

Appendix I

PENNY CAROLO CONSIDERATIONS FOR NEXT  
PRETREATMENT LOCAL LIMITS EVALUATION



TECHNICAL MEMORANDUM

# Wastewater Treatment Facilities Plan 2020

City of Wilsonville

Date: September 13,  
2021

Project No.: 11962A.00 Task  
602

To: David Price, PE

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From: Penny Carlo, PE

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Subject: Considerations for Next Pretreatment Local Limits Evaluation

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## Introduction/Objective

The City of Wilsonville (City) Wastewater Treatment Plant (WWTP) is beginning a new industrial local limits evaluation. It will be the first update since 2004. The WWTP is an activated sludge plant and produces tertiary/UV-disinfected effluent that is discharged to the Willamette River. Biosolids are dewatered then dried in a thermal dryer to produce Class A biosolids..

The WWTP operates under the National Pollutant Discharge Elimination System (NPDES) permit #OR0022764, issued by the Oregon Department of Environmental Quality (DEQ). The City operates a state-approved industrial pretreatment program and must operate the program in compliance with the General Pretreatment Regulations (40 CFR 403). The NPDES permit requires that the City perform a technical evaluation of the local limits and update them if necessary, by February 2022. The new local limits evaluation is being conducted to comply with this permit requirement.

The purpose of this evaluation is to provide high-level comments and recommendations for consideration in the industrial local limits update. This review is intended to provide continuity with the planning and evaluation of potential WWTP upgrades in the 2020 Facilities Plan.

## Initial List of Potential Pollutants of Concern (POC)

Pertinent regulatory standards and/or limits inform the initial list of potential POCs that need to be considered in any local limits evaluation. The regulatory standards applicable to the Wilsonville WWTP local limits program are listed below.

- The City's current local limits
- NPDES permit effluent limitations
- NPDES permit biosolids metals limits for land application (40 CFR 503)
- U.S. EPA's list of 15 National POCs, established by the National Pretreatment Program

## PENNY CARLO ENGINEERING, LLC.

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In addition to requirements contained in the WWTP NPDES permit, the City's design/build/operate (DBO) agreement with Jacobs Engineering includes a daily maximum effluent ammonia concentration of 20 mg/L during the dry weather season.

Table 1 lists the specific POCs in each of the above categories. At a minimum, the City will need to consider and screen for these POCs in the local limits evaluation, to ensure the WWTP will meet requirements of the Clean Water Act, General Pretreatment Regulations, and its local pretreatment program. Other POCs may be added to the list during the evaluation, following a more detailed screening of pollutant data or if any issues of local concern are identified.

Table 1 Initial List of POCs for the Local Limits Evaluation

Pollutant	Current Local Limit	NPDES Effluent Limit	Seasonal Ammonia Effluent Limit <sup>(1)</sup>	EPA National POC	EPA Biosolids Metal <sup>(2)</sup>
Ammonia			✓	✓	
Arsenic	✓			✓	✓
BOD/CBOD		✓		✓	
Cadmium	✓			✓	✓
Chromium				✓	
Copper	✓			✓	✓
Cyanide	✓			✓	
Lead	✓			✓	✓
Mercury	✓			✓	✓
Molybdenum				✓	✓
Nickel	✓			✓	✓
pH	✓	✓			
Selenium				✓	✓
Silver	✓			✓	
TSS		✓		✓	
Zinc	✓			✓	✓

Note:

(1) City of Wilsonville and Jacobs Engineering DBO contract.

(2) Regulated pollutants for land applied biosolids (40 CFR § 503.13).

### New or Future POCs based on WWTP Regulatory Considerations (Subtask 601 Findings)

An evaluation was conducted under Subtask 601 of the Facilities Plan to identify regulatory elements that are the primary drivers for improvements to the WWTP and may trigger the need for industrial source control.

Three future POCs for the local limits program were identified:

- Phosphorous: A future WWTP effluent limit is possible when the DEQ establishes TMDLs for the Lower Willamette River, due to indications that the Willamette River is likely phosphorous limited. The timing of the TMDL and need for phosphorous treatment is not known.
  - There is currently no local limit for phosphorous. Development of a local limit to address this future regulation is not needed at this time. If an effluent limit is established in the future, a local limit may be needed.
- Ammonia: Nitrification may be required in the future to reduce the ammonia discharge to the Willamette River. This will be determined as part of DEQ's TMDL related to dissolved oxygen. The timing of the TMDL development is not known but will not be forthcoming soon. The future TMDL could trigger the need for an industrial local limit for ammonia.
  - There is currently no local limit for ammonia. However, because ammonia is a national POC (Table 1), it will need to be evaluated during local limits update to determine if a limit is needed.
- Methylmercury: DEQ is required to implement the recent methylmercury standard promulgated by the U.S. EPA. The NPDES Permit requires the City submit a Mercury Minimization Plan (MMP) by September 15, 2022. The MMP will identify and evaluate sources and establish potential new source control methods to reduce or eliminate mercury discharges to the collection system. These would include best management practices, material substitution or recovery, recycling, process modifications, etc.
  - The WWTP currently has a local limit for mercury (Table 1), so it will automatically be evaluated in the local limits update.

The review of regulatory elements found that new WWTP effluent limits are not anticipated for pesticides or any legacy (recalcitrant) pollutants that have been banned for decades. Examples of recalcitrant pollutants are organochlorine pesticides, DDT, PCBs, etc. These priority pollutants are not generally found in the WWTP effluent (see below) so these pollutant groups are not considered POCs for the local limits update.

### Prior WWTP Upsets or Problems

There were no instances of process interference or pass through of pollutants in 2019 or 2020 that would trigger the need to develop new local limits or update current local limits for any specific pollutant.

Operations staff at the WWTP reported a nitrification process upset in July 2021 which resulted in the effluent exceeding the DBO contract daily maximum ammonia limit of 20 mg/L on July 28<sup>th</sup> and July 29<sup>th</sup>. Plant operators investigated and noted an abrupt drop in dissolved oxygen occurred during the prior week, at 7:00 am on July 23<sup>rd</sup>. The normal feedback loop was disrupted and became locked in this exceedingly low demand level and the blowers responded accordingly, keeping DO levels between 0.5 mg/L and 1.0 mg/L for several days. Once aware of the problem, operators were able to circumvent the low DO condition by forcing the blower system to increase delivery of air to the process.

Influent ammonia concentrations for the two days were 24.0 mg/L and 32.8 mg/L, which is typical. Effluent ammonia concentrations were 27.9 mg/L and 29.0 mg/L. Effluent ammonia concentrations are typically less than 1 mg/L.

The cause of the nitrification upset has not been identified with certainty, but WWTP operations staff assume a toxic slug came into the plant around the time low dissolved oxygen was observed on July 23<sup>rd</sup> that killed the nitrifiers. Influent pH, CBOD, and TSS were observed to be at typical concentrations. Online influent sensors for pH and UVAS (a measure of organic load) did not detect any abnormal activity.

## Review of WWTP Priority Pollutant Data

A review of available data was conducted to identify potential POCs that may need to be addressed in the local limits evaluation. The following data were reviewed:

**Influent and Effluent Metals:** The influent and effluent are monitored quarterly, per Table B4 of the NPDES permit, for eleven priority pollutant metals and cyanide. The metals are: arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, zinc. Trend charts for influent and effluent concentrations, spanning March 2015 through August 2019, are attached.

The 5-year trend charts illustrate the variability in raw sewage, general dampening of the variability in the effluent, and lower effluent concentrations due to process removals within the plant. Trends and concentrations over the 5-year time period vary by constituent. A few trends were observed: Influent concentrations for chromium, copper, selenium, and zinc show increasing trends. Influent mercury concentrations show a decreasing trend.

As shown in Table 1, the eleven metals and cyanide are all identified by the U.S. EPA as mandatory POCs, so they will automatically be evaluated in the local limits update.

**Biosolids Metals:** Biosolids are tested quarterly for the 9 metals with concentration limits per the 40 CFR 503 regulations. The metals are listed in Table 1. Data from 2017 through 2019 (attached) show that the biosolids metals concentrations are all well below the 40 CFR 503 Table 3 (high quality) pollutant concentrations.

Of the nine biosolids metals, seven are included in the City's local limits. The City does not have local limits for molybdenum or selenium. The nine metals are all listed as National POCs, so they will all be evaluated in the local limits update.

### Effluent Priority Pollutants:

Effluent data from 2019 and 2020 Tier 2 Monitoring for effluent characterization, per the NPDES permit, were reviewed. Nearly 300 priority pollutants (metals and trace organics) were analyzed during each sampling event. Table 2 lists the analytical methods employed. Most pollutants were not detected in the effluent. Lab reports were reviewed to find any pollutants present in quantifiable concentrations (above the practical quantitation or reporting limits).

Table 2 [Analytical Methods – Effluent Characterization for Priority Pollutants in 2019 and 2020 \(Tier 2 Monitoring\)](#)

Method Number	Method Name
EPA 200.8	Metals (dissolved and total)
EPA 608	Organochlorine Pesticides and Polychlorinated Biphenyls
EPA 624	Volatile Organic Compounds
EPA 625	Low Level Semivolatile Compounds
EPA 1631E	Mercury (Total)
1632	Inorganic Arsenic (Total and Dissolved)
3500-Cr B	Hexavalent Chromium (Dissolved)

Method Number	Method Name
7196A	Hexavalent Chromium (Total)
SM 4500-CN-E	Cyanide Amenable to Chlorination and Total Cyanide

Several observations were made regarding effluent quality:

- Total metals and cyanide concentrations were nondetectable or present at low concentrations, and below the average concentrations observed in 2018-2019.
- Recalcitrant pollutants, such as PCBs, DDT, and other organochlorine pesticides, were not detected.
- The only trace organics present in quantifiable concentrations were di-n-butyl phthalate (0.19 µg/L) and diethyl phthalate (0.24 µg/L). They were detected in the 2021 samples.
- Toluene, a volatile organic compound, was detected at estimated concentrations of 0.52 µg/L, 0.57 µg/L, and 0.56 µg/L in grab samples analyzed in 2020. The concentrations are estimated because they were below the practical quantitation limit but above the method detection limit.

The following conclusions can be made:

- Effluent quality is excellent, with most priority pollutants below the level of detection.
- Metals and cyanide will be considered in the local limits evaluation. No new concerns (higher concentrations compared to past trends) were identified in these data sets.
- Trace organics were generally not found in the WWTP effluent, except for low estimated levels of toluene and the two phthalate compounds. There are no regulated criteria for these compounds applicable to the discharge. Inclusion in the local limits evaluation is not needed, based on the limited data reviewed.
- Recalcitrant pollutants that are not readily degraded, such as DDT, PCB, and organochlorine pesticides, were not observed in the effluent. No data were available to determine if any of these types of pollutants are present in the influent or biosolids.
- Since it was not analyzed, it is not known if any of the trace organics are present in the influent. Trace organics that are volatile or readily degraded during wastewater treatment could be present in the influent.

### 2021 Local Limits Sampling Program Results

A program of specialized sampling was conducted from July 26<sup>th</sup> to August 6<sup>th</sup> at the WWTP to gather priority pollutant data for the upcoming local limits evaluation. The influent and effluent were sampled on seven days, and biosolids were sampled on two days. Priority pollutant analyses included total metals (EPA 200.8), hexavalent chromium (3500-CrB), cyanide (D7284), volatile organic compounds (EPA 624.1), semi-volatile organic compounds (EPA 625.1), ammonia and total Kjeldahl nitrogen (SM4500). Samples were not tested for organochlorine pesticides and PCBs (EPA 208).

The results provide the City with the opportunity to:

- Fill several data gaps;
- Supplement their current data base for metals;
- Further characterize WWTP influent, effluent, and biosolids with respect to trace organics
- Derive WWTP removal efficiencies for the organic and inorganic POCs included in the local limits analysis.

## Recommendations

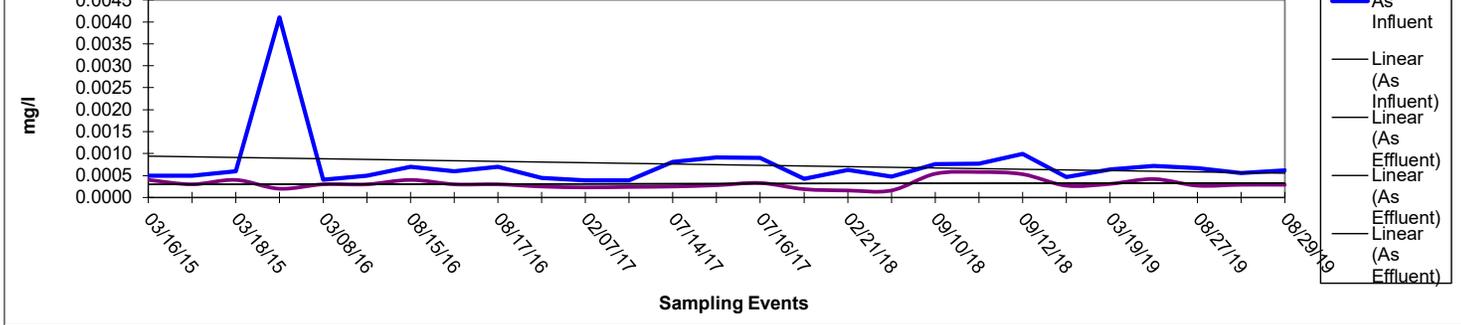
Based on this high-level review, the following recommendations are provided:

The local limits evaluation will need to consider, at a minimum, the list of initial POCs provided in Table 1. Other potential POCs may be added during the project, following a more detailed screening of WWTP, industrial, and background (domestic) pollutant data or new data acquired through a sampling program.

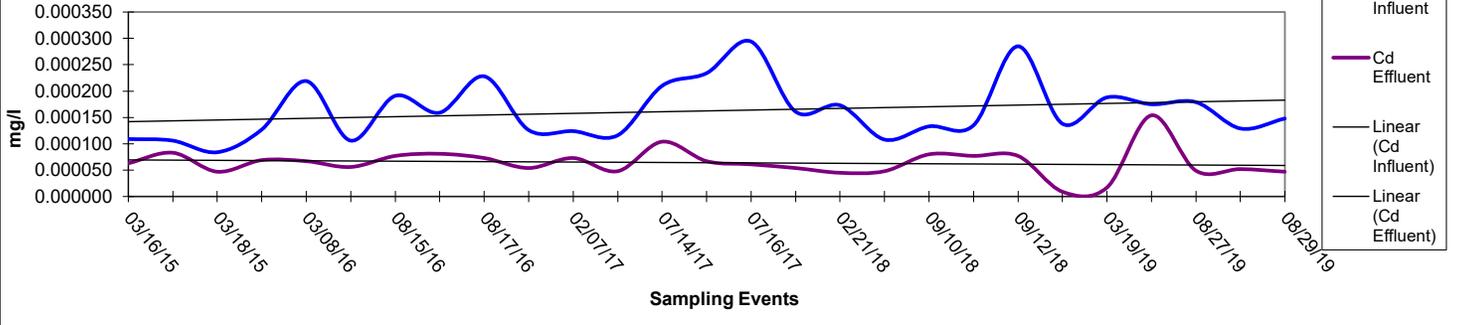
Phosphorous and ammonia are potential future POCs based on anticipation of future TMDLs. A local limit for phosphorous does not need to be considered until a TMDL or effluent limitation is established. A local limit for ammonia does not need to be considered to address the future TMDL, but because it is a national POC (Table 1), it must be considered in the local limits evaluation.

No other new POCs were identified for the local limits evaluation during this review.

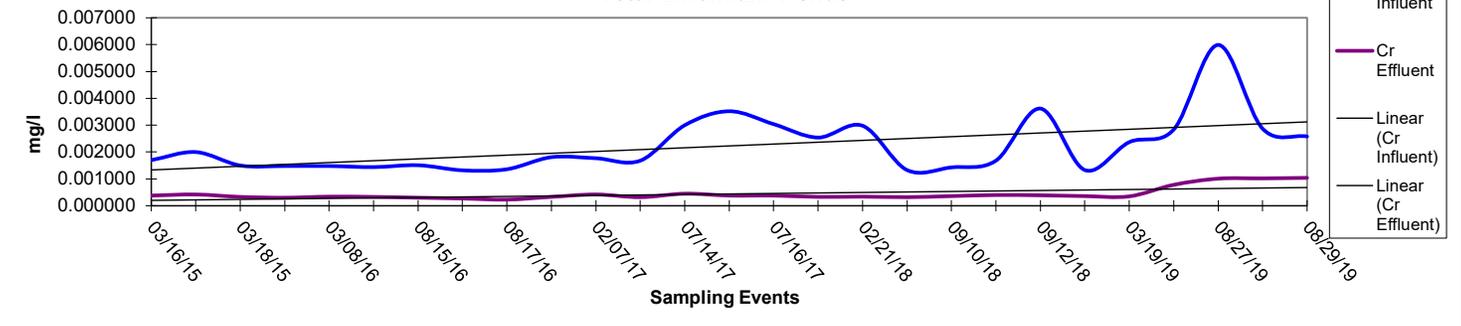
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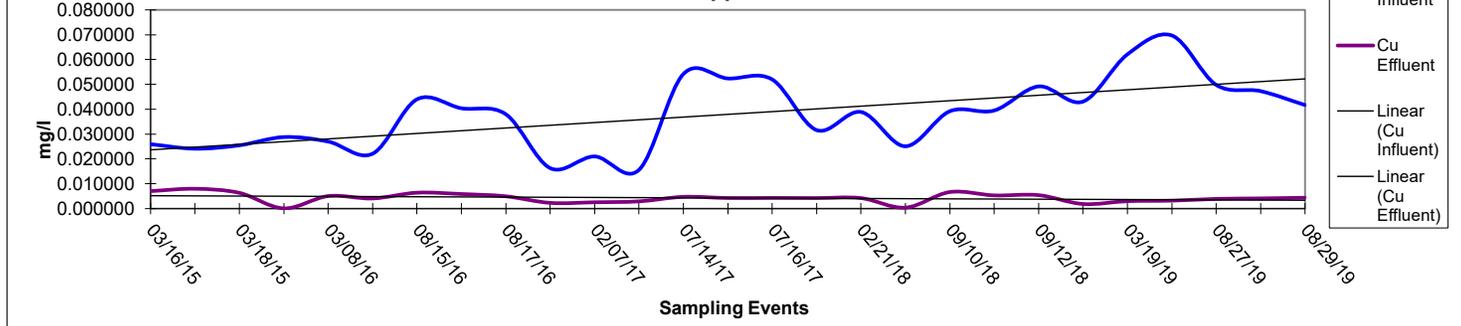
Total Cadmium Trends



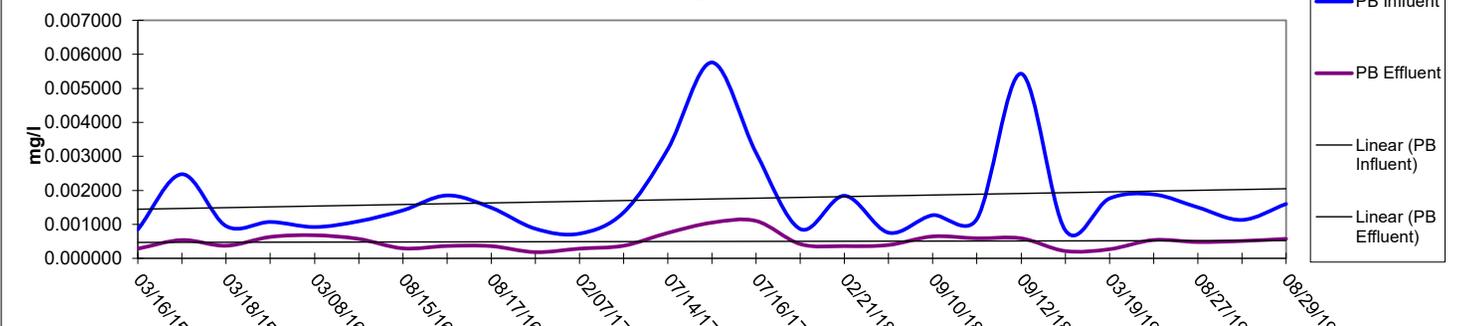
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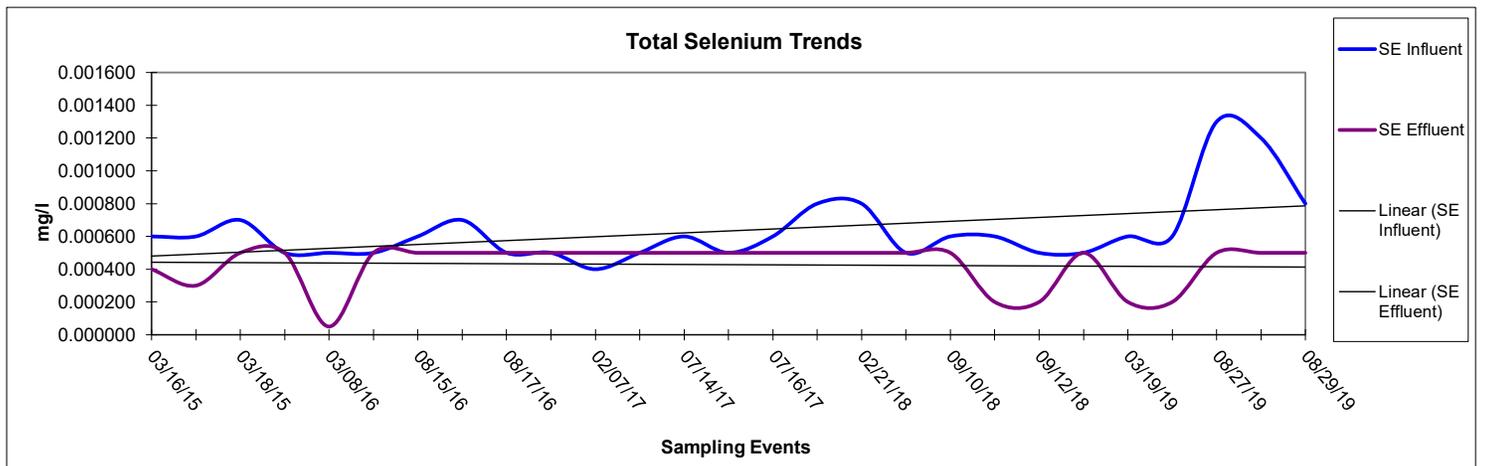
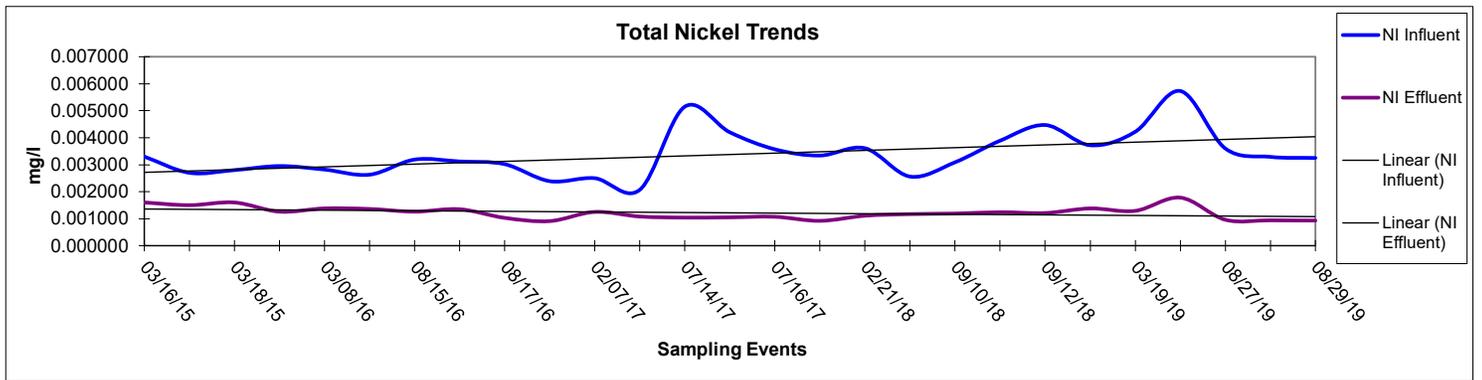
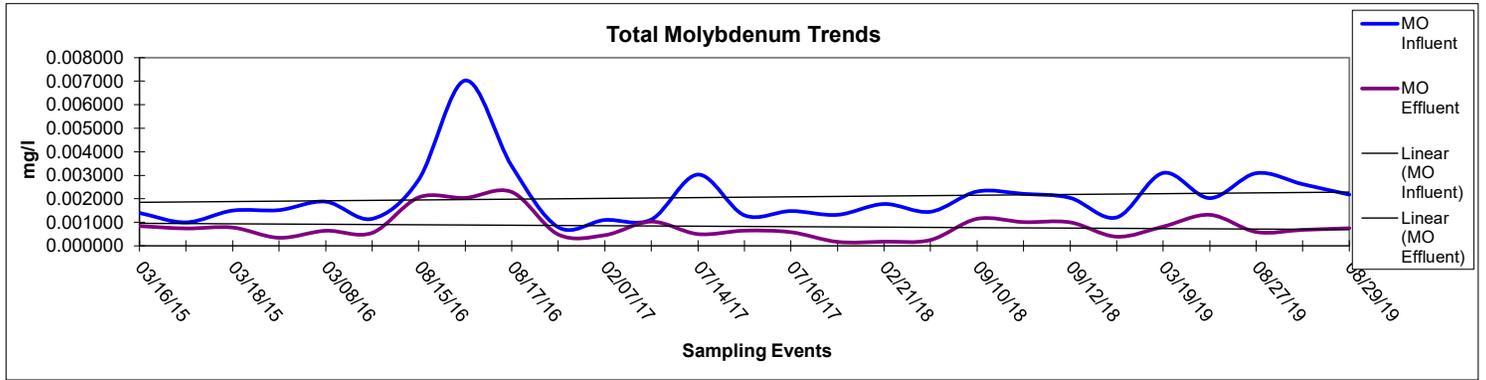
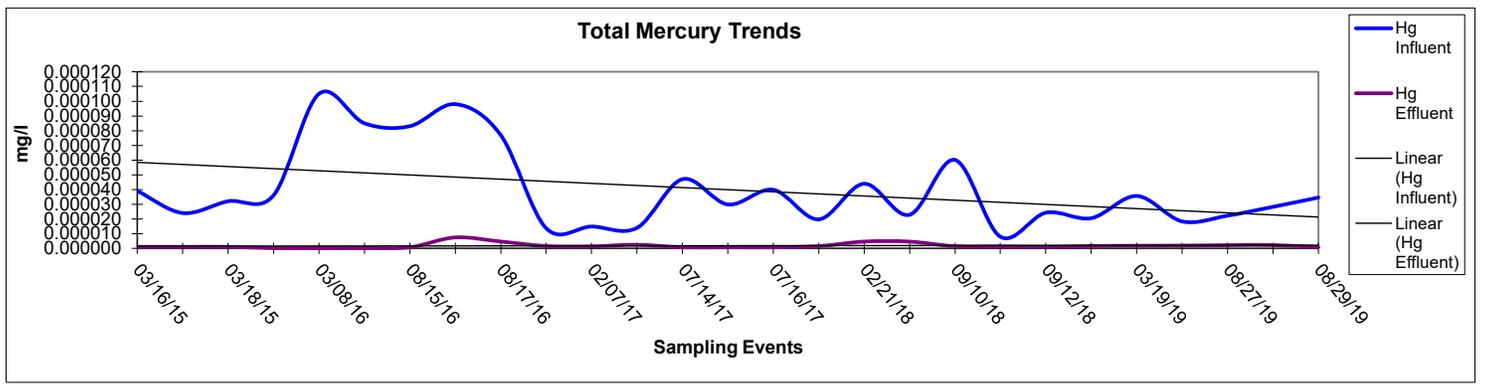


Total Copper Trends

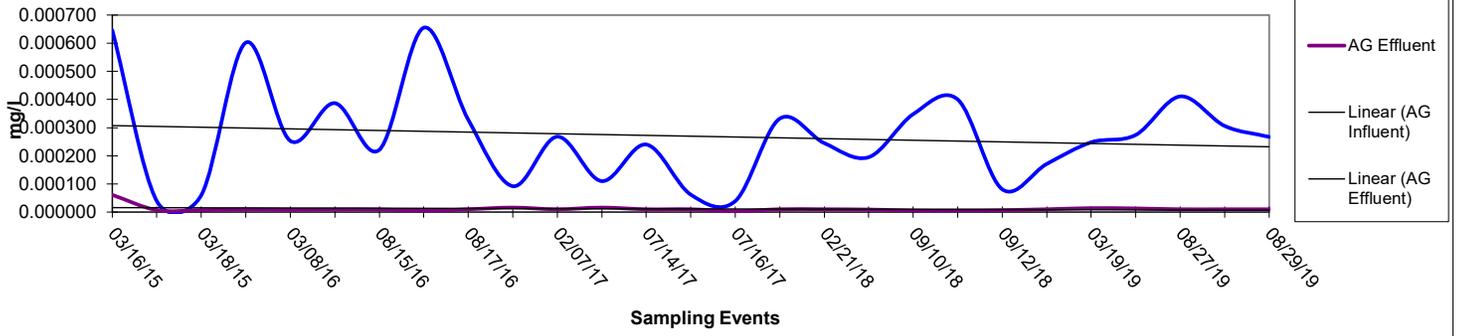


Total Lead Trends

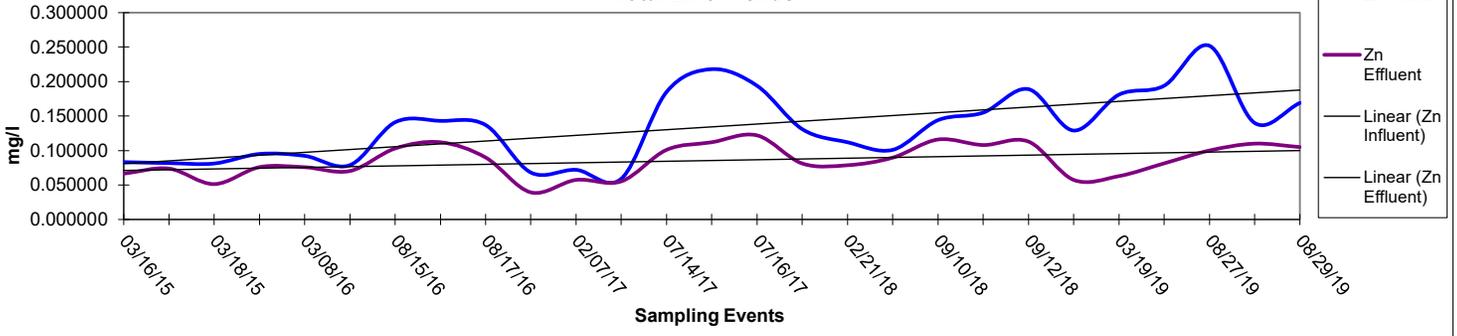




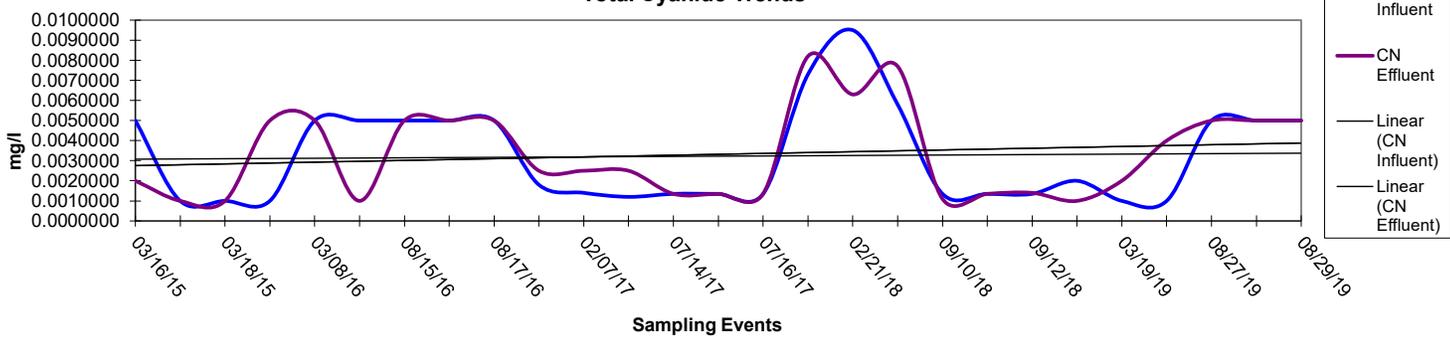
Total Silver Trends



Total Zinc Trends



Total Cyanide Trends



City of Wilsonville

Biosolids Metals Concentrations (Thermoflite Dryer)

		40 CFR 503			January	June	February
	Units	Ceiling	40 CFR 503	2017	2018	2018	2019
		Conc.	Table 3 Conc				
Arsenic	mg/kg dry basis	75	41	3.24	1.5	1.7	<1.2
Cadmium	mg/kg dry basis	85	39	3	<2.0	<1.0	<2.0
Copper	mg/kg dry basis	4300	1500	166	157.9	175.8	288.4
Lead	mg/kg dry basis	840	300	8.92	5	3.8	5.1
Mercury	mg/kg dry basis	57	17	0.33	0.2	0	<0.4
Molybdenum	mg/kg dry basis	75	N/A	12.4	8.9	9.9	<20.1
Nickel	mg/kg dry basis	420	420	20	17	21.8	20.5
Selenium	mg/kg dry basis	100	100	3.76	4.2	5.9	<5.0
Zinc	mg/kg dry basis	7500	2800	232	193.3	211.1	414.1

2017 results = maximum of four samples taken in February, April, and July.