**Utah Division of Water Quality**
**Statement of Basis**
**ADDENDUM**
**Wasteload Analysis and Antidegradation Level I Review - PRELIMINARY**

**Date:** **October 1, 2012**

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**Water Quality Management Section**

**Facility:** **Salem City Wastewater Treatment Facility**
**Salem, UT**
**UPDES No. UT0020249**

**Receiving water:** **Beer Creek (2B, 3C, 4)**

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

Discharge
Outfall 001: Irrigation Ditch → Beer Creek → Benjamin Slough of Utah Lake
Outfall 002: Constructed Wetlands → Irrigation Ditch → Beer Creek → Benjamin Slough

The maximum daily design discharge is 2.0 MGD and the maximum monthly design discharge is 1.25 MGD for the facility.

Receiving Water
The receiving water for Outfall 001 is an irrigation ditch, which is tributary to Beer Creek, which drains to Benjamin Slough of Utah Lake.

The receiving water for Outfall 002 is a constructed wetland, which outlets to the same irrigation ditch as Outfall 001.

Per UAC R317-2-13.5.c, the designated beneficial uses for Beer Creek (Utah County) from 4850 West (in NE1/4NE1/4 sec. 36, T.8 S., R.1 E.) to headwaters are 2B, 3C, and 4.

- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*

- *Class 3C - Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain*

- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten year return frequency (7Q10). Due to a lack of flow records for the irrigation ditch and Beer Creek, the 20$^{th}$ percentile of flow measurements was calculated to estimate annual critical flow in the receiving water (Table 1).

**Table 1: Annual critical low flow**

| Waterbody | Flow (cfs) |
|---|---|
| Irrigation Ditch above Lagoons | 0.5 |
| Beer Creek above confluence with Irrigation Ditch | 2.0 |

TMDL

Beer Creek is not listed as impaired for any parameters according to the 2010 303(d) list. Utah Lake is listed as impaired for Total Phosphorus and Total Dissolved Solids.

Mixing Zone

The discharge is considered instantaneously fully mixed since the discharge is more than twice the background receiving water flow. Therefore, no mixing zone is allowed.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), dissolved oxygen (DO), $BOD_5$, total phosphorus (TP), total nitrogen (TN), total ammonia (TAM), E. coli, pH, and total residual chlorine (TRC) as determined in consultation with the UPDES Permit Writer.

Water Quality Modeling

A QUAL2Kw model of the receiving water was built based on physiographic information from Google Earth and site data collected by DWQ staff. The model extends from the facility discharge past the confluence with Beer Creek to Arrowhead Trail Road.

Insufficient observed data was available for model calibration. The rate parameters used in the model were the same as those used for the Spanish Fork WWTP QUAL2Kw model, which was calibrated under contract by Utah State University. Beer Creek was considered to have similar stream characteristics as Dry Creek.

Receiving water quality data was obtained from monitoring sites 4995460 Beer Creek (L-FK) above Salem WWTP and 5919820 Beer Creek at Arrowhead Road. The average seasonal value was calculated for each constituent with available data in the receiving water.

The QUAL2Kw model was used for determining the WQBELs. Effluent concentrations were

adjusted so that water quality standards were not exceeded in the receiving water.

Where WQBELs exceeded secondary standards or categorical limits, the concentration in the model was set at the secondary standard or categorical limit.

The wasteload model is available for review by request.

WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The $LC_{50}$ (lethal concentration, 50%) percent effluent for acute toxicity and the $IC_{25}$ (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test, needs to be below the WET limits, as determined by the WLA. The WET limit for $LC_{50}$ is typically 100% effluent and does not need to be determined by the WLA.

**Table 2: WET Limits for $IC_{25}$**

| Season | Percent Effluent |
|---|---|
| Annual | 79% |

Effluent Limits

The effect of the effluent on the DO in the receiving water was evaluated using the QUAL2Kw model. A DO sag downstream resulting from the plant discharge was predicted by the model in the irrigation ditch. However, the DO recovered at the confluence with Beer Creek and limits beyond secondary standards are not required for DO and $BOD_5$ (Table 3).

Due to relatively high temperature and pH in the receiving water after mixing, the ammonia limits for acute and chronic toxicity are stringent.

QUAL2Kw rates, input and output for DO, eutrophication related constituents, and TRC are summarized in Appendix A.

A simple mixing analysis was conducted for conservative constituents such as dissolved metals. The simple mixing analysis WQBELs are summarized in Appendix B.

Models and supporting documentation are available for review upon request.

**Table 3: Water Quality Based Effluent Limits Summary**

| Effluent Constituent | Acute | | | Chronic | | |
|---|---|---|---|---|---|---|
| | Standard | Limit | Averaging Period | Standard | Limit | Averaging Period |
| Flow (MGD) | | 2.0 | 1 day | | 1.25 | 30 days |
| Ammonia (mg/L)[1] | Varies | 5.0 | 1 hour | Varies | 1.5 | 30 days |
| Min. Dissolved Oxygen (mg/L) | 3.0 | 5.0 | Instantaneous | 5.0 | 5.0 | 30 days |
| $BOD_5$ (mg/L)[2] | None | 65 | 7 days | None | 45 | 30 days |
| TRC (mg/L) | 0.019 | 0.110 | 1 hour | 0.011 | 0.075 | 4 days |
| | 1: Ammonia limit due to toxicity requirements.<br>2: $CBOD_5$ test could be used in lieu of $BOD_5$ test. | | | | | |

Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is not required for this discharge since the pollutant concentration and load is not increasing under this permit renewal.

WLA Document: *salem_potw_wla_2012_preliminary.docx*
QUAL2Kw Wasteload Model: *salem_potw_wla_2012.xlsm*

**WASTELOAD ANALYSIS [WLA]** Date: 10/1/2012
**Appendix A: QUAL2Kw Analysis for Eutrophication**

| | | | |
|---|---|---|---|
| Discharging Facility: | Salem WWTP | | |
| UPDES No: | UT-0020249 | | |
| Permit Flow [MGD]: | 1.25 | Maximum Monthly Flow | |
| | 2.00 | Maximum Daily Flow | |
| Receiving Water: | Beer Creek | | |
| Stream Classification: | 2B, 3C, 4 | | |
| Stream Flows [cfs]: | 0.50 | Summer (July-Sept) | Critical Low Flow |
| | 0.50 | Fall (Oct-Dec) | |
| | 0.50 | Winter (Jan-Mar) | |
| | 0.50 | Spring (Apr-June) | |
| Fully Mixed: | YES | | |
| Acute River Width: | 100% | | |
| Chronic River Width: | 100% | | |

**Modeling Information**

A QUAL2Kw model was used to determine these effluent limits.

**Model Inputs**

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

| Headwater/Upstream Information | Summer | Fall | Winter | Spring |
|---|---|---|---|---|
| Flow (cfs) | 0.5 | 0.5 | 0.5 | 0.5 |
| Temperature (deg C) | 22.4 | 8.6 | 2.9 | 14.9 |
| Specific Conductance (µmhos) | 1180 | 1180 | 1180 | 1180 |
| Inorganic Suspended Solids (mg/L) | 10.7 | 12.9 | 12.2 | 21.8 |
| Dissolved Oxygen (mg/L) | 8.1 | 8.6 | 10.9 | 11.8 |
| $CBOD_5$ (mg/L) | 1.8 | 2.1 | 2.3 | 2.7 |
| Organic Nitrogen (mg/L) | 1.500 | 1.500 | 1.500 | 1.500 |
| NH4-Nitrogen (mg/L) | 0.081 | 0.072 | 0.103 | 0.169 |
| NO3-Nitrogen (mg/L) | 1.000 | 1.000 | 1.000 | 1.000 |
| Organic Phosphorus (mg/L) | 0.168 | 0.107 | 0.154 | 0.199 |
| Inorganic Ortho-Phosphorus (mg/L) | 0.042 | 0.027 | 0.039 | 0.050 |
| Phytoplankton (µg/L) | 0.0 | 0.0 | 0.0 | 0.0 |
| Detritus [POM] (mg/L) | 1.2 | 1.4 | 1.4 | 2.4 |
| Alkalinity (mg/L) | 235 | 235 | 235 | 235 |
| pH | 8.0 | 8.1 | 8.2 | 8.5 |
| TRC (mg/L) | 0.0 | 0.0 | 0.0 | 0.0 |

| Discharge Information | Summer | Fall | Winter | Spring |
|---|---|---|---|---|
| Flow (cfs) | 1.3 | 1.3 | 1.3 | 1.3 |
| Temperature (deg C) | 23.9 | 10.9 | 4.4 | 16.3 |
| Inorganic Suspended Solids (mg/L) | 12.0 | 13.3 | 21.8 | 23.6 |
| NO3-Nitrogen (mg/L) | 0.833 | 3.033 | 0.444 | 2.148 |
| Organic Phosphorus (mg/L) | 0.000 | 0.000 | 0.000 | 0.000 |
| Alkalinity (mg/L) | 235 | 235 | 235 | 235 |
| pH | 8.2 | 8.2 | 8.2 | 8.4 |

| Tributary Information | Summer | Fall | Winter | Spring |
|---|---|---|---|---|
| Flow (cfs) | 2.0 | 2.0 | 2.0 | 2.0 |
| Temperature (deg C) | 24.6 | 10.7 | 4.3 | 15.4 |
| Specific Conductance (µmhos) | 1050.0 | 1050.0 | 1050.0 | 1050.0 |
| Inorganic Suspended Solids (mg/L) | 44.3 | 34.6 | 13.0 | 38.0 |
| Dissolved Oxygen (mg/L) | 8.2 | 9.4 | 10.5 | 8.7 |
| $CBOD_5$ (mg/L) | 6.9 | 2.3 | 3.6 | 9.0 |
| Organic Nitrogen (mg/L) | 1.0 | 1.0 | 1.0 | 1.0 |
| NH4-Nitrogen (mg/L) | 0.2 | 0.1 | 0.5 | 0.4 |
| NO3-Nitrogen (mg/L) | 1.0 | 1.0 | 1.0 | 1.0 |
| Organic Phosphorus (mg/L) | 0.6 | 0.4 | 0.3 | 0.3 |
| Inorganic Ortho-Phosphorus (mg/L) | 0.1 | 0.1 | 0.1 | 0.1 |
| Phytoplankton (µg/L) | 0.0 | 0.0 | 0.0 | 0.0 |
| Detritus [POM] (mg/L) | 4.9 | 3.8 | 1.4 | 4.2 |
| Alkalinity (mg/L) | 235.0 | 235.0 | 235.0 | 235.0 |
| pH | 8.3 | 8.1 | 8.2 | 8.3 |
| TRC (mg/L) | 0.0 | 0.0 | 0.0 | 0.0 |

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

**Effluent Limitations**

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

**Effluent Limitations based upon Water Quality Standards for DO and Ammonia Toxicity**

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent limitation as follows:

| Chronic | Standard | Summer | Fall | Winter | Spring |
|---|---|---|---|---|---|
| Flow (MGD) | N/A | 1.25 | 1.25 | 1.25 | 1.25 |
| Organic Nitrogen (mg/L) | N/A | 5.0 | 5.0 | 5.0 | 5.0 |
| NH4-Nitrogen (mg/L) | Varies | 1.5 | 1.5 | 1.5 | 1.5 |
| Inorganic Phosphorus (mg/L) | N/A | 5.0 | 5.0 | 5.0 | 5.0 |
| $CBOD_5$ (mg/L) | N/A | 45.0 | 45.0 | 45.0 | 45.0 |
| Dissolved Oxygen [30-day Ave] (mg/L) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| TRC (mg/L) | 0.011 | 0.075 | 0.075 | 0.075 | 0.075 |

| Acute | Standard | Summer | Fall | Winter | Spring |
|---|---|---|---|---|---|
| Flow (cfs) | N/A | 2.0 | 2.0 | 2.0 | 2.0 |
| Organic Nitrogen (mg/L) | N/A | 10.0 | 10.0 | 10.0 | 10.0 |
| NH4-Nitrogen (mg/L) | Varies | 5.0 | 5.0 | 5.0 | 5.0 |
| Inorganic Phosphorus (mg/L) | N/A | 10.0 | 10.0 | 10.0 | 10.0 |
| $CBOD_5$ (mg/L) | N/A | 65.0 | 65.0 | 65.0 | 65.0 |
| Dissolved Oxygen [Minimum] (mg/L) | 3.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| TRC (mg/L) | 0.019 | 0.110 | 0.110 | 0.110 | 0.110 |

**Summary Comments**

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important down-stream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

**Coefficients and Other Model Information**

| *Parameter* | *Value* | *Units* |
|---|---|---|
| *Stoichiometry:* | | |
| Carbon | 40 | gC |
| Nitrogen | 7.2 | gN |
| Phosphorus | 1 | gP |
| Dry weight | 100 | gD |
| Chlorophyll | 1 | gA |
| *Inorganic suspended solids:* | | |
| Settling velocity | 0.001 | m/d |
| *Oxygen:* | | |
| Reaeration model | Internal | |
| Temp correction | 1.024 | |
| Reaeration wind effect | None | |
| O2 for carbon oxidation | 2.69 | gO2/gC |
| O2 for NH4 nitrification | 4.57 | gO2/gN |
| Oxygen inhib model CBOD oxidation | Exponential | |
| Oxygen inhib parameter CBOD oxidation | 0.60 | L/mgO2 |
| Oxygen inhib model nitrification | Exponential | |
| Oxygen inhib parameter nitrification | 0.60 | L/mgO2 |
| Oxygen enhance model denitrification | Exponential | |
| Oxygen enhance parameter denitrification | 0.60 | L/mgO2 |
| Oxygen inhib model phyto resp | Exponential | |
| Oxygen inhib parameter phyto resp | 0.60 | L/mgO2 |
| Oxygen enhance model bot alg resp | Exponential | |
| Oxygen enhance parameter bot alg resp | 0.60 | L/mgO2 |
| *Slow CBOD:* | | |
| Hydrolysis rate | 0 | /d |
| Temp correction | 1.047 | |
| Oxidation rate | 0.242802 | /d |
| Temp correction | 1.047 | |
| *Fast CBOD:* | | |
| Oxidation rate | 10 | /d |
| Temp correction | 1.047 | |
| *Organic N:* | | |
| Hydrolysis | 0.2625675 | /d |
| Temp correction | 1.07 | |
| Settling velocity | 0.087906 | m/d |
| *Ammonium:* | | |
| Nitrification | 2.817054 | /d |
| Temp correction | 1.07 | |
| *Nitrate:* | | |
| Denitrification | 1.756367 | /d |
| Temp correction | 1.07 | |
| Sed denitrification transfer coeff | 0.24334 | m/d |
| Temp correction | 1.07 | |
| *Organic P:* | | |
| Hydrolysis | 0.227735 | /d |
| Temp correction | 1.07 | |
| Settling velocity | 0.103774 | m/d |
| *Inorganic P:* | | |
| Settling velocity | 0.06798 | m/d |
| Sed P oxygen attenuation half sat constant | 0.99342 | mgO2/L |

| | | |
|---|---|---|
| *Phytoplankton:* | | |
| Max Growth rate | 2.57133 | /d |
| Temp correction | 1.07 | |
| Respiration rate | 0.1432355 | /d |
| Temp correction | 1.07 | |
| Death rate | 0.45734 | /d |
| Temp correction | 1 | |
| Nitrogen half sat constant | 15 | ugN/L |
| Phosphorus half sat constant | 2 | ugP/L |
| Inorganic carbon half sat constant | 1.30E-05 | moles/L |
| Phytoplankton use HCO3- as substrate | Yes | |
| Light model | Smith | |
| Light constant | 57.6 | langleys/d |
| Ammonia preference | 15 | ugN/L |
| Settling velocity | 0.0645665 | m/d |
| *Bottom Plants:* | | |
| Growth model | Zero-order | |
| Max Growth rate | 8.663865 | gD/m2/d or /d |
| Temp correction | 1.07 | |
| First-order model carrying capacity | 100 | gD/m2 |
| Basal respiration rate | 0.1046738 | /d |
| Photo-respiration rate parameter | 0.39 | unitless |
| Temp correction | 1.07 | |
| Excretion rate | 0.05015 | /d |
| Temp correction | 1.07 | |
| Death rate | 0.1437 | /d |
| Temp correction | 1.07 | |
| External nitrogen half sat constant | 127.576 | ugN/L |
| External phosphorus half sat constant | 89.161 | ugP/L |
| Inorganic carbon half sat constant | 1.10E-04 | moles/L |
| Bottom algae use HCO3- as substrate | Yes | |
| Light model | Half saturation | |
| Light constant | 71.6656 | langleys/d |
| Ammonia preference | 15.2922 | ugN/L |
| Subsistence quota for nitrogen | 0.9375732 | mgN/gD |
| Subsistence quota for phosphorus | 0.058037 | mgP/gD |
| Maximum uptake rate for nitrogen | 640.4095 | mgN/gD/d |
| Maximum uptake rate for phosphorus | 190.7675 | mgP/gD/d |
| Internal nitrogen half sat ratio | 1.8677685 | |
| Internal phosphorus half sat ratio | 4.4374015 | |
| Nitrogen uptake water column fraction | 1 | |
| Phosphorus uptake water column fraction | 1 | |
| *Detritus (POM):* | | |
| Dissolution rate | 3.773984 | /d |
| Temp correction | 1.07 | |
| Settling velocity | 0.097025 | m/d |
| *pH:* | | |
| Partial pressure of carbon dioxide | 370 | ppm |
| *TRC:* | | |
| Decay rate | 20 | /d |

| Atmospheric Inputs: | Summer | Fall | Winter | Spring |
|---|---|---|---|---|
| Min. Air Temperature, F | 57.7 | 29.5 | 24.0 | 45.0 |
| Max. Air Temperature, F | 90.5 | 51.0 | 44.9 | 74.2 |
| Dew Point, Temp., F | 58.6 | 35.0 | 30.3 | 48.5 |
| Wind, ft./sec. @ 21 ft. | 9.8 | 7.5 | 7.6 | 9.2 |
| Cloud Cover, % | 10% | 10% | 10% | 10% |

| Other Inputs: | |
|---|---|
| Bottom Algae Coverage | 100% |
| Bottom SOD Coverage | 100% |
| Prescribed SOD, $gO_2/m^2/day$ | 0 |

**WASTELOAD ANALYSIS [WLA]** Date: 10/1/2012

**Appendix B: Simple Mixing Analysis for Conservative Constituents**

| | | | |
|---|---|---|---|
| Discharging Facility: | Salem WWTP | | |
| UPDES No: | UT-0020249 | | |
| Permit Flow [MGD]: | 1.25 | Maximum Monthly Flow | |
| | 2.00 | Maximum Daily Flow | |
| Receiving Water: | Beer Creek | | |
| Stream Classification: | 2B, 3C, 4 | | |
| Stream Flows [cfs]: | 0.50 | Summer (July-Sept) | Critical Low Flow |
| | 0.50 | Fall (Oct-Dec) | |
| | 0.50 | Winter (Jan-Mar) | |
| | 0.50 | Spring (Apr-June) | |
| Fully Mixed: | YES | | |
| Acute River Width: | 100% | | |
| Chronic River Width: | 100% | | |

**Modeling Information**

A simple mixing analysis was used to determine these effluent limits.

**Model Inputs**

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

**Headwater/Upstream Information**

| | Irrigation Ditch cfs | Beer Creek cfs |
|---|---|---|
| Summer | 0.5 | 2.00 |
| Fall | 0.5 | 2.00 |
| Winter | 0.5 | 2.00 |
| Spring | 0.5 | 2.00 |

**Discharge Information**

| | Flow MGD |
|---|---|
| Maximum Daily | 2.0 |
| Maximum Monthly | 1.25 |

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

**Effluent Limitations**

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

## Effluent Limitations for Protection of Recreation (Class 2B Waters)

| Physical Parameter | Maximum Concentration |
|---|---|
| pH Minimum | 6.5 |
| pH Maximum | 9.0 |

| Bacteriological | |
|---|---|
| E. coli (30 Day Geometric Mean) | 206 (#/100 mL) |
| E. coli (Maximum) | 668 (#/100 mL) |

## Effluent Limitations for Protection of Aquatic Wildlife (Class 3C Waters)

| Physical Parameter | Maximum Concentration |
|---|---|
| Temperature (deg C) | 27 |
| Temperature Change (deg C) | 4 |

| Inorganics Parameter | Chronic Standard (4 Day Average) Standard | Acute Standard (1 Hour Average) Standard |
|---|---|---|
| Phenol (mg/L) | | 0.010 |
| Hydrogen Sulfide (Undissociated) [mg/L] | | 0.002 |

| Dissolved Metals | Chronic Standard (4 Day Average)[1] | | | Acute Standard (1 Hour Average)[1] | | |
|---|---|---|---|---|---|---|
| Parameter | Standard | Background[2] | Limit | Standard | Background[2] | Limit |
| Aluminum (µg/L) | 87.0 | 58.3 | 124.1 | 750.0 | 58.3 | 1308.9 |
| Arsenic (µg/L) | 150.0 | 100.5 | 214.0 | 340.0 | 100.5 | 533.5 |
| Cadmium (µg/L) | 0.4 | 0.3 | 0.6 | 3.9 | 0.3 | 6.9 |
| Chromium VI (µg/L) | 11.0 | 7.4 | 15.7 | 16.0 | 7.4 | 23.0 |
| Chromium III (µg/L) | 130.8 | 87.6 | 186.5 | 1005.2 | 87.6 | 1746.6 |
| Copper (µg/L) | 16.2 | 10.8 | 23.1 | 25.8 | 10.8 | 37.9 |
| Cyanide (µg/L) | 22.0 | 14.7 | 31.4 | 5.2 | 14.7 | -2.5 |
| Iron (µg/L) | | | | 1000.0 | 670.0 | 1266.6 |
| Lead (µg/L) | 5.3 | 3.6 | 7.6 | 136.1 | 3.6 | 243.3 |
| Mercury (µg/L) | 0.012 | 0.008 | 0.017 | 2.4 | 0.0 | 4.3 |
| Nickel (µg/L) | 93.5 | 62.6 | 133.4 | 841.7 | 62.6 | 1471.1 |
| Selenium (µg/L) | 4.6 | 3.1 | 6.6 | 18.4 | 3.1 | 30.8 |
| Silver (µg/L) | | | | 10.6 | 7.1 | 13.4 |
| Tributylin (µg/L) | 0.072 | 0.048 | 0.103 | 0.46 | 0.05 | 0.79 |
| Zinc (µg/L) | 212.5 | 142.4 | 303.2 | 210.8 | 142.4 | 266.1 |

1: Based upon a Hardness of 200 mg/l as CaCO3

2: Background concentration assumed 67% of chronic standard

| Organics [Pesticides] | Chronic Standard (4 Day Average) | | | Acute Standard (1 Hour Average) | | |
|---|---|---|---|---|---|---|
| Parameter | Standard | Background[1] | Limit | Standard | Background[1] | Limit |
| Aldrin (µg/L) | | | | 1.5 | 1.0 | 1.9 |
| Chlordane (µg/L) | 0.0043 | 0.0029 | 0.0061 | 1.2 | 0.0 | 2.2 |
| DDT, DDE (µg/L) | 0.001 | 0.001 | 0.001 | 0.55 | 0.00 | 0.99 |
| Diazinon (µg/L) | 0.17 | 0.11 | 0.24 | 0.17 | 0.11 | 0.22 |
| Dieldrin (µg/L) | 0.0056 | 0.0038 | 0.0080 | 0.24 | 0.00 | 0.43 |
| Endosulfan, a & b (µg/L) | 0.056 | 0.038 | 0.080 | 0.11 | 0.04 | 0.17 |
| Endrin (µg/L) | 0.036 | 0.024 | 0.051 | 0.086 | 0.024 | 0.136 |
| Heptachlor & H. epoxide (µg/L) | 0.0038 | 0.0025 | 0.0054 | 0.26 | 0.00 | 0.47 |
| Lindane (µg/L) | 0.08 | 0.05 | 0.11 | 1.0 | 0.1 | 1.8 |
| Methoxychlor (µg/L) | | | | 0.03 | 0.02 | 0.04 |
| Mirex (µg/L) | | | | 0.001 | 0.001 | 0.001 |
| Nonylphenol (µg/L) | 6.6 | 4.4 | 9.4 | 28.0 | 4.4 | 47.1 |
| Parathion (µg/L) | 0.0130 | 0.0087 | 0.0185 | 0.066 | 0.009 | 0.112 |
| PCB's (µg/L) | 0.014 | 0.009 | 0.020 | | | |
| Pentachlorophenol (µg/L) | 15.0 | 10.1 | 21.4 | 19.0 | 10.1 | 26.2 |
| Toxephene (µg/L) | 0.0002 | 0.0001 | 0.0003 | 0.73 | 0.00 | 1.32 |

1: Background concentration assumed 67% of chronic standard

| Radiological | Maximum Concentration | | |
|---|---|---|---|
| Parameter | Standard | Background[1] | Limit |
| Gross Alpha (pCi/L) | 15 | 10.1 | 21.4 |

1: Background concentration assumed 67% of chronic standard; TDS is based on observed ambient data

**Effluent Limitation for Protection of Agriculture (Class 4 Waters)**

| | Maximum Concentration | | |
|---|---|---|---|
| Parameter | Standard | Background[1] | Limit |
| Total Dissolved Solids (mg/L) | 1200 | 700 | 1846 |
| Boron (µg/L) | 75 | 50.3 | 107.0 |
| Arsenic (µg/L) | 100 | 67.0 | 142.7 |
| Cadmium (µg/L) | 10 | 6.7 | 14.3 |
| Chromium (µg/L) | 100 | 67.0 | 142.7 |
| Copper (µg/L) | 200 | 134.0 | 285.3 |
| Lead (µg/L) | 100 | 67.0 | 142.7 |
| Selenium (µg/L) | 50 | 33.5 | 71.3 |
| Gross Alpha (pCi/L) | 15 | 10.1 | 21.4 |

1: Background concentration assumed 67% of chronic standard; TDS is based on observed ambient data