



State of Utah

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DIVISION OF WATER QUALITY
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Director

MEMORANDUM

TO: Sarah Leavitt, Permit Writer

FROM: Chris Bittner, Standards Coordinator

DATE: May 15, 2020

SUBJECT: Antidegradation Review for the Chevron Products Company Salt Lake Refinery

2019 UPDES Permit Renewal UT0021725

Receiving Water and Designated Uses (UAC R317-2-13):

Northwest Oil Drain /Salt Lake Sewage Canals Class 2B protected for infrequent primary and secondary contact recreation Class 3E severely habitat-limited waters. Narrative Standards will be applied to protect these waters for aquatic life Northwest Oil Drain/Salt Lake Sewage Canals→Farmington Bay Class 5D protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

The Level I anti-degradation review was conducted in accordance with the *Interim Methods for Evaluating Use Support for Great Salt Lake Utah Pollution Discharge Elimination System (UPDES) Permits* (v. 1.0 January 4, 2016). The Level II anti-degradation review is based on the requirements of UAC R317-2-3. The whole effluent toxicity (WET) requirements are based on the *Utah Pollutant Discharge Elimination System Permit and Enforcement Guidance Document for Whole Effluent Toxicity* (DWQ, February, 2018).

Level I Antidegradation Review

Limitations on total suspended solids (TSS), biochemical oxygen demand (BOD5), E. coli, pH and percent removal for BOD5 and TSS are based on current Utah Secondary Treatment Standards, *UAC R317-1-3.2*. The DWQ has determined that this discharge will not cause or

Antidegradation Review for the Chevron Products Company

Salt Lake Refinery

2019 UPDES Permit Renewal UT0021725

contribute to a violation of water quality standards based upon the Reasonable Potential Analysis and Level 1 Review that follows. An Antidegradation Level II review is not required since water quality will not be further lowered by the proposed activity, *UAC R317-2-3.5.b.1.(b)*.

Numeric criteria are available for pH, E. coli and turbidity for the recreational use in the Northwest Oil Drain (NWOD). However, no numeric criteria are available for the aquatic life uses in the NWOD or Farmington Bay. The Level I anti-degradation review, protection of existing uses, was conducted in accordance with the *Interim Methods for Evaluating Use Support for Great Salt Lake Utah Pollution Discharge Elimination System (UPDES) Permits* (v. 1.0 January 4, 2016) (*Interim Methods*). These methods were under development when the previous permit was issued but the methods used were similar. No existing uses are identified that require more stringent protection than the designated uses.

As described in the *Interim Methods*, effluent pollutant concentrations were screened against Class 3D aquatic life numeric criteria to determine reasonable potential and the protection of the uses. Based on application of Narrative Standards, acute criteria were screening values for the NWOD and chronic criteria were used to protect downstream uses at Farmington Bay under the Narrative Standards.

Chevron is required to identify the pollutants present in their effluent. In Attachment 7, Table 2C-5B of the renewal application, Chevron identified the following metal and metalloid toxic pollutants as believed present in the effluent: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc, and cyanide. Quantitative data are needed to evaluate if these pollutants demonstrate reasonable potential. Table 2C-5B includes the result of a single analysis of the effluent for these pollutants.

The previous permit evaluated reasonable potential using the information presented in the March 27, 2014 Chevron letter titled *Renewal of UPDES Permit UT0000175 – Revised Supplemental RPA Documentation*. An alternative approach for analyzing reasonable potential, consistent with USEPA guidance, was proposed and accepted by DWQ. This approach initially relied on a single analytical result for nine metals and metalloids to calculate the maximum expected concentration in the effluent. When the maximum expected concentrations exceeded the comparison criteria, additional samples were collected and analyzed for four of the metals and metalloids. With the additional sample results included, the maximum expected concentrations supported no reasonable potential for these metals and metalloids¹. The additional analyses for cyanide, selenium and zinc demonstrate that effluent concentrations were variable over the two month sampling period. To reduce some of the remaining uncertainties, additional monitoring requirements were added by DWQ to the 2014 permit. These monitoring requirements included measurements of flows in the NWOD and the concentrations of ammonia and selenium in the NWOD. The results are documented in the *Northwest Oil Drain and Salt Lake Sewage Canal Selenium, Ammonia and Flow Characterization Report* (Stantec, May 10, 2018) (*NWOD Report*). Figure 1 illustrates the monitoring locations and Figure 2 summarizes the results as

¹ The maximum expected concentration is calculated by including statistical uncertainty that is reduced when additional samples are available (USEPA, 1991 *Technical Support Document for Water Quality-based Toxics Control*)

**Antidegradation Review for the Chevron Products Company
Salt Lake Refinery
2019 UPDES Permit Renewal UT0021725**

presented in the *NWOD Report*.

The specific monitoring objectives for the *NWOD Report* were to provide additional data to evaluate:

1. Protection of downstream aquatic life uses in Farmington Bay from chronic selenium toxicity.
2. Protection of aquatic life uses using whole-effluent toxicity (WET) testing.
3. Characterization of mercury concentrations in the effluent.

Significant Updates compared to 2014 permit. Ammonia.

As reported in the *NWOD Report*, ammonia concentrations were measured at several locations on the NWOD during the previous permit cycle (Figures 1, 2, and 3). These ammonia concentrations represent all sources of ammonia to the NWOD. For this permit cycle, the updated 2013 EPA ammonia criteria were used for screening because these criteria better represent the potential for ammonia toxicity for the aquatic life expected at this location. The 2013 EPA chronic criteria applied are based on an absence of salmonids (trout) and unionid mussels in the receiving waters.

Ammonia concentrations measured at the discharge to Farmington Bay compared to the chronic screening criteria are shown on Figure 4. Ammonia concentrations exceed the screening values and were further investigated for reasonable potential.

First, the representativeness of the 2013 EPA ammonia criteria was evaluated in more detail. This evaluation concluded that these are appropriate screening values for determining effluent limits for the discharge to Farmington Bay. Ammonia is generally toxic to aquatic life but species vary widely in their sensitivity. Ammonia is also a nutrient that is taken up rapidly by plants and bacteria when present at sub-toxic concentrations. Farmington Bay includes freshwater taxa such as daphnids and mayflies¹. Fish can be sensitive to ammonia and fish have been observed in Farmington Bay and surrounding wetlands. Fish are observed in similar freshwater habitats at Great Salt Lake and fish presence in nearby waters such as waterfowl management areas and observations of fish-eating birds support that fish should be considered residents for the comparison criteria. Studies are ongoing to better characterize fish populations in Farmington Bay. For this permit cycle, early life-stages of fish were presumed to be absent for the winter months similar to the lower Jordan River.

The ammonia loads to Farmington Bay are compared to the ammonia loads discharged from the SLCWRF and the Chevron Refinery in Figure 5. The Chevron Refinery's portions of the ammonia loads to the NWOD add up to 5 percent to the SLCWRF loads. Ammonia loads to Farmington Bay generally correlate well with the loads from the SLCWRF.

¹ <https://documents.deq.utah.gov/water-quality/standards-technical-services/gsl-website-docs/alu-standards-development/DWQ-2019-000534.pdf>

Antidegradation Review for the Chevron Products Company

Salt Lake Refinery

2019 UPDES Permit Renewal UT0021725

The SLCWRF is anticipated to reduce their ammonia discharges when a new treatment plant is completed. As shown on the Figure 6, this will affect the future assimilative capacity for Chevron because of the small volume of Chevron's effluent compared to the SLCWRF effluent. In addition to the flow, the pH upstream of Chevron may also be affected which will affect the ammonia criteria. Based on the currently available data and the anticipated changes to the SLCWRF permitted effluent limits, ammonia does not have reasonable potential for the Chevron Refinery for this permit cycle.

Selenium.

NWOD measurements for dissolved selenium demonstrate that the screening chronic criterion of 4.6 µg/L is met in the NWOD including at the discharge to Farmington Bay (Figures 2 and 7). These data demonstrate that the discharge does not have reasonable potential for selenium. However, the available data from the NWOD and Chevron's *Renewal of UPDES Permit UT0000175 – Revised Supplemental RPA Documentation* demonstrate that selenium concentrations are variable. Accordingly, additional effluent characterization data are recommended to support the absence of reasonable potential analysis for the next permit. The additional monitoring data will also confirm the efficacy of the treatment processes.

Whole Effluent Toxicity (WET).

Dilution is used to determine if acute or chronic duration WET tests will be required. Dilution exceeding 20:1 require acute testing and lower dilutions require chronic testing. Dilution was measured for the *NWOD Report* and as shown on Figure 7, dilution flows at the Chevron outfall exceed 20:1. These measurements confirm that Chevron's existing acute WET requirements are appropriate.

Other Metals and Inorganics.

Chevron identifies the specific pollutants that are believed to be present in the effluent in Attachment 7, Table 2C- 5B in the renewal application and in the 2014 *Renewal of UPDES Permit UT0000175 – Revised Supplemental RPA Documentation*. Of the pollutants identified as believed to be present, the *Revised Supplemental RPA Documentation* documents that the effluent concentrations of cyanide, selenium and zinc were variable over the two month period that additional samples were collected for analyses. The single analytical result for the metals and inorganics data submitted with this permit application confirm no reasonable potential as concluded in the March 27, 2014 *Revised Supplemental RPA Documentation* for the previous permit cycle. However, more frequent monitoring is recommended for the upcoming permit cycle to characterize the effluent variability and support future reasonable potential determinations consistent with DWQ's Reasonable Potential Guidance, September 15, 2015 and 40 CFR 122.44(d)(1)(ii).

Mercury.

The FSSOB for the previous permit cycle recommended a monitoring requirement using a more sensitive mercury analytical method (Method 1631) to quantify mercury in the effluent. This requirement was inadvertently omitted from the permit and is added to this permit.

Level II Antidegradation Review.

Based on the information provided in this permit application, a Level II anti-degradation review is not required because water quality will not be further lowered under the renewed permit (R317-2-3.5(b)1). There is no increase in concentrations or loading anticipated.

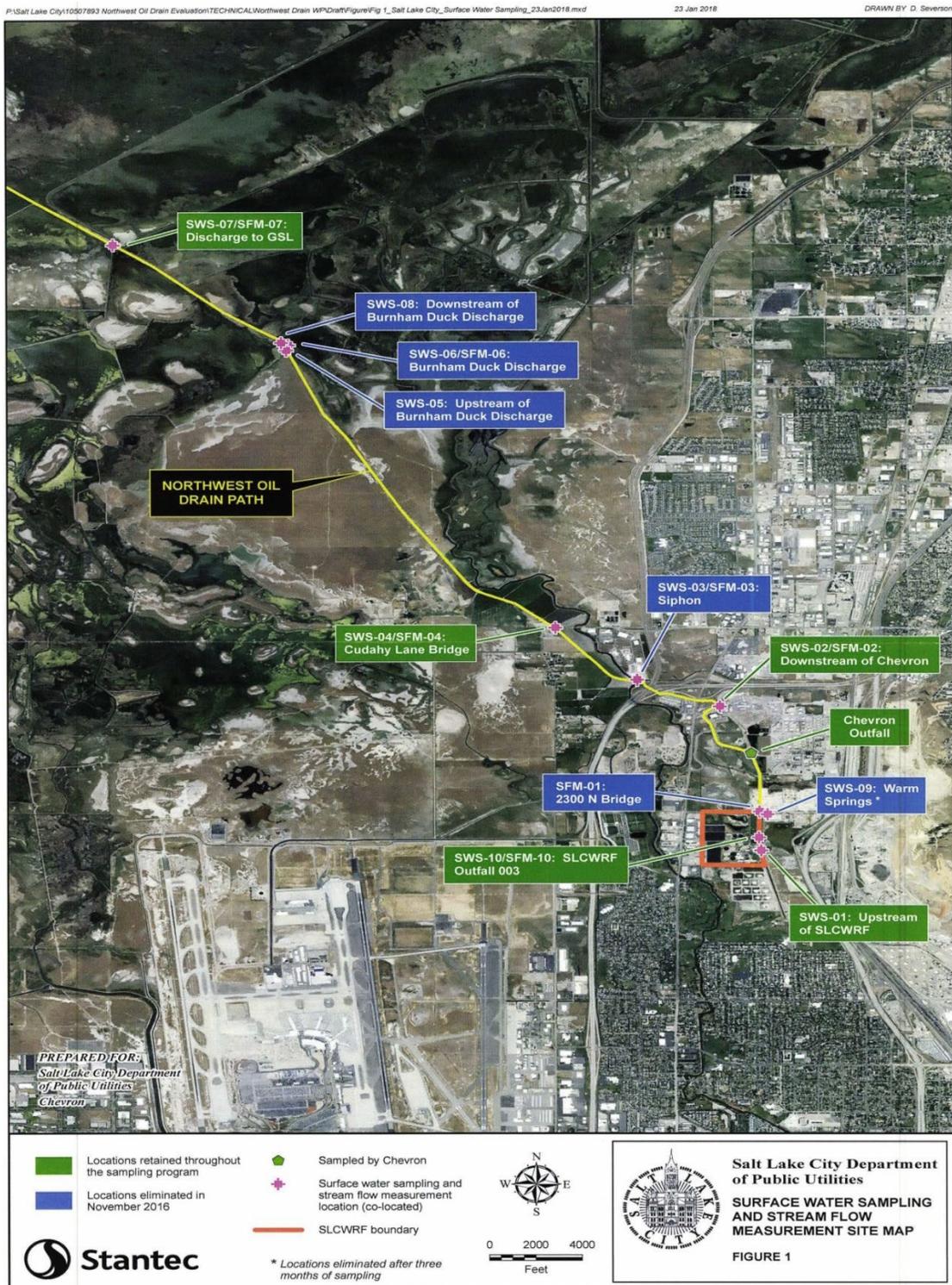


Figure 1. Monitoring Locations from NWOD Report.

Page 7
Antidegradation Review for the Chevron Products Company
Salt Lake Refinery
2019 UPDES Permit Renewal UT0021725

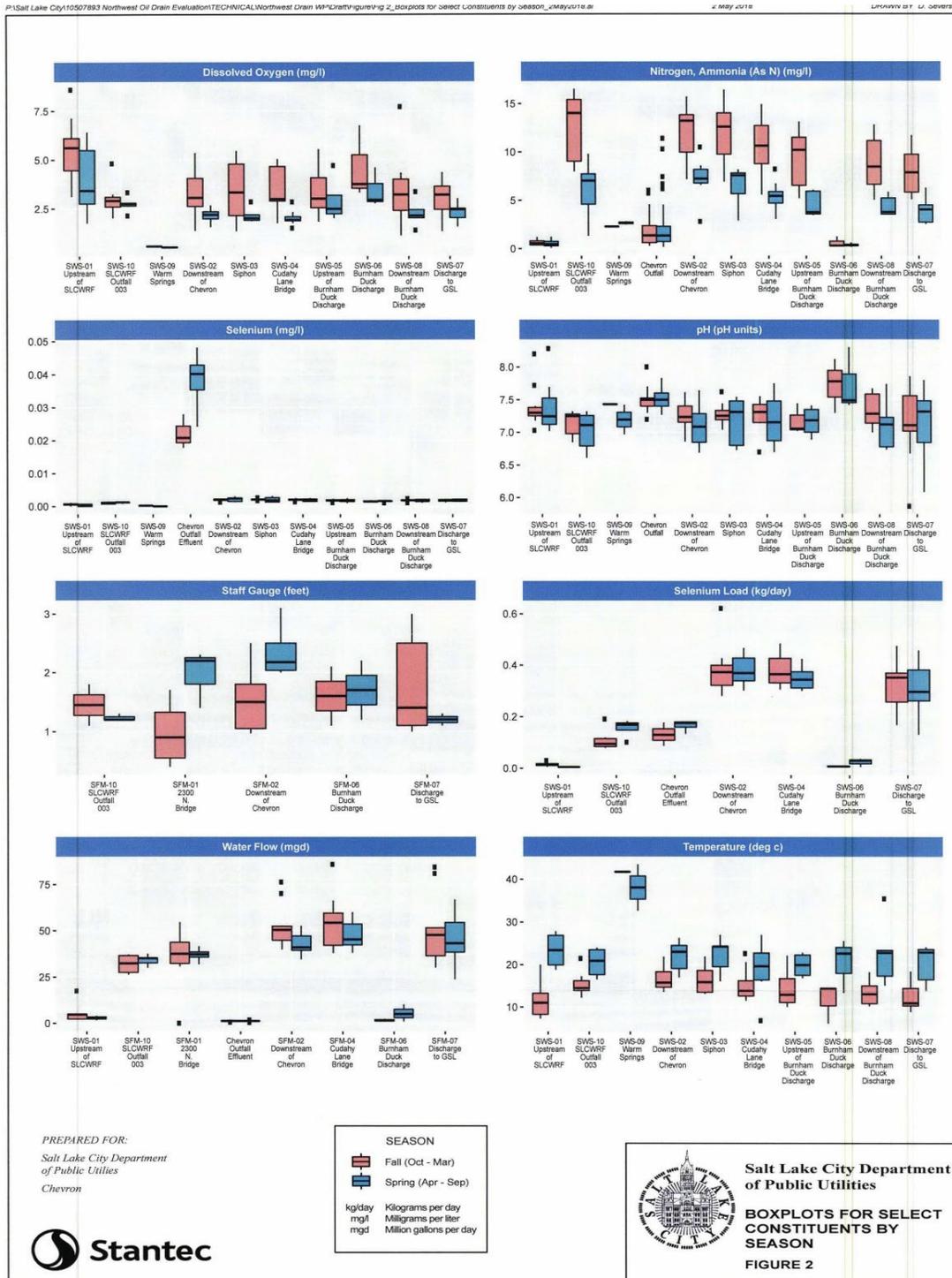


Figure 2 Boxplots of Concentrations Measured from NWOD Report

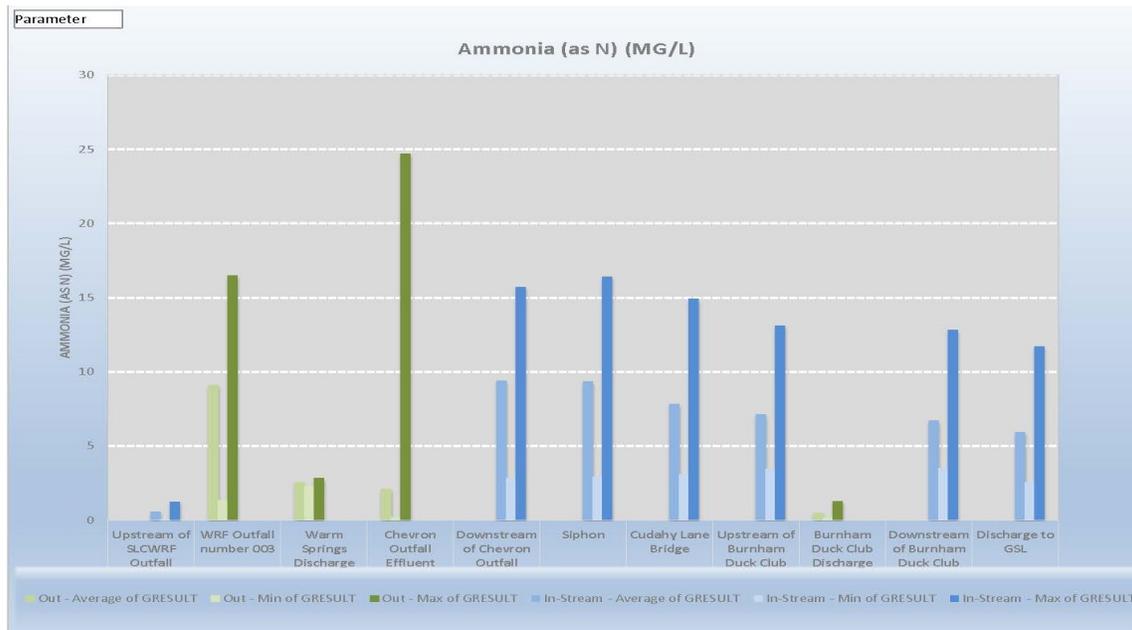


Figure 3. Measured ammonia concentrations as total N in effluents and the Northwest Oil Drain from the NWOD Report

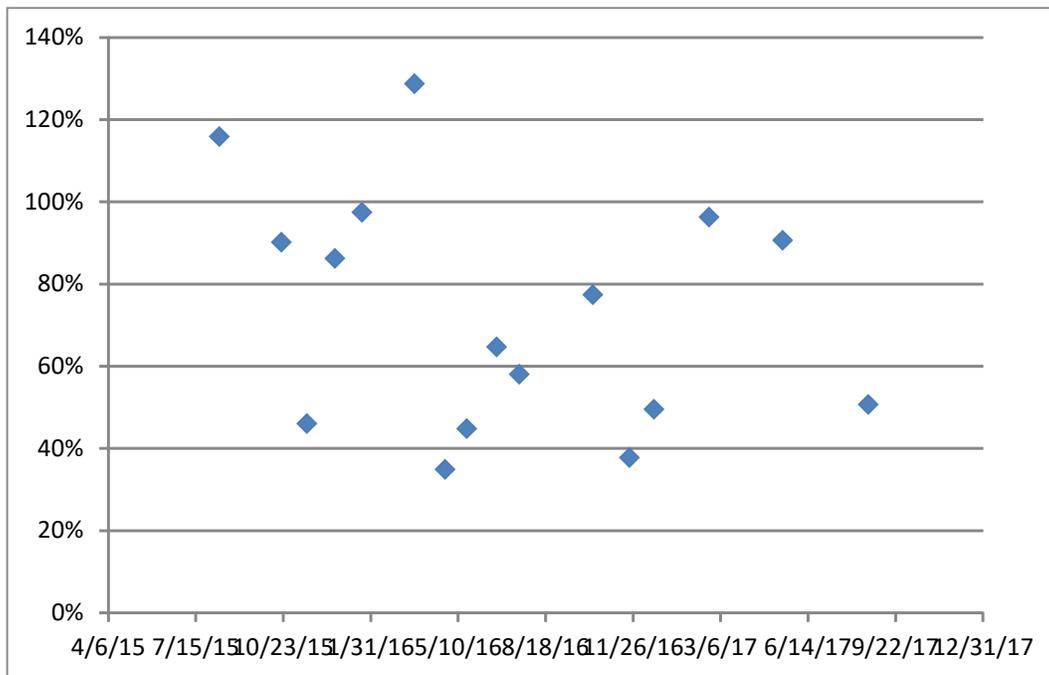


Figure 4. Measured ammonia concentrations in Northwest Oil Drain at Farmington Bay divided by chronic ammonia criteria

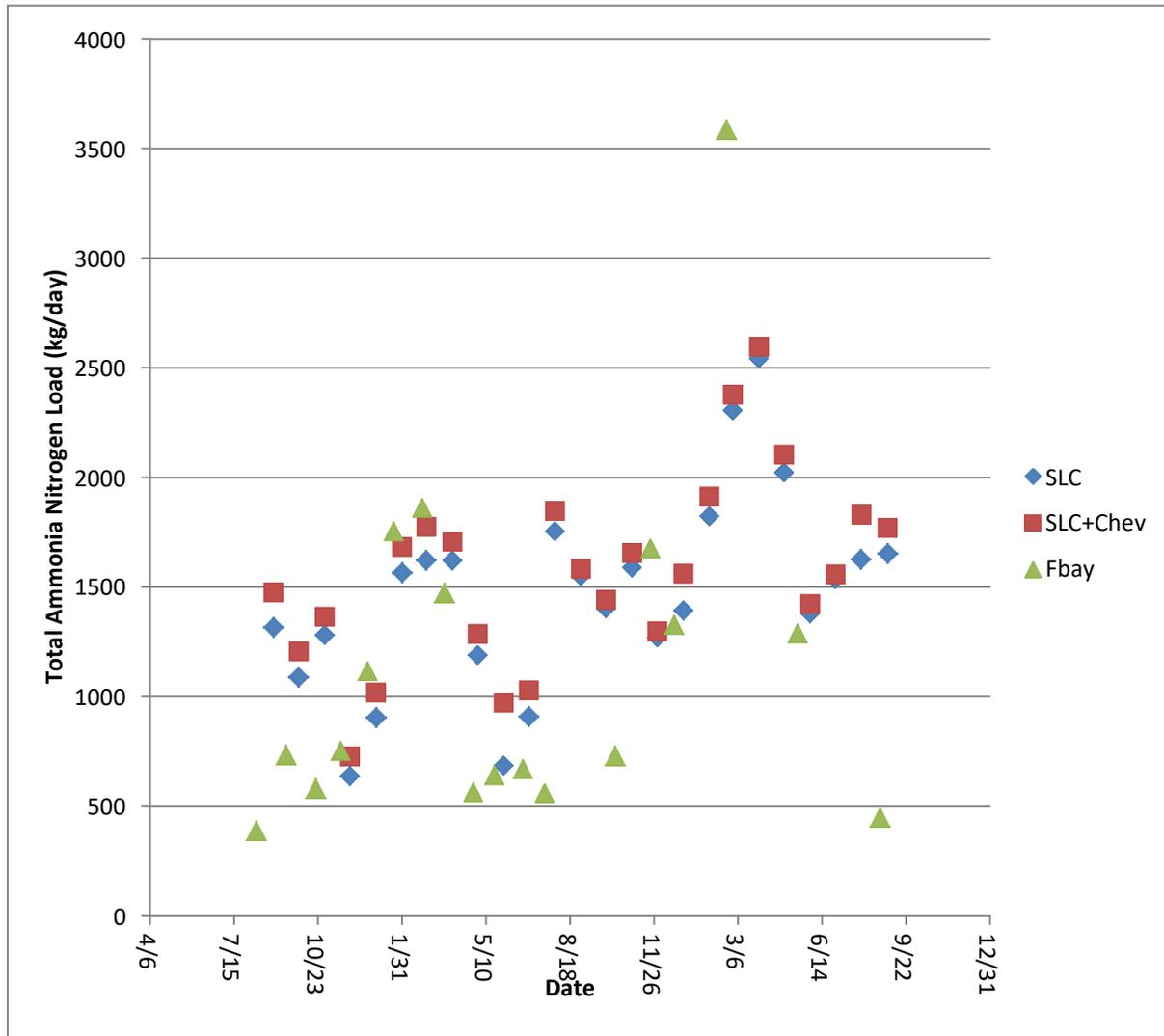


Figure 5. Comparisons of Ammonia Loads measured at the outfalls for Chevron and the Salt Lake City Water Reclamation Facility and the NWOD discharge to Farmington Bay, the Salt Lake City Water Reclamation Facility and the Chevron Refinery.

Antidegradation Review for the Chevron Products Company
 Salt Lake Refinery
 2019 UPDES Permit Renewal UT0021725

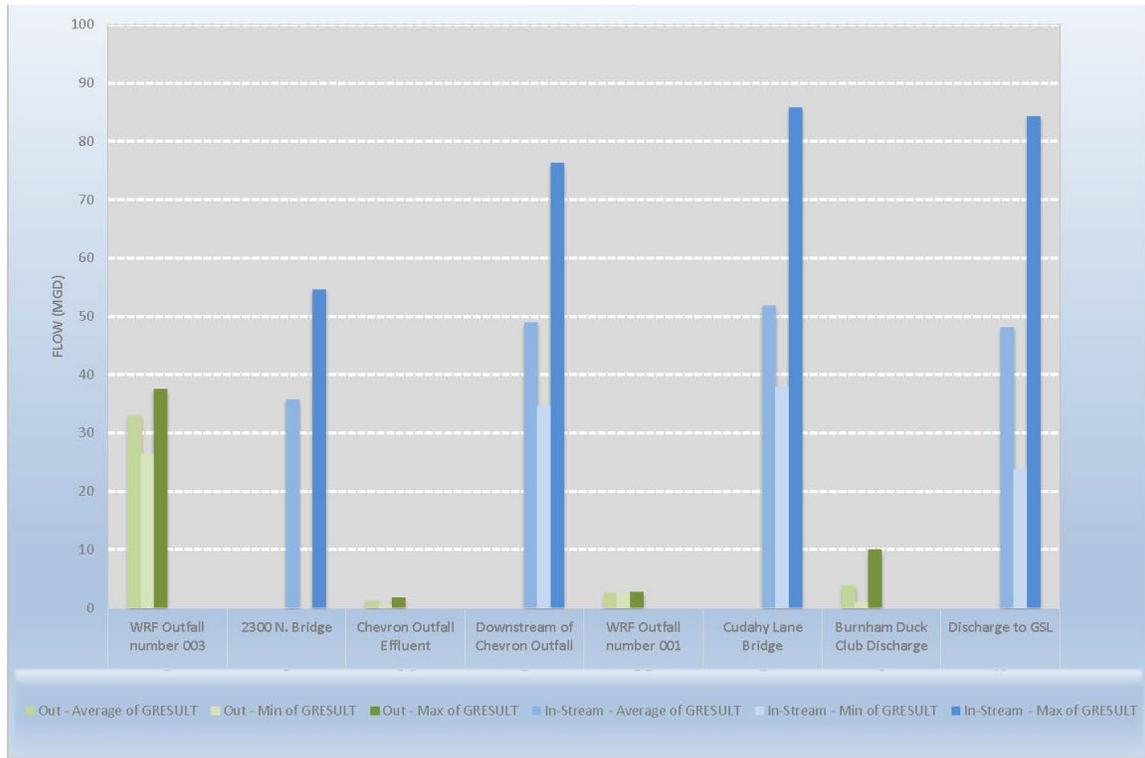


Figure 6. Flow measurements for effluents and Northwest Oil Drain from the NWOD report

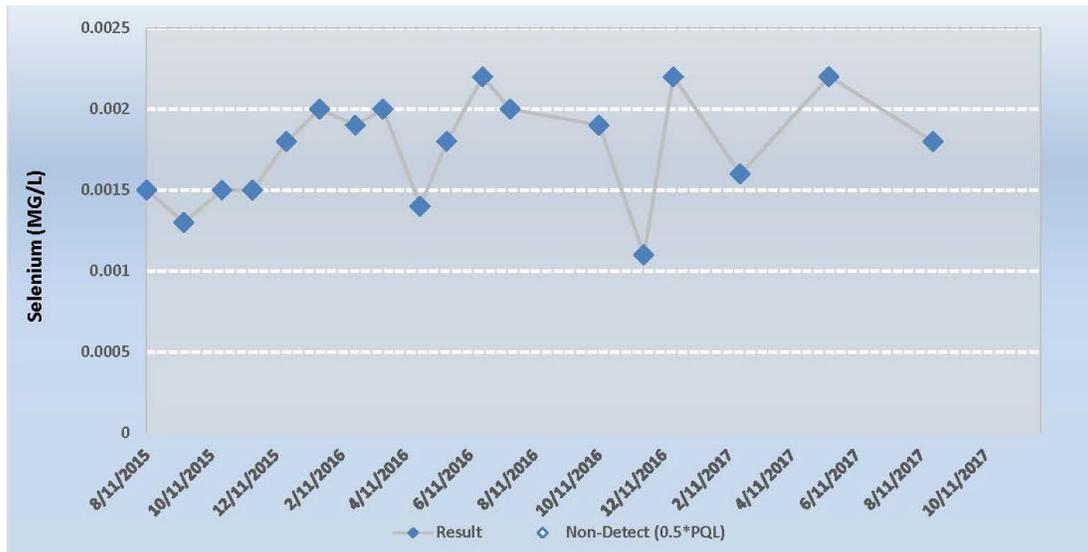


Figure 7. Selenium concentrations in Northwest Oil Drain at discharge to Farmington Bay from the NWOD Report