$R_{PRIM} = \frac{\sum(I_N - E_{PRIM,N})/I_N}{N}$$

$$R_{SEC} = \frac{\sum(I_N - E_{SEC,N})/I_N}{N}$$

where,	R_{WWTP}	=	Plant removal efficiency from headworks to plant effluent, as a decimal
	R_{PRIM}	=	Removal efficiency from headworks to primary treatment effluent, as a decimal
	R_{SEC}	=	Removal efficiency from headworks to secondary treatment effluent, as a decimal
	I_N	=	WWTP influent pollutant concentration at the headworks, mg/L
	$E_{WWTP,N}$	=	WWTP effluent pollutant concentration, mg/L
	$E_{PRIM,N}$	=	Primary treatment effluent pollutant concentration, mg/L
	$E_{SEC,N}$	=	Secondary treatment effluent pollutant concentration, mg/L
	N	=	Paired observations, numbered 1 to N

4.1.2. Mean Removal Efficiency (MRE)

The MRE is calculated by using the same formula as for the ADRE, but instead of using individual influent and effluent values, the average of all influent values and the average of all effluent values are used in the equation. Unlike the ADRE method, the MRE method does not require paired influent and effluent values.

$$R_{WWTP} = \frac{\overline{I_r} - \overline{E_{WWTP,t}}}{\overline{I_r}}$$

$$R_{SEC} = \frac{\overline{I_r} - \overline{E_{SEC,y}}}{\overline{I_r}}$$

$$R_{PRIM} = \frac{\overline{I_r} - \overline{E_{PRIM,x}}}{\overline{I_r}}$$

Where,			
	R_{WWTP}	=	Plant removal efficiency from headworks to plant effluent, as a decimal
	R_{PRIM}	=	Removal efficiency from headworks to primary treatment effluent, as a decimal
	R_{SEC}	=	Removal efficiency from headworks to secondary treatment effluent, as a decimal
	I_r	=	WWTP influent pollutant concentration at headworks, mg/L
	$E_{WWTP, t}$	=	WWTP effluent pollutant concentration, mg/L
	$E_{PRIM, x}$	=	Primary treatment effluent pollutant concentration, mg/L
	$E_{SEC, y}$	=	Secondary treatment effluent pollutant concentration, mg/L
	t	=	Plant effluent samples, numbered 1 to t
	r	=	Plant influent samples, numbered 1 to r
	x	=	Primary treatment effluent samples, numbered 1 to x
	y	=	Secondary treatment effluent samples, numbered 1 to y

4.1.3. Decile Method

Unlike the above methods, the decile method considers how often the actual daily removal efficiency will be above or below a specified removal rate. The decile method requires at least nine daily removal efficiency values based on paired sets of influent and effluent data. By sorting daily removal efficiency from highest to lowest, it calculates the percentage of the daily removal efficiency. The decile method is similar to a data set median but it divides the ordered data set into 10 equal parts. 10 percent of the data set is below the first decile; 20 percent of the data is below the second decile, etc. The fifth decile is equivalent to the data set medium. The USEPA recommends using the seventh decile removal for calculating sludge quality-based AHLs and third decile removal for calculating water quality-based AHLs.

4.2. Sources of Removal Efficiency Data

Sample analysis data for influent and final effluent were utilized to calculate site-specific removal efficiencies using the mean removal efficiency (MRE) methodology. For pollutants that were detected in influent but not in the effluent, half of the value of the method detection level was substituted for effluent results reported as non-detected. In the absence of sufficient site-specific performance data for certain pollutants, removal efficiencies reported by USEPA (i.e. 2004 USEPA Local Limits Development Guidance, Appendix R) were used. These literature values represent median removal efficiencies from a database of 40 wastewater treatment plants.

Pollutants that were not detected in either the influent or effluent were removed from further analysis as these were considered as either not present or an issue at the RWQCP. Additionally, instances where sample results were observed to have negative removal efficiencies, these removal efficiencies were disregarded due to their potential for skewing the loading results as these instances are not considered typical. Where calculations required the use of these removal efficiency values, that analysis is unable to be carried out and thus also removed from the analysis. Removal efficiency calculations for POCs are shown in **Appendix B**.

4.3. Selection of Representative Removal Efficiency

The removal efficiencies for each pollutant are included in the following **Table 9**. Where possible, removal efficiencies for the POCs were calculated from site-specific data. Removal efficiencies for arsenic, cadmium, cyanide (total and free), lead, mercury, and molybdenum, which had insufficient data to calculate site-specific values, were cited from 2004 USEPA Local Limits Development Guidance.

Table 9: Final Effluent Removal Efficiency Summary

POCs	Removal Efficiency	Source
1. Ammonia-Nitrogen	99.6%	Sampling Data (MRE)
2. Arsenic	37%	Sampling Data (MRE)
3. BOD_5	99.3%	Sampling Data (MRE)
4. Boron	3%	Sampling Data (MRE)
5. Bromide	57%	Sampling Data (MRE)
6. Cadmium	50%	2004 USEPA Local Limits Guidance
7. COD_5	97.4%	Sampling Data (MRE)
8. Chromium (total)	72%	2004 USEPA Local Limits Guidance
9. Copper	85%	2004 USEPA Local Limits Guidance
10. Cyanide (total)	66%	2004 USEPA Local Limits Guidance
11. Fluoride	6%	Sampling Data (ADRE)
12. Inorganic Nitrogen (Total)	86%	Sampling Data (MRE)
13. Lead	52%	2004 USEPA Local Limits Guidance

POCs	Removal Efficiency	Source
14. Manganese	27%	Sampling Data (MRE)
15. Mercury	67%	2004 USEPA Local Limits Guidance
16. Molybdenum	32%	Sampling Data (MRE)
17. Nickel	17%	2004 USEPA Local Limits Guidance
18. Selenium	ND	Not Detected
19. Silver	62%	2004 USEPA Local Limits Guidance
20. Total Dissolved Solids	3%	Sampling Data (ADRE)
21. TDS by Summation	5%	Sampling Data (MRE)
22. Total Hardness	4%	Sampling Data (ADRE)
23. Total Nitrogen	88%	Sampling Data (MRE)
24. TSS	99.9%	Sampling Data (MRE)
25. Zinc	81%	Sampling Data (MRE)
26. Oil and Grease	76%	Sampling Data (MRE)

As observed from the City’s sampling results, Cadmium, Cyanide, Lead, Selenium, and Silver were not detected in the influent or effluent of the RWQCP nor detected in the residential or commercial sampling and are thus removed from the need for local limit implementation and further analysis.

5. MAHL ANALYSES

The MAHL is an estimate of the upper limit of pollutant loading to a POTW and is intended to prevent pass-through or interference. The MAHL is the maximum pollutant load in pounds per day that the POTW can receive without exceeding regulatory criteria or experiencing plant operation upset. The MAHL analysis for a single POC is calculated in following three steps:

- Determine POTW removal efficiency for the POC (Section 4)
- Calculate the allowable headworks loading (AHL) for each environmental criterion (Section 5)
- Designate as the MAHL the most stringent AHL for the POC (Section 5).

The following sections provide discussions on these calculations.

5.1. AHL Analysis

To determine the MAHL, the various AHL must first be calculated to determine the most stringent criteria. AHL is the estimated maximum loading of a pollutant that can be received at the POTW headworks based on the various regulatory and environmental criteria. An AHL is calculated for each applicable criterion: water quality, sludge quality, and the various forms of interference. The AHLs for each POC are calculated using the applicable environmental criteria, source flow rates, and treatment process removal efficiencies. After calculating the series of AHLs for each POC, the lowest AHL is typically chosen as the MAHL.

AHLs were calculated based on the following applicable criteria:

- NPDES Permit No. CA0105350 (2013)
- RWQCP Design Capacity (for conventional pollutants)
- California Water Quality Standards (WQS, May 2000))
- Plant Inhibition: 1) Activated Sludge Inhibition, 2) Nitrification Inhibition, and 3) Digester Inhibition
- Sludge Quality Standards.

Local limits development uses a mass-balance approach to determine the AHLs and calculates the amount of loading received at the POTW headworks that will still meet the environmental or treatment plant criteria that apply to each pollutant. In calculating AHLs, steady-state equations were used for conservative pollutants such as metals because the amount of pollutant loading was conserved throughout the treatment process.

5.1.1. NPDES Permit AHL

The NPDES permit limit is the most effective means of restricting the discharge of toxic substances. The AHL based on the NPDES permit limit was calculated for each POC using the following equation:

$$AHL_{NPDES} = \frac{(8.34)\,(C_{NPDES})\,(Q_{WWTP})}{(1 - R_{WWTP})}$$

Where,	AHL_{NPDES}	=	AHL based on NPDES permit limit, lb/day
	C_{NPDES}	=	NPDES permit limit, mg/L
	Q_{WWTP}	=	WWTP average flow rate, MGD

R_{WWTP}	=	WWTP removal efficiency from headworks to plant effluent, as a decimal
8.34	=	Conversion factor

The AHL calculations based on NPDES permit limits are presented in **Appendix B**.

5.1.2. Water Quality Standards AHL

The NPDES permit does not have effluent discharge limits for all of the POCs established during the local limits study. For these pollutants, the USEPA recommends basing the AHL on California WQS. California WQSs provide allowable water quality criteria to protect public health and particular water bodies. By using the equation below and maximum pollutant level in the California WQSs, the AHL based on WQS was calculated for each POC.

$$AHL_{WQS} = \frac{(8.34)\ (C_{WQS})(Q_{WWTP})}{(1 - R_{WWTP})}$$

Where,	AHL_{WQS}	=	AHL based on water quality criteria, lb/day
	C_{WQS}	=	California WQS, mg/L
	Q_{WWTP}	=	WWTP average flow rate, MGD
	R_{WWTP}	=	WWTP removal efficiency from headworks to plant effluent, as a decimal
	8.34	=	Conversion factor

The AHL calculations based on WQS are presented in **Appendix B**.

5.1.3. Plant Process Inhibition AHL

Certain pollutant levels in wastewater or sludge can cause operational problems for biological treatment processes. Disruption or inhibition by pollutants (especially metals) can interfere with a treatment process's ability to remove BOD5 and other pollutants. Although the RWQCP has not experienced any past inhibition problems, the determination of AHLs based on biological process inhibition criteria can prevent future loadings that may cause inhibition.

The 2004 USEPA Local Limits Development Guidance provides literature-based inhibition data for activated sludge, digester, and nitrification. Inhibition-based AHLs were calculated for secondary treatment processes, including activated sludge and nitrification, using these values. Where ranges of values were given, the most stringent was selected.

The AHL calculations based on inhibition threshold values are presented in **Appendix B**.

5.1.4. Activated Sludge Inhibition AHL

The equation below was used to calculate AHLs based on activated sludge inhibition. The RWQCP's MBR treatment process is considered an activated sludge treatment since MBR incorporates elements of the activated sludge process. The equation calculates the AHL for conservative pollutants such as metals. **Table 10** presents the threshold concentration of activated sludge inhibition from Appendix G of the 2004 USEPA Local Limits Development Guidance.

$$AHL_{AS} = \frac{(8.34)\left(C_{AS\_INHIBI}\right)(Q_{WWTP})}{(1 - R_{PRIM})}$$

Where,	AHL_{AS}	=	AHL based on activated sludge inhibition, lb/day
	C_{AS_INHIBI}	=	Activated sludge inhibition criteria, mg/L
	Q_{WWTP}	=	WWTP average flow rate, MGD
	R_{PRIM}	=	Removal efficiency from headworks to primary treatment effluent, as a decimal
	8.34	=	Conversion factor

Table 10: Activated Sludge Inhibition Threshold Levels

Pollutants	Inhibition Threshold Level (mg/L)
Ammonia	480
Arsenic	0.1
Cadmium	1
Chromium	1
Copper	1
Cyanide (total)	0.1
Lead	1
Mercury	0.1
Nickel	1.0
Zinc	0.3

Source: USEPA 2004 Local Limits Development Guide Appendix G

5.1.5. Nitrification Inhibition AHL

The equation below was used to calculate AHLs based on nitrification inhibition. The equation calculates the AHL for conservative pollutants such as metals. **Table 11** below presents the threshold concentration of nitrification inhibition from Appendix G of the 2004 USEPA Local Limits Development Guidance.

$$AHL_{NITRI} = \frac{(8.34)\left(C_{NITRI\_INHIBI}\right)(Q_{WWTP})}{(1 - R_{PRIM})}$$

Where,	AHL_{NITRI}	=	AHL based on nitrification inhibition, lb/day
	C_{NITRI_INHIBI}	=	Nitrification inhibition criteria, mg/L
	Q_{WWTP}	=	WWTP average flow rate, MGD
	R_{PRIM}	=	Removal efficiency from headworks to primary treatment effluent, as a decimal
	8.34	=	Conversion factor

Table 11: Nitrification Inhibition Threshold Levels

Pollutants	Inhibition Threshold Level (mg/L)
Arsenic	1.5
Cadmium	5.2
Chromium	0.25
Copper	0.5
Cyanide	0.34
Lead	0.5
Nickel	0.25
Zinc	0.4

Source: USEPA 2004 Local Limits Development Guide Appendix G

5.1.6. Digester Inhibition AHL

The equation below was used to calculate AHLs based on nitrification inhibition. The equation calculates the AHL for conservative pollutants such as metals. **Table 12** below presents the threshold concentration of nitrification inhibition from Appendix G of the 2004 USEPA Local Limits Development Guidance.

$$AHL_{DGSTR} = \frac{(8.34)\left(C_{DGST\_INHIBI}\right)\left(Q_{DGST}\right)}{R_{POTW}}$$

where,

AHL_{DGSTR}	=	AHL based on nitrification inhibition, lb/day
C_{DGST_INHIBI}	=	Digester inhibition criteria, mg/L
Q_{DGST}	=	WWTP average flow rate, MGD
R_{POTW}	=	Removal efficiency from headworks to primary treatment effluent, as a decimal
8.34	=	Conversion factor

Table 12: Digester Inhibition Threshold Levels

Pollutants	Inhibition Threshold Level (mg/L)
Ammonia	8,000
Arsenic	1.6
Cadmium	20
Chromium	110
Copper	40

Pollutants	Inhibition Threshold Level (mg/L)
Cyanide	100
Lead	340
Nickel	136
Silver	65
Sulfate	1,000
Zinc	400

Source: USEPA 2004 Local Limits Development Guide Appendix G.

5.1.7. Sludge Quality AHL

According to 40 CFR 503, Standards for the Use or Disposal of Sewage Sludge, pollutant levels are established for three disposal alternatives: land application, surface disposal, and incineration. The current RWQCP's NPDES permit specifies that all sludge and/or solids generated at the treatment plant are to be disposed, treated, or applied to land in accordance with 40 CFR Part 503. Regardless of how the RWQCP disposes of sludge, the 2004 USEPA Local Limits Development Guidance recommends considering use of land application "clean sludge" values from 40 CFR 503.13 in AHL calculations. Use of these criteria can improve a plant's beneficial use options for disposal of sludge. Furthermore, these standards are consistent with the objectives of the National Pretreatment Program listed at 40 CFR 403.2.

40 CFR 503 establishes limitations for nine common metals (arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc).

The equation below was used to calculate the AHLs based on sludge land application.

$$AHL_{SLDG} = \frac{(8.34)\ (C_{SLGSTD})(\frac{PS}{100})\ (Q_{SLDG})(G_{SLDG})}{R_{WWTP}}$$

Where,

Where,	AHL_{SLDG}	=	AHL based on sludge, lb/day
	C_{SLGTD}	=	Sludge standard – "Clean Sludge" at 40 CFR Part 503, mg/L
	PS	=	Percent solids of sludge to disposal
	Q_{SLDG}	=	Total sludge flow rate to disposal, MGD
	R_{WWTP}	=	Removal efficiency from headworks to plant effluent, as a decimal
	G_{SLDG}	=	Specific gravity of sludge, kg/L
	8.34	=	Conversion factor

The AHL calculations based on biosolids criteria are presented in **Appendix B**.

5.2. AHL Results and MAHL Selection

To determine the MAHL, the various AHLs were calculated and compared. Selection of the most stringent was selected.

Table 13: Summary of AHLs and Selection of MAHLs

	AHLs Calculated								
	NPDES Permit (lb/day)	**WQS (Basin Plan)** (lb/day)	**WQS (CWA Criteria)** (lb/day)	**Activated Sludge Inhibition** (lb/day)	**Nitrification Inhibition** (lb/day)	**Digester Inhibition** (lb/day)	**Sludge Quality** (lb/day)	**MAHL Identified** (lb/day)	**Governing Criteria**
1. Ammonia-Nitrogen	319,137	-	-	N/A	-	11,650	-	**11,650**	Digester Inhibition
2. Arsenic	-	-	121	28	424	6.2	4.5	**4.5**	Sludge Quality
3. BOD_5	680,954	-	-	-	-	-	-	**680,954**	NPDES Permit
4. Boron	-	173	173	-	-	-	-	**173**	WQS
5. Bromide	-	-	-	-	-	-	-	**NA**	None (no criteria limit)
6. Cadmium	-	-	1.9	263	1,367	58	3.2	**1.9**	WQS
7. COD_5	258,617	-	-	-	-	-	-	**258,617**	WQS
8. Chromium (total)	-	-	-	306	582	222	-	**222**	Digester Inhibition
9. Copper	-	-	60	342	164	61	65	**60**	WQS
10. Cyanide (total)	2.8	-	14	31	153	220	-	**2.8**	NPDES Permit
11. Fluoride	-	-	477	-	-	-	-	**477**	WQS
12. Inorganic Nitrogen (Total)	-	15,858	-	-	-	-	-	**15,858**	WQS
13. Lead	-	-	30	520	260	949	24	**24**	Sludge Quality
14. Manganese	-	-	15	-	-	-	-	**15**	WQS
15. Mercury	-	-	0.9	27	-	-	1.1	**0.9**	WQS
16. Molybdenum	-	-	-	-	-	-	9.7	**20.47**	Sludge Quality
17. Nickel	-	-	127	260	65	1,161	103	**65**	Nitrification Inhibition

18. Selenium	-	-	N/A	-	-	-	N/A	**NA**	None (No removal efficiency)
19. Silver	-	-	2.0	-	-	152	-	**2.0**	WQS
20. Total Dissolved Solids	150,195	161,748	-	-	-	-	-	**150,195**	NPDES Permit
21. TDS by Summation	150,195	161,748	-	-	-	-	-	**150,195**	NPDES Permit
22. Total Hardness	-	81,713	-	-	-	-	-	**81,713**	WQS
23. Total Nitrogen	-	-	-	-	-	-	-	**NA**	None (no criteria limit)
24. TSS	3,053,488	-	-	-	-	-	-	**3,053,488**	NPDES Permit
25. Zinc	-	-	138	127	212	720	144	**127**	Activated Sludge Inhibition
26. Oil and Grease	-	-	-	-	-	-	-	**NA**	None (no criteria limit)

5.3. Comparison of Influent Loadings and MAHLs for Determination of Need of Local Limits

Comparison of the influent loadings and MAHLs for the RWQCP were performed to determine which pollutants have the need for local limits. The summaries of influent loadings and the calculated MAHLs for the RWQCP are presented in **Table 13** and discussed herein. The 2004 USEPA Local Limits Development Guidance suggests that local limits are needed when the following criteria are satisfied:

- Average influent loading of a toxic pollutant exceeds 60 percent of the MAHL
- Maximum daily influent loading of a toxic pollutant exceeds 80 percent of the MAHL any time in the 12-month period preceding the analysis
- Monthly average influent loading reaches 80 percent of average design capacity for BOD, TSS, and ammonia during any one month in the 12-month period preceding the analysis

Most of the influent pollutant loadings at the RWQCP were observed to be below the calculated MAHLs and did not meet the stated criteria for local limit implementation. However, Ammonia, Chemical Oxygen Demand, and Total Dissolved Solids were observed to exceed their respective MAHL requiring the need for local limit implementation. The average influent loading and maximum daily influent loading of these pollutants exceeded 60 percent and 80 percent of the MAHL, respectively. Additionally, Biological Oxygen demand, although meeting the MAHL threshold, was observed to be exceeding 80% of the RWQCP's design capacity suggesting the need for local limits.

It is recommended that the City establish local limits for the identified pollutants above to prevent increases in loadings from current industrial users and/or loadings from new industrial users from reaching levels that could jeopardize facility performance. Except for these pollutants identified above, the remaining pollutants are unlikely to cause problems for the RWQCP's performance at current loadings. Determination of the value for the new limits are addressed in the following sections.

Table 14: Comparison of RWQCP Influent Loadings to MAHLs

POCs	MAHL (lb/day)	60% of MAHL (lb/day) (A)	Average Influent Loading (lb/day) (B)	New Local Limits Required? (B) > (A)	80% of MAHL (lb/day) (C)	Maximum Influent Loading (lb/day) (D)	New Local Limits Required? (D) > (C)	80% of Design Capacity (lb/day) (E)	Monthly Average Influent Loading (lb/day) (F)	New Local Limits Required? (F) > (E)
1. Ammonia-Nitrogen	11,650	6,990	8,808	**Yes**	9,320	9,609	**Yes**	5,006	8,808	**Yes**
2. Arsenic	4.5	2.7	0.7	No	3.6	1.1	No	-	-	-
3. BOD_5	680,954	408,572	68,095	No	544,763	72,402	No	52,737	68,095	**Yes**
4. Boron	173	104	92	No	138	116	No	-	-	-
5. Bromide	N/A	N/A	27	N/A	N/A	47	N/A	-	-	-
6. Cadmium	1.9	1.2	ND	No	2	ND	No	-	-	-
7. COD_5	258,617	155,170	159,959	**Yes**	206,893	185,475	**Yes**	117,989	159,959	**Yes**
8. Chromium (total)	222	133	1.0	No	177	1.1	No	-	-	-
9. Copper	60	36	24	No	48	27	No	-	-	-
10. Cyanide (total)	14.5	8.7	ND	No	11.6	ND	No	-	-	-
11. Fluoride	477	286	132	No	381.5	156	No	-	-	-
12. Inorganic Nitrogen (Total)	15,858	9,515	8,808	No	12,686	9,609	No	-	-	-
13. Lead	24	14	ND	No	19	ND	No	-	-	-
14. Manganese	15	9	7	No	12	8.5	No	-	-	-
15. Mercury	0.9	1	0.03	No	0.76	0.042	No	-	-	-
16. Molybdenum	9.7	6	1.2	No	7.74	1.4	No	-	-	-
17. Nickel	65	39	0.8	No	52	0.98	No	-	-	-
18. Selenium	N/A	N/A	ND	No	N/A	ND	No	-	-	-
19. Silver	2.0	1.2	ND	No	1.60	ND	No	-	-	-
20. Total Dissolved Solids	150,195	90,117	129,606	**Yes**	120,156	145,251	**Yes**	-	-	-
21. TDS by Summation	150,195	90,117	139,478	**Yes**	120,156	145,251	**Yes**	-	-	-

22. Total Hardness	81,713	49,028	48,603	No	65,370	53,631	No	-	-	-
23. Total Nitrogen	N/A	N/A	11,639	**N/A**	N/A	13,631	No	-	-	-
24. TSS	3,053,488	1,832,093	56,150	**No**	2,442,790	73,296	No	48,268	56,150	**Yes**
25. Zinc	127	76	38	No	102	47	No	-	-	-
26. Oil and Grease	N/A	N/A	5,615	N/A	N/A	10,950	N/A	-	-	-

6. DESIGNATING AND IMPLEMENTING LOCAL LIMITS

This section describes control strategies for pollutants including Maximum Allowable Industrial Loadings (MAILs) and numeric local limits. MAILs were calculated using estimates of loadings from uncontrolled sources and hauled waste, a safety factor, and a growth allowance.

6.1. MAIL Analyses

MAHLs are estimates of the maximum combined loadings that can be received at the RWQCP's headworks from all sources, whereas MAILs represent the pollutant loadings the RWQCP can receive from controlled sources including industrial users that the RWQCP chooses to control through local limits. The MAIL was calculated from the MAHL by subtracting estimate of loadings from uncontrolled sources, loadings from hauled waste, and growth allowance. The MAHL is further adjusted with a safety factor. The estimated MAHLs for the pollutants under the Study are presented in **Table 14**. The MAIL was calculated for each POC using the following equation:

$$MAIL = MAHL\ (1 - SF) - (L_{UNC} + HW + GA)$$

Where,	MAIL	=	Maximum allowable industrial loading, lb/day
	MAHL	=	Maximum allowable headworks loading, lb/day
	SF	=	Safety factor
	L_{UNC}	=	Loadings from uncontrolled sources, lb/day
	HW	=	Loadings from hauled waste, lb/day
	GA	=	Growth allowance

Since the City of Riverside has expanded over the years, it is assumed the City is close to reaching buildout. As such, no growth allowance was included in this analysis. A safety factor of 10 percent was used for this analysis to provide conservative results since that is the minimum recommended by USEPA. Additionally, the RWQCP accepts hauled waste, as represented in the grab samples designated "septic". These sample concentrations were averaged and multiplied by the estimated flow received from the hauled waste source. The flow from this source was assumed to be the volume of a standard heavy-duty tanker of 9,000 gallons with the RWQCP receiving an average of 10 trucks as a typical day from previous discussions with City staff. This flow results in approximately 0.09 MGD.

6.2. Numeric Limits

The uniform concentration limit (UCL) method was adopted for allocating MAILs for conservative pollutants. The UCL method generates values for the individual pollutant limits which apply to all industrial users. It requires that the MAIL for each pollutant be divided by the total flows from all controlled dischargers. In general, this method is the most stringent allocation approach, but easiest to administer.

$$C_{LIM} = \frac{MAIL}{(Q_{CONT})(8.34)}$$

Where, C_{LIM} = Uniform concentration limit, mg/L
MAIL = Maximum allowable industrial loading, lb/day
Q_{CONT} = Total flow rate from industrial and other controlled sources, MGD
8.34 = Conversion factor

Table 15 below summarizes the calculated MAIL and UCLs for each pollutant.

Table 15: Summary of Maximum Allowable Industrial Loadings and Local Limits

Pollutants	MAHL (lbs/day)	Loadings from Uncontrolled Sources (lbs/day)	MAIL (lbs/day)	Local Limits (mg/L)	MAHL-Based Local Limits
Ammonia-Nitrogen	11,650	8,974	1,408	217	**Yes**
Arsenic	5	1	3.30	0.51	No
BOD_5	680,954	66,355	545,402	83,993	**Yes**
Boron	173	83	72	11.0	No
Bromide	N/A	24	N/A	N/A	No
Cadmium	2	ND	ND	ND	No
COD_5	258,617	129,069	96,382	14,843	**Yes**
Chromium (total)	222	ND	ND	ND	No
Copper	60	21	31	4.7	No
Cyanide (total)	3	ND	11.43	1.76	No
Fluoride	477	128	300	46	No
Inorganic Nitrogen (Total)	15,858	8,988	5,181	798	No
Lead	24	ND	ND	ND	No
Manganese	15	4	8.6	1.3	No
Mercury	0.95	0.04	0.81	0.13	No
Molybdenum	10	0.92	7.64	1.18	No
Nickel	65	0.14	58.24	8.97	No

Pollutants	MAHL (lbs/day)	Loadings from Uncontrolled Sources (lbs/day)	MAIL (lbs/day)	Local Limits (mg/L)	MAHL-Based Local Limits
Selenium	N/A	ND	N/A	N/A	No
Silver	2	ND	ND	ND	No
Total Dissolved Solids	150,195	126,479	8,186	1,261	**Yes**
TDS by Summation	150,195	132,137	2,143	330	**Yes**
Total Hardness	81,713	44,438	28,440	4,380	No
Total Nitrogen	No Criteria	11,297	N/A	N/A	No
TSS	3,053,488	47,323	2,693,122	414,746	No
Zinc	127	24	83	13	No
Oil and Grease	N/A	5,837	N/A	N/A	Yes

7. COLLECTION SYSTEM-BASED LIMITS

The 2004 USEPA Local Limits Development Guidance also recommends that POTWs analyze whether there is a need to develop local limits for their collection system to meet the requirements found in the City's Municipal Code Section 14.12.335 for Prohibited Waste Dischargers and 40 CFR 403.5(b), which include protecting the health and safety of workers at the RWQCP. These collection system-based limits protect the RWQCP from fire and explosions, corrosion, flow obstructions, high-temperature, toxic gases, vapors, and fumes. Each of these are discussed in the sections below.

7.1. Fire and Explosions

The General Pretreatment Regulations prohibit the discharge of pollutants that will cause a fire or explosion hazard in the POTW. To protect against fires and explosions, the City's existing Ordinance Section 14.12.335(d) and 40 CFR 403.5(b), prohibits discharge of pollutants with a fire or explosive hazard.

> *City Ordinance 14.12.355(d) prohibits: Pollutants which create a fire or explosive hazard in the POTW or sewer lines, including, but not limited to, waste streams or materials with a closed-cup flashpoint of less than 140 degree Fahrenheit or 60 degrees Celsius using the test methods specified in 40 CFR 261.21.*

Due to this, it is recommended that the City's local limit for flashpoint remain less than 140 degrees Fahrenheit.

7.2. Corrosion

General Pretreatment Regulations prohibit discharges of pollutants that will cause corrosive structural damage to a POTW. The City's existing Municipal Code and local limit prohibits against discharge of wastewater with a pH less than 5.0 or more than 11.5.

> *City Ordinance 14.12.355(p) prohibits: Any wastewater having a corrosive property capable of causing damage to the POTW, City sewer or storm drain system, equipment, or structures, or harm to POTW personnel. However, in no case shall wastewater be discharged to the City's POTW with a pH below 5.0, or greater than 11.5, or which changes treatment plant influent pH to above 8.0 or below 6.5, or which would otherwise be considered hazardous.*

Due to this, it is recommended that the City's local limit for pH remain 5.0-11.5 S.U.

7.3. Flow Obstruction

General Pretreatment Regulations prohibit discharge of solid or viscous pollutants that obstruct wastewater flow to the RWQCP. The greatest threat of obstruction comes from polar fats, oils, and grease of animal and vegetable origin. These pollutants can accumulate and congeal in the collection system, pump stations, and RWQCP, obstructing influent flow, reducing pipe and pump capacities, interfering with the treatment processes and instruments, reducing treatment capacity, and increasing operations and maintenance cost.

> *City Ordinance 14.12.355(a) prohibits: Any earth, sand, silt, rocks, ashes, cinders, spent lime, stone, stone cutting dust, carbon fines, ion-exchange resin fines, gravel, plaster, concrete, glass, metal filings, metal or plastic objects, garbage, grease, viscera, paunch manure, medical waste, bones, hair, hides, or fleshings, whole blood, feathers, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastic, tar, asphalt residues, residues from refining or processing fuel or lubrication oil and similar substances, other pollutant, or solid, semi-solid or viscous material in quantities or volume which may obstruct, either partially or completely, the flow of sewage in the collection system or any object which may cause the blockage, either partially or completely, of a sewer or sewage lift pump, or interfere with the normal operation of the POTW.*

Although there is no AHL-based local limit of oil and grease, the existing oil and grease limit (i.e. 250 mg/L) has proven effective in preventing accumulation of oil and grease in the collection system and at the treatment plant that could create blockages and other maintenance issues. Due to this, it is recommended that the City’s local limit for oil and grease remain 250 mg/L with an instantaneous maximum limit of 350 mg/L.

7.4. Temperature

The City’s existing ordinance contains a specific prohibition against discharges having a temperature greater than 140 degrees Fahrenheit (or 60 degrees Celsius) or which will inhibit biological activity at the RWQCP resulting in interference. Any discharge that causes the temperature at the POTW headworks to exceed 104 degrees Fahrenheit (or 40 degrees Celsius) is also prohibited.

> *City Ordinance 14.12.355(i) prohibits: Any substance or heat in amounts that will inhibit biological activity in the City's POTW resulting in interference or which will cause the temperature of the sewage in any public sewer to be higher than 140 degrees Fahrenheit. In no case shall any substance or heat be discharged to the sewer that will raise the treatment plant's influent higher than 104 degrees Fahrenheit (40 degrees Celsius).*

8. CONCLUSIONS AND RECOMMENDATIONS

Twenty-eight (28) pollutants along with pH and Flashpoint were initially identified as POCs in developing local limits for the RWQCP. Of these initial pollutants, chloride, sodium, and sulfate were removed due to the City's Basin Plan updates while Cadmium, Cyanide, Lead, Selenium, and Silver were removed after review of the sampling results due to non-detection in the influent or effluent of the RWQCP, and residential and commercial sampling. The remaining 21 pollutants were investigated and MAHL and MAIL analyses were conducted for these conventional pollutants to determine the need for local limits.

8.1. Pollutant Summary

The recommended local limits for pollutants are described below and apply to all industrial users. These limitations would be implemented as a daily maximum allowable concentration limit for all industrial dischargers.

1) **Ammonia-Nitrogen.** The average influent loading was calculated to be approximately 76 percent of the MAHL and thus meets the criteria for local limit implementation.

   However, the RWQCP has shown its processes result in 100 percent removal efficiency of ammonia-nitrogen and it is currently not a concern. Moreover, it is observed that the City currently does not have a local limit for ammonia but instead has a limit for Total Nitrogen. Thus, it is recommended that ammonia continue to be regulated through the limit of Total Nitrogen. The calculated limit for ammonia can be used to update the new limit for Total Nitrogen since ammonia along with Inorganic nitrogen, Nitrate as N, and Nitrite as N combined comprise the makeup of Total Nitrogen. Using the sample data for the other chemical composition constituents, the recommended UCL for Total Nitrogen is 305 mg/L. Refer to the paragraph on Total Nitrogen for continued discussion.

   As such, it is recommended that the City maintain the use of Total Nitrogen as a representative for limiting ammonia-nitrogen since Total Nitrogen is already being monitored and the plant has shown its capability for 100 percent removal of ammonia. Refer to section #25 below.

2) **Arsenic.** The average influent loading was approximately 16 percent of the MAHL. A new local limit is not recommended for Arsenic.

   However, the City has an existing limit of 0.18 mg/L for Arsenic which is more stringent than the calculated UCL of 0.51mg/L based on sludge quality criteria of 41 mg/kg. As such, it is recommended that the City maintain its current limit of 0.18 mg/L.

3) **Biological Oxygen Demand.** The average influent loading for BOD was only 10 percent of the MAHL. However, the monthly average influent loading exceeds 80% of the RWQCP's design capacity thus meeting the criteria for local limit implementation. As such, BOD may be added as a new local limit. It is recommended that the UCL for BOD of 83,900 mg/L be established and implemented as a daily maximum allowable concentration limit for all industrial dischargers.

However, BOD can also be monitored through the use of COD which is already a local limit for the City. Using COD as a local limit to control BOD is preferable due to COD's ability to provide a more comprehensive measure of the total organic load in wastewater. COD measures the amount of oxygen required to chemically oxidize both biodegradable and non-biodegradable organic compounds, offering a broader assessment and quality of the waste stream compared to BOD, which only accounts for biodegradable material. By setting COD limits, the City can more effectively ensure overall compliance with water quality standards and better manage both immediate and long-term impacts by reducing the overall organic load entering the facility.

As such, it is recommended that the City maintain the use of COD as a representative for limiting BOD since COD is already being monitored. Refer to section #7 below.

4) **Boron.** The average influent loading accounted for 53 percent of the MAHL. A new local limit is not recommended for boron.

   However, the City has an existing limit of 5.2 mg/L for boron which is more stringent than the calculated UCL of 11 mg/L based on water quality standard criteria concentration of 0.75 mg/L. As such, it is recommended that the City maintain its current limit of 5.2 mg/L.

5) **Bromide.** Bromide, and more specifically, Chlorodibromomethane and Dichlorobromomethane are new pollutants the State is beginning to address. However, due to their complex breakdown into trihalomethanes (THMs) additional targeted sampling would be required to identify a potential local limit. However, even with targeted sampling, the percentage converted into Bromates and other reactants in the chemical breakdown would be infeasible to determine. As such, a current local limit was not possible to determine for this Study.

6) **Cadmium.** Pollutant was not detected in either the RWQCP influent, effluent, residential or commercial sample data. A new local limit is not recommended for Cadmium.

   However, the City has an existing limit of 0.15 mg/L for Cadmium. As such, it is recommended that the City maintain its current limit of 0.15 mg/L.

7) **Chemical Oxygen Demand.** The average influent loading was 62 percent of the MAHL and thus meets the criteria for local limit implementation. The recommended UCL for COD is 14,843 mg/L based on the previous Basin Plan criteria concentration of 30 mg/L.

   However, the City has an existing limit of 8,000 mg/L for COD. As such, it is recommended that the City maintain its current limit of 8,000 mg/L. As mentioned above, monitoring of COD will also serve to limit BOD concentrations. Refer to section #3 above.

8) **Chloride.** As discussed, chloride was determined to not contribute to violations of water quality. As such, the current local limit for Chloride is recommended to be removed.

9) **Chromium.** The average influent loadings for chromium was less than 1 percent of the MAHL. A new local limit is not recommended for Chromium.

However, the City has an existing limit of 0.68 mg/L for Chromium which is more stringent than the calculated UCL of 31 mg/L based on digester inhibition. As such, it is recommended that the City maintain its current limit of 0.68 mg/L.

10) **Copper.** The average influent loading accounted for 40 percent of the MAHL. A new local limit is not recommended for Copper.

    However, the City has an existing limit of 3.0 mg/L for Copper which is more stringent than the calculated UCL of 4.7 mg/L based on water quality standard criteria concentration of 0.013 mg/L. As such, it is recommended that the City maintain its current limit of 3.0 mg/L.

11) **Total Cyanide.** Pollutant was not detected in either the RWQCP influent, effluent, residential or commercial sample data. A new local limit is not recommended for Total Cyanide.

    However, the City has an existing limit of 0.17 mg/L for Cyanide. As such, it is recommended that the City maintain its current limit of 0.17 mg/L.

12) **Fluoride.** The average influent loading accounted for 28 percent of the MAHL. A new local limit is not recommended for Fluoride.

    However, the City has an existing limit of 12.0 mg/L for Fluoride which is more stringent than the calculated UCL of 46 mg/L based on EPA's current secondary drinking water standard of 2.0 mg/L. As such, it is recommended that the City maintain its current limit of 12.0 mg/L.

13) **Total Inorganic Nitrogen.** The average influent loading accounted for 56 percent of the MAHL. A local limit is not recommended for Total Inorganic Nitrogen.

14) **Lead.** Pollutant was not detected in either the RWQCP influent, effluent, residential or commercial sample data. A new local limit is not recommended for Lead.

    However, the City has an existing limit of 1.2 mg/L for Lead. As such, it is recommended that the City maintain its current limit of 1.2 mg/L.

15) **Manganese.** The average influent loading accounted for 46 percent of the MAHL. A new local limit is not recommended for Manganese.

    However, the City has an existing limit of 1.0 mg/L for Manganese which is more stringent than the calculated UCL of 1.3 mg/L based on water quality standard criteria. As such, it is recommended that the City maintain its current limit of 1.0 mg/L.

16) **Mercury.** The average influent loading was less than 5 percent of the MAHL. A new local limit is not recommended for Mercury.

    However, the City has an existing limit of 0.001 mg/L for Mercury which is more stringent than the calculated UCL of 0.13 mg/L based on the water quality standard criteria. As such, it is recommended that the City maintain its current limit of 1.0 mg/L as the daily maximum allowable concentration.

17) **Molybdenum.** The average influent loading accounted for 13 percent of the MAHL. A local limit is not recommended for Molybdenum.

18) **Nickel.** The average influent loading for nickel barely accounted for 1 percent of the MAHL. A local limit is not recommended for Nickel.

    However, the City has an existing limit of 2.3 mg/L for Nickel which is more stringent than the calculated UCL of 9 mg/L based on nitrification inhibition. As such, it is recommended that the City maintain its current limit of 2.3 mg/L.

19) **Selenium.** Pollutant was not detected in either the RWQCP influent, effluent, residential or commercial sample data. A local limit is not recommended for Selenium.

20) **Silver.** Pollutant was not detected in either the RWQCP influent, effluent, residential or commercial sample data. A new local limit is not recommended for Silver.

    However, the City has an existing limit of 0.8 mg/L for Silver. As such, it is recommended that the City maintain its current limit of 0.8 mg/L

21) **Sodium.** As discussed, Sodium was determined to not contribute to violations of water quality. As such, the current local limit for Sodium is recommended to be removed.

22) **Sulfate.** As discussed, Sulfate was determined to not contribute to violations of water quality. As such, the current local limit for Sulfate is recommended to be removed.

23) **Total Dissolved Solids.** The average influent loading based on the standard analytical method was 86 percent of the MAHL. Thus, TDS meets the criteria for local limit implementation. The recommended UCL for TDS is 1,261 mg/L.

    However, the City has an existing limit of 1,210 mg/L for TDS. As such, it is recommended that the City maintain its current limit to be conservative.

    Similarly, the average influent loading based on the TDS by Summation method was 93 percent of the MAHL. If TDS by Summation Method is used, the recommended UCL for TDS by summation was 330 mg/L and was found to be more stringent than the standard testing method and the exiting local limit of 1210 mg/L. Since the intent of the analytical method TDS by Summation was to provide greater flexibility to dischargers, it was removed from consideration as the data found it was actually more restrictive.

24) **Total Hardness.** The average influent loading was approximately 58 percent of the MAHL. A local limit is not recommended for Total Hardness.

    However, the City has an existing limit of 2,500 mg/L for Total Hardness which is more stringent than the calculated UCL of 4,380 mg/L based on previous Basin Plan water quality criteria. As such, it is recommended that the City maintain its current limit of 2.3 mg/L.

25) **Total Nitrogen.** Total Nitrogen does not have an AHL Criteria limit and was unable to be analyzed on its own. However, as discussed previously, Total Nitrogen can be regulated through the limit of Ammonia as N. Using the UCL limit for ammonia (i.e. 217 mg/L), the corresponding local limit for Total Nitrogen would be 305 mg/L. This total nitrogen limit is

based on the ratio of the sampled ammonia and total nitrogen concentrations of 37 mg/L and 52 mg/L, respectively. Total nitrogen is the sum of organic and ammonia nitrogen (TKN) plus nitrates and nitrites. Nitrates and nitrites were not detected in the RWQCP influent, so that TKN is a reasonable measure of total nitrogen in this case. A limit on total nitrogen is necessary to account for potential nitrate and nitrate discharges from industrial users in the future if nitrification pre-treatment facilities are enabled.

As such, it is recommended that the local limit for ammonia be substituted with the continued limit on Total Nitrogen. Moreover, it is recommended that the current local limit for Total Nitrogen of 500 mg/L be maintained as the RCWQCP has no current concerns due to the plant's reported capability for 100 percent removal of ammonia. The new local limit for Total Nitrogen may be reduced from the existing 500 mg/L to 305 mg/L in the future if the RWQCP begins to experience challenges in meeting its effluent limits.

26) **Total Suspended Solids (TSS).** The average influent loading for TSS is only 2 percent of the MAHL. However, the monthly average influent loading exceeds 80% of the RWQCP's original design capacity thus meeting the criteria for local limit implementation. It is recommended that TSS be added as a new local limit.

    However, the City has an existing limit of 2,000 mg/L for TSS which is more stringent than the calculated UCL of 414,746 mg/L based on the NPDES Permit. The high UCL concentration calculated is due to the MBR treatment's high removal efficiency resulting in the system's ability to handle such large concentrations. Increasing the local limit for dischargers is not recommended due to the unintended consequences this may have on instantaneous maximums experienced at the treatment works. As such, it is recommended that the City maintain its current limit of 2,000 mg/L.

27) **Zinc.** The average influent loading was approximately 30 percent of the MAHL. A local limit is not recommended for Zinc.

    However, the City has an existing limit of 6.7 mg/L for Zinc which is more stringent than the calculated UCL of 13 mg/L based on activated sludge inhibition. As such, it is recommended that the City maintain its current limit of 6.7 mg/L.

28) **Oil and Grease.** Oil and Grease did not have an AHL Criteria limit and was unable to be analyzed. The current local limit prohibits discharges in excess of 250 mg/L within a 24 hr period and instantaneous maximum concentration of 350 mg/L which has proven effective in preventing accumulation in the collection system and RWQCP. As such, it is recommended that the City maintain its current limit of 250 mg/L and instantaneous max of 350 mg/L. Restaurants should be required in a modification to the Ordinance to provide and maintain grease traps as a best management practice for reducing oil and grease loadings to the sewer system.

29) **pH.** It is recommended that the current prohibition of discharge pH of less than 5.0 or greater than 11.5 be maintained and established as the UCL.

30) **Flashpoint.** It is recommended that the City's local limit for Flashpoint be maintained and remain less than 140 degrees Fahrenheit.

Table 16: Summary of Recommended Local Limits

Pollutants	Existing Local Limit (mg/L)	Calculated Uniform Concentration Limit (mg/L)	Recommended Local Limit (mg/L)	Result
Ammonia-Nitrogen	-	217	217	Add New Limit
Arsenic	0.18	0.51	0.18	Maintain Existing
BOD_5	-	83,993	83,993	Add New Limit
Boron	5.2	11.0	5.2	Maintain Existing
Bromide	-	N/A	-	No Limit Needed
Cadmium	0.15	ND	0.15	Maintain Existing
COD_5	8,000	14,843	8,000	Maintain Existing
Chromium (total)	0.68	31	0.68	Maintain Existing
Copper	3.0	4.7	3.0	Maintain Existing
Cyanide (total)	0.17	1.76	0.17	Maintain Existing
Fluoride	12.0	46	12.0	Maintain Existing
Inorganic Nitrogen (Total)	-	798	-	No Limit Needed
Lead	1.2	ND	1.2	Maintain Existing
Manganese	1.0	1.3	1.0	Maintain Existing
Mercury	0.001	0.13	0.001	Maintain Existing
Molybdenum	-	1.18	-	No Limit Needed
Nickel	2.3	8.97	2.3	Maintain Existing
Selenium	-	N/A	-	No Limit Needed
Silver	0.8	-	0.8	Maintain Existing
Total Dissolved Solids	1,210	1,261	1,210	Maintain Existing
Total Hardness	2,500	4,380	2,500	Maintain Existing
Total Nitrogen	500	305	305	Add New Limit
TSS	2,000	414,746	2,000	Maintain Existing

Pollutants	Existing Local Limit (mg/L)	Calculated Uniform Concentration Limit (mg/L)	Recommended Local Limit (mg/L)	Result
Zinc	6.7	13	6.7	Maintain Existing
Oil and Grease	250	N/A	250	Maintain Existing
pH	5.0-11.5 S.U.	-	5.0-11.5 S.U.	Maintain Existing
Flashpoint	<140º F	-	<140º F	Maintain Existing

8.2. Septic Waste Haulers

New local limits for the acceptance of septic waste hauled into the RWQCP were also evaluated in addition to the general industrial user discharges discussed above. Currently, permits issued to Liquid Waste Haulers allow for slightly higher concentrations than those of the established industrial waste discharge limits for certain pollutants due to their typical domestic source. Based on the current sampled loading rates from this recent local limit study, it is recommended that these current permit limits be maintained at this time. Due to the high concentrations typical of septic waste characteristics, easing of these existing limits is not advisable to maintain current protections of the facility headworks and treatment processes from upset. Additional restrictions will need to be revisited in the future as the City's industrial and commercial landscape changes.