

## ARIZONA POLLUTANT DISCHARGE ELIMINATION SYSTEM (AZPDES)

This document gives pertinent information concerning the reissuance of the AZPDES permit listed below. This facility consists of a wastewater treatment plant (WWTP) and a water treatment plant (WTP). The wastewater treatment plant (WWTP) has a design capacity of 0.030 million gallons per day (mgd) while the maximum combined discharge flow from both the WWTP and WTP is 0.061 mgd and thus is considered to be a minor facility under the NPDES program. The effluent limitations contained in this permit will maintain the Water Quality Standards listed in Arizona Administrative Code (A.A.C.) R18-11-101 et. seq. This permit is proposed to be issued for a period of 5 years.

<b>I. PERMITTEE INFORMATION</b>	
Permittee's Name:	U.S. Department of Interior, Bureau of Reclamation
Permittee's Mailing Address:	P.O. Box 60400 Boulder City, NV 89006
Facility Name:	Hoover Dam Wastewater and Water Treatment Plants (WWTP/WTP)
Facility Address or Location:	U.S. Hwy. 93, SR 172 Boulder City, NV 89005
County:	Mohave
Contact Person(s): Phone/e-mail address	Hollan B. Silcox; Wastewater Operator 702-494-2374/ hsilcox@usbr.gov
AZPDES Permit Number:	AZ0025160
Inventory Number:	102131
LTF Number:	76335

<b>II. STATUS OF PERMIT(S)</b>	
AZPDES permit applied for:	Renewal
Date application received:	<b>March 28, 2019</b>
Date application was determined administratively complete:	April 23, 2019
Previous permit number (if different):	N/A
Previous permit expiration date:	October 9, 2019

**208 Consistency:**

In accordance with A.A.C. R18-9-A903(6), a permit cannot be issued for any discharge inconsistent with a plan or plan amendment approved under section 208(b) of the Clean Water Act.

<b>II. STATUS OF PERMIT(s)</b>		
Based on review of the application, there are no changes to the facility that require a new determination of consistency with the Regional Water Quality Management Plan.		
The U.S. Department of Interior, Bureau of Reclamation has the following permits issued by ADEQ applicable to the Hoover Dam Wastewater Treatment Plant and Water Treatment Plant:		
<b>Type of Permit</b>		
Aquifer Protection Permit (APP)	P102131	Regulates discharges to the local aquifer

<b>III. GENERAL FACILITY INFORMATION</b>	
Type of Facility:	Federally-owned treatment works and water treatment plant
Facility Location Description:	Just below Hoover Dam on the Colorado River, northeast of Boulder City, Nevada
Permitted Design Flow:	0.061 mgd Includes wastewater treatment plant design flow of 0.030 mgd plus water treatment plant filter backwash
Treatment level (WWTP):	Secondary
Treatment Processes :	Pre-treatment, grinding, equalization, anaerobic and aerobic treatment, clarification, chlorination, and dechlorination.
Sludge Handling and Disposal:	Sludge is stored in a holding tank before being transferred to 1 of 2 sludge drying beds or evaporation ponds for long term storage/disposal.
Nature of facility discharge:	Domestic wastewater generated by tourists and employees and filter backwash water from the Hoover Dam Water Treatment Plant (WTP).
Total Number of significant industrial users (SIUs):	0
Average flow per discharge:	Based on data submitted by the applicant the average flow per discharge is 0.025 mgd.
Service Area:	Hoover Dam
Service Population:	20 - 3,000; based on the number of employees plus the number of visitors to the dam
Reuse / irrigation or other disposal method(s):	N/A
Continuous or intermittent discharge:	Intermittent discharge on a daily basis
Discharge pattern summary:	Discharge flow records submitted during the existing permit term indicate the facility generally discharges slightly more in summer months than in winter months.

<b>IV. RECEIVING WATER</b>
The State of Arizona has adopted water quality standards to protect the designated uses of its surface waters. Streams have been divided into segments and designated uses assigned to these segments. The water quality standards vary by designated use depending on the level of protection required to maintain that use.

<b>IV. RECEIVING WATER</b>	
Receiving Water :	Colorado River (Lake Mead to Topock Marsh)
River Basin:	Colorado-Lower Gila River Basin
Outfall Location(s):	<p>Outfall 001: Township 30 N, Range 23 W, Section 3 Latitude 36° 00' 50" N, Longitude 114° 44' 22" W</p> <p>Outfall 002: Township 30 N, Range 23 W, Section 3 Latitude 36° 00' 45" N, Longitude 114° 44' 15" W</p> <p>(Outfall 001 is the external discharge point to the Colorado River. The discharge at Outfall 001 may include both WWTP effluent and the WTP filter backwash, monitoring of which takes place after mixing in the Mix Water Holding Tank. Outfall 002 is the internal outfall used for monitoring the WWTP effluent prior to mixing with the WTP filter backwash in the Mix Water Holding Tank.)</p>
The outfall discharges to, or the discharge may reach, a surface water listed in Appendix B of A.A.C. Title 18, Chapter 11, Article 1.	
Designated uses for the receiving water listed above:	<p>Aquatic and Wildlife cold water (A&amp;Wc) Full Body Contact (FBC) Fish Consumption (FC) Agricultural Irrigation (Agl) Agricultural Livestock watering (Agl) Domestic Water Supply (DWS)</p>
Is the receiving water on the 303(d) list?	No, the receiving water Colorado River (Hoover Dam to Lake Mohave) was previously impaired for selenium. The delisting report was completed and accepted by EPA in 2018. Currently there are no TMDL issues associated.
Given the uses stated above, the applicable narrative water quality standards are described in A.A.C. R18-11-108, and the applicable numeric water quality standards are listed in A.A.C. R18-11-109 and in Appendix A thereof. There are two standards for the Aquatic and Wildlife uses, acute and chronic. In developing AZPDES permits, the standards for all applicable designated uses are compared and limits that will protect for all applicable designated uses are developed based on the standards.	
<p>In addition to the above, the Colorado River has a salinity standard. Per A.A.C. R18-11-110, the flow-weighted average annual concentration of total dissolved solids shall not exceed 723 milligrams per liter (mg/L) in the river below Hoover Dam and above Parker Dam. In order to meet this standard, discharges must meet the plan of implementation requirements developed by the Colorado River Basin Salinity Control Forum.</p> <p>Per A.A.C. R18-11-110 (B), the plan of implementation contained in the "2014 Review, Water Quality Standards for Salinity, Colorado River System," has been incorporated by reference to preserve the basin-wide approach to salinity control to ensure compliance with the above numeric standard. The plan requires that maximum incremental increases in TDS (i.e., TDS concentration in the discharge minus TDS concentration in the supply or source water) shall not exceed 400 mg/L or that the salt load is less than 1 ton/day.</p> <p>Requirements for establishing incremental increases may be waived in those cases where the incremental salt load reaching the main stem of the Colorado River is less than 1 ton per day (ton/day). In the Colorado River Salinity Control Forum 2014 Review, the Hoover Dam is listed as a municipal user in compliance with Forum policy since the</p>	

<b>IV. RECEIVING WATER</b>
discharges meet the plan of implementation for salt loading being less than 1 ton/day, therefore, the salt load requirement is applied to the Hoover Dam WWTP/WTP.

<b>V. DESCRIPTION OF DISCHARGE</b>		
Because the facility is in operation and discharges have occurred, effluent monitoring data are available. The following is the measured effluent quality reported in the application.		
Parameters	Units	Maximum Daily Discharge Concentration
Biochemical Oxygen Demand (BOD)	mg/L	15
Total Suspended Solids (TSS)	mg/L	< 10
Nitrogen, nitrates (NO3)	mg/L	24
Ammonia	mg/L	0.58
E. coli	cfu / 100 mL	2
Arsenic	µg/L	12
Copper	µg/L	44
Mercury	µg/L	0.0028
Selenium	µg/L	1.7
Facility design removal rates:	BOD: 85 % TSS: 85 % N: N/A	

<b>VI. STATUS OF COMPLIANCE WITH THE EXISTING AZPDES PERMIT</b>	
Date of most recent inspection:	08/31/2016; no potential violations were noted as a result of this inspection.
DMR files reviewed:	10/2014 through 02/2019
Lab reports reviewed:	09/2015 through 02/2019
DMR Exceedances:	Copper (June and December 2015); Nitrogen (June 2015); Total Dissolved Solids (December 2014, June 2015, December 2015, March 2016, and December 2018); Total Suspended Solids (March 2017).  Iron (December 2014, June and December 2016, June 2017) and Lead (December 2014) were above Assessment Levels. No other exceedances were noted.
NOVs issued:	None
NOVs closed:	N/A
Compliance orders:	None

<b>VII. PROPOSED PERMIT CHANGES</b>			
The following table lists the major changes from the previous permit in this draft permit.			
<b>Parameter</b>	<b>Existing Permit</b>	<b>Proposed permit</b>	<b>Reason for change</b>
Reporting Location	Mail in hard copies of DMRs and other attachments	DMRs and other reports to be submitted electronically through myDEQ portal	Language added to support the NPDES electronic DMR reporting rule that became effective on December 21, 2015.
Mixing Zone for Arsenic, Copper, and Nitrate (Outfall 001)	Downstream limits	Limits removed	Data submitted and the steady-state model for the mixing zone indicated no reasonable potential (RP) for an exceedance of a standard.
Iron and Lead (Outfall 001)	Assessment level	Limited	Data submitted indicated reasonable potential (RP) for an exceedance of a standard.
Total dissolved solids (TDS) (Outfall 001)	Incremental increases ≤ 400 mg/L	Net Salt load < 1 ton/day	TDS limit is based on the Colorado River Salinity Forum (CRSF) requirements. This facility was labeled in the 2014 and 2017 (CRSF) review as in compliance with the net salt load requirement of < 1 ton/day. The permit limit was changed to determine compliance with the TDS criteria that is consistent with the CRSF requirements.
<p>Anti-backsliding considerations – “Anti-backsliding” refers to statutory (Section 402(o) of the Clean Water Act) and regulatory (40 CFR 122.44(l)) requirements that prohibit the renewal, reissuance, or modification of an existing NPDES permit that contains effluent limits, permit conditions, or standards that are less stringent than those established in the previous permit. The rules and statutes do identify exceptions to these circumstances where backsliding is acceptable. This permit has been reviewed and drafted with consideration of anti-backsliding concerns.</p> <p>Limits for the following parameters have been removed from the permit because evaluation of current data allows the conclusion that no reasonable potential (RP) for an exceedance of a standard exists:</p> <ul style="list-style-type: none"> <li>• Arsenic (Outfall 001)</li> <li>• Copper (Outfall 001)</li> <li>• Nitrate (Outfall 001)</li> </ul> <p>This is considered allowable backsliding under 303(d)(4). The effluent limitations in the current permit for these three parameters were based on state standards, the respective receiving waters are in attainment for these parameters, and the revisions are consistent with antidegradation requirements. See Section XII for information regarding antidegradation requirements.</p> <p>Limits are retained in the draft permit for parameters where reasonable potential (RP) for an exceedance of a standard continues to exist or is indeterminate. In these cases, limits will be recalculated using the most current Arizona Water Quality Standards (WQS). If less stringent limits result due to a change in the WQS then backsliding is allowed in accordance with 303(d)(4) if the new limits are consistent with antidegradation requirements and the receiving water is in attainment of the new standard; see Section XII for information regarding antidegradation requirements. No limits are less stringent due to a change in the WQS in this permit.</p>			

**VIII. DETERMINATION OF EFFLUENT LIMITATIONS and ASSESSMENT LEVELS**

When determining what parameters need monitoring and/or limits included in the draft permit, both technology-based and water quality-based criteria were compared and the more stringent criteria applied.

**Technology-based Limitations:** As outlined in 40 CFR Part 133:

The regulations found at 40 CFR §133 require that POTWs achieve specified treatment standards for BOD, TSS, and pH based on the type of treatment technology available. The Hoover Dam WWTP is a federally owned plant using the same technology for treatment of domestic sewage as a POTW. Therefore, technology-based effluent limitations (TBELs) have been established in the permit for these parameters based on Best Professional Judgment (BPJ). Additionally, oil & grease will be monitored with a TBEL based on best professional judgment (BPJ). The average monthly limit of 10 mg/L and daily maximum of 15 mg/L are commonly accepted values that can be achieved by properly operated and maintained WWTPs. This level is also considered protective of the narrative standard at A.A.C. R18-11-108(B).

**Numeric Water Quality Standards:** As outlined in A.A.C. R18-11-109 and Appendix A:

Per 40 CFR 122.44(d)(1)(ii), (iii) and (iv), discharge limits must be included in the permit for parameters with “reasonable potential” (RP), that is, those known to be or expected to be present in the effluent at a level that could potentially cause any applicable numeric water quality standard to be exceeded. RP refers to the possibility, based on the statistical calculations using the data submitted, or consideration of other factors to determine whether the discharge may exceed the Water Quality Standards. The procedures used to determine RP are outlined in the *Technical Support Document for Water Quality-based Toxics Control (TSD)* (EPA/505/2-90-001). In most cases, the highest reported value for a parameter is multiplied by a factor (determined from the variability of the data and number of samples) to determine a “highest estimated value”. This value is then compared to the lowest applicable Water Quality Standard for the receiving water. If the value is greater than the standard, RP exists and a water quality-based effluent limitation (WQBEL) is required in the permit for that parameter. RP may also be determined from BPJ based on knowledge of the treatment facilities and other factors. The basis for the RP determination for each parameter with a WQBEL is shown in the table below.

Ammonia water quality criteria vary based on the receiving water pH and temperature at the time of effluent sampling. As a result, no single ammonia concentration can be included as a permit limit. To overcome this, an Ammonia Impact Ratio (AIR) of 1 for the monthly average and a value of 2 for the maximum daily limits has been established as the permit limits for ammonia. The AIR is calculated by dividing the ammonia concentration in the effluent by the applicable ammonia standard based on the receiving water pH and temperature at the time of sampling. AIR values will be reported on DMRs and on the Ammonia Data Log which is included as Appendix B in the permit.

It is assumed that RP exists for exceedance of water quality criteria for the pollutants *E. coli* and, if chlorine or bromine is used in the treatment process, total residual chlorine (TRC). These parameters have been shown through extensive monitoring of WWTPs to fluctuate greatly and thus are not conducive to exclusion from limitation due to a lack of RP. Therefore, the draft permit contains WQBELs for *E. coli* and TRC which applies to the combined discharge at Outfall 001.

However, since effluent data were either non-detect with high LOQ or not available, RP could not be calculated for other potential pollutants that are subject to numeric water quality standards. Instead of WQBELs, assessment levels (ALs) were established for Trace Substances (Table 2 in the permit). ALs and relatively frequent monitoring are necessary for these parameters because they are commonly present in WWTP effluents at variable concentrations and at a level that could exceed the applicable water quality criteria for them. (See discussion under “Assessment Levels” below for further details.) For a number of other pollutants, Effluent Characterization (EC) monitoring is required at a lesser frequency and without established ALs or numeric limits (Tables 4.a. – 4.b in the permit). (See discussion under “Effluent Characterization” below for further details.)

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The proposed permit limits were established using a methodology developed by EPA. Long Term Averages (LTA) were calculated for each designated use and the lowest LTA was used to calculate the average monthly limit (AML) and maximum daily limit (MDL) necessary to protect all uses. This methodology takes into account criteria, effluent variability, and the number of observations taken to determine compliance with the limit and is described in Chapter 5 of the TSD. Limits based on A&W criteria were developed using the “two-value steady state wasteload allocation” described on page 99 of the TSD. When the limit is based on human health criteria, the monthly average was set at the level of the applicable standard and a daily maximum limit was determined as specified in Section 5.4.4 of the TSD.

**Mixing Zone**

Arizona state water quality rules require that water quality standards be achieved without mixing zones unless the permittee applies for and is approved for a mixing zone. The U.S. Department of Interior has requested that the previous mixing zone for arsenic, copper, and nitrate be renewed. The permit reestablishes a mixing zone for arsenic, copper, and nitrate as requested.

The following factors in Arizona mixing zone rules listed in A.A.C. R18-11-114(D) were considered upon approving the request:

Factor	Consideration
Assimilative capacity of the receiving water	The large dilution factor (26,000:1) of the discharge to the receiving water will have no impact on the assimilative capacity of the receiving water.
Likelihood of adverse human health effects	A complete and rapid mix is assumed at the discharge point with downstream concentrations being below the domestic water source standards.
Location of drinking water plant intakes and public swimming areas	A complete and rapid mix is assumed at the discharge point with downstream concentrations being below the FBC and DWS standards.
Predicted exposure of biota and the likelihood that resident biota will be adversely affected	There will be no likelihood that resident biota will be affected. A complete and rapid mix is assumed at the discharge point with the downstream concentrations being below the acute and chronic aquatic and wildlife standards.
Bioaccumulation	The bioaccumulation potential is generally not considered to be significant unless the BCF exceeds 100, therefore, arsenic, copper, and nitrate will not create a bioaccumulation hazard.
Size of the zone of initial dilution	Initial dilution is instantaneous due to the large dilution factor of the discharge to the receiving water and the location of the outfall immediately downstream of the dam’s spillway.
Known or predicted safe exposure levels for the pollutant for which the mixing zone is granted	Effluent concentrations are well below safe exposure levels for arsenic, copper, and nitrate.
Size of the mixing zone	Due to the large dilution factor and extreme turbulence, the mixing zone is assumed to be completely mixed at the discharge point.



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Location of the mixing zone relative to biologically sensitive areas in the surface water	A complete and rapid mix is assumed at the discharge point with the downstream concentrations being below the aquatic and wildlife standards.
Concentration gradient of the pollutant within the mixing zone	A complete and rapid mix is assumed.
Sediment deposition	None
Potential for attracting aquatic life to the mixing zone	None
Cumulative impacts of other mixing zones and other discharges to the surface water	Not applicable

Rapid and complete mixing occurs when the lateral variation in the concentration of a pollutant in the direct vicinity of the outfall is small. Outfall 001 from the Hoover Dam WWTP/WTP enters the Colorado River into the tailrace area below the dam, which is also where water from Lake Mead is released after passing through the dam. Because of the extreme amount of dilution and turbulence that occurs in this area, rapid and complete mixing is assumed and the steady state dilution model is used to calculate the mixing zone.

The following steady-state mass balance formula was used to determine reasonable potential for arsenic, copper and nitrate in consideration of the applicant's request to reestablish the mixing zone:

$$Q_s C_s + Q_d C_d = Q_r C_r$$

Where:

- $Q_s$  = background in-stream flow above discharge point during critical conditions (lowest one-day average flow event expected to occur once every ten years on average)
- $C_s$  = background in-stream arsenic/copper/nitrate concentration
- $Q_d$  = facility design capacity was used for maximum water discharge flow
- $C_d$  = highest estimated maximum effluent concentration for arsenic/copper/nitrate (using the highest reported value from effluent data submitted)
- $Q_r$  = critical downstream receiving water flow
- $C_r$  = resultant in-stream pollutant concentration

Model Results (Arsenic):

- $Q_s$  ((1Q10) flow from Colorado River above discharge point during critical conditions) = 1615 MGD
- $C_s$  (maximum arsenic concentration from upstream sampling location above discharge point) = 2 µg/L
- $Q_d$  (facility design capacity for the Hoover Dam WWTP/WTP) = 0.061 MGD
- $C_d$  (maximum effluent arsenic concentration sampled) = 12 µg/L
- $Q_r$  (low-flow value upstream flow plus discharge design flow) = 1615 MGD
- $C_r$  (resultant in-stream pollutant concentration) = 2 µg/L



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RP is determined based on the projected maximum receiving water concentration at the edge of the mixing zone. This is determined by solving for  $C_r$  using the critical inputs into the steady-state mass balance formula. Solving for  $C_r$  to determine RP yields:

$$C_r = \frac{Q_s C_s + Q_d C_d}{Q_r}$$

$$C_r = 2 \mu\text{g/L}$$

Because the  $C_r$  value of 2  $\mu\text{g/L}$  is less than the arsenic standard of 10  $\mu\text{g/L}$  it was determined that there would not be RP for an exceedance of the domestic water source arsenic standard.

Model Results (Copper):

- $Q_s$  ((1Q10) flow from Colorado River above discharge point during critical conditions) = 1615 MGD
- $C_s$  (maximum copper concentration from upstream sampling location above discharge point; two outliers were removed from the data set because they were not consistent with USGS data taken upstream of the dam) = 2.2  $\mu\text{g/L}$
- $Q_d$  (facility design capacity for the Hoover Dam WWTP/WTP) = 0.061 MGD
- $C_d$  (maximum effluent copper concentration sampled) = 44  $\mu\text{g/L}$
- $Q_r$  (low-flow value upstream flow plus discharge design flow) = 1615 MGD
- $C_r$  (resultant in-stream pollutant concentration) = 2  $\mu\text{g/L}$

RP is determined based on the projected maximum receiving water concentration at the edge of the mixing zone. This is determined by solving for  $C_r$  using the critical inputs into the steady-state mass balance formula. Solving for  $C_r$  to determine RP yields:

$$C_r = \frac{Q_s C_s + Q_d C_d}{Q_r}$$

$$C_r = 2 \mu\text{g/L}$$

Because the  $C_r$  value of 2  $\mu\text{g/L}$  is less than the copper standard of 22.0  $\mu\text{g/L}$  it was determined that there would not be RP for an exceedance of the chronic aquatic and wildlife cold water copper standard.

Model Results (Nitrate):

- $Q_s$  ((1Q10) flow from Colorado River above discharge point during critical conditions) = 1615 MGD
- $C_s$  (maximum nitrate concentration from upstream sampling location above discharge point) = 0.48  $\mu\text{g/L}$
- $Q_d$  (facility design capacity for the Hoover Dam WWTP/WTP) = 0.061 MGD
- $C_d$  (maximum effluent nitrate concentration sampled) = 600  $\mu\text{g/L}$
- $Q_r$  (low-flow value upstream flow plus discharge design flow) = 1615 MGD
- $C_r$  (resultant in-stream pollutant concentration) = 1  $\mu\text{g/L}$

RP is determined based on the projected maximum receiving water concentration at the edge of the mixing zone. This is determined by solving for  $C_r$  using the critical inputs into the steady-state mass balance formula. Solving for  $C_r$  to determine RP yields:

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$$C_r = \frac{Q_s C_s + Q_d C_d}{Q_r}$$

$$C_r = 1 \mu g/L$$

Because the Cr value of 1 µg/L is less than the nitrate standard of 10,000 µg/L it was determined that there would not be RP for an exceedance of the domestic water source nitrate standard.

See Section XII for the mixing zone discussion.

**Assessment Levels (ALs)**

ALs are listed in Part I.B of the permit. An AL differs from a discharge limit in that an exceedance of an AL is not a permit violation. Instead, ALs serve as triggers, alerting the permitting authority when there is cause for re-evaluation of RP for exceeding a water quality standard, which may result in new permit limitations. The AL numeric values also serve to advise the permittee of the analytical sensitivity needed for meaningful data collection. Trace substance monitoring is required when there is uncertain RP (based on non-detect values or limited datasets) or a need to collect additional data or monitor treatment efficacy on some minimal basis. A reopener clause is included in the draft permit should future monitoring data indicate water quality standards are being exceeded.

The requirement to monitor for these parameters is included in the draft permit according to A.A.C. R18-11-104(C) and Appendix A. ALs listed for each parameter were calculated in the same manner that a limit would have been calculated (see Numeric Water Quality Standards Section above).

**Hardness**

The permittee is required to sample hardness as CaCO<sub>3</sub> at the same time the trace metals are sampled because the water quality standards for some metals are calculated using the water hardness values. The hardness value of 286 mg/L (the average hardness of the receiving stream) was used to calculate the applicable water quality standards and any assessment levels or limits for the hardness dependent metals (cadmium, chromium III, copper, lead, nickel, silver and zinc).

**Whole Effluent Toxicity (WET)**

WET testing is required in the draft permit (Parts I.C and IV) to evaluate the discharge according to the narrative toxic standard in A.A.C. R18-11-108(A)(5), as well as whether the discharge has RP for WET per 40 CFR 122.44(d)(iv).

WET testing for chronic toxicity shall be conducted using the following three surrogate species:

- *Ceriodaphnia dubia* (water flea) – for evaluating toxicity to invertebrates
- *Pimephales promelas* (fathead minnow) – for evaluating toxicity to vertebrates
- *Pseudokirchneriella subcapitata* (formerly known as *Selenastrum capricornutum* or *Raphidocelis subcapitata*) (a green alga) – for evaluating toxicity to plant life

ADEQ does not have a numeric standard for Whole Effluent Toxicity. However, ADEQ adopted the EPA recommended chronic toxicity benchmark of 1.0 TUC for a four day exposure period. Using this benchmark, the action levels for WET included in the draft permit were calculated in accordance with the methods specified in the TSD. The species chosen for WET testing are as recommended in the TSD and in *Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity Testing Programs*.

An exceedance of an action level will trigger follow-up testing to determine if effluent toxicity is persistent. If toxicity above an action level is found in a follow-up test, the permittee will be required to conduct a Toxicity Reduction Evaluation (TRE) and possibly a Toxicity Identification Evaluation (TIE) to identify the source of toxicity and reduce toxicity. These conditions are required to ensure that toxicants are not discharged in amounts that are toxic to

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organisms [A.A.C. R18-11-108(A)(5)]. A reopener clause is included in accordance with 40 CFR Parts 122 and 124 and AAC R18-9-B906.

The draft permit requires 8-hour composite samples be collected for WET testing. An 8-hour composite sample type was chosen over the suggested 24-hour composite for WET testing in order to have consistency with the type of sample required for other parameters requiring monitoring in this permit. WET sampling must coincide with testing for all the parameters in Parts I.A and B of the draft permit, when testing of those parameters is required, to aid in the determination of the cause of toxicity if toxicity is detected. Additional procedural requirements for the WET test are included in the proposed permit.

The required WET monitoring frequency for this facility is consistent with the WET testing frequency required for facilities with a similar design flow. The draft permit requires WET test results to be reported on discharge monitoring reports and submittal of the full WET lab report to ADEQ.

**Effluent Characterization (EC)**

In addition to monitoring for parameters assigned either a limit or an AL, sampling is required to assess the presence of pollutants in the discharge at certain minimum frequencies for additional suites of parameters, whether the facility is discharging or not. This monitoring is specified in Tables 4.a. and 4.b, *Effluent Characterization Testing*, as follows:

- Table 4.a. – General Chemistry and Microbiology: ammonia, BOD-5, *E. coli*, total residual chlorine (TRC), dissolved oxygen, total Kjeldahl nitrogen (TKN), nitrate/nitrite, oil and grease, pH, phosphorus, temperature, total dissolved solids (TDS), and total suspended solids (TSS)
- Table 4.b. – Selected Metals, Hardness, Cyanide, and WET

NOTE: Some parameters listed in Tables 4.a. and 4.b. are also listed in Tables 1 or 2. In this case, the data from monitoring under Tables 1 or 2 may be used to satisfy the requirements of Tables 4.a. and / or 4.b., provided the specified sample types are the same. In the event the facility does not discharge to a water of the U.S. during the life of the permit, EC monitoring of representative samples of the effluent is still required.

The purpose of EC monitoring is to characterize the effluent and determine if the parameters of concern are present in the discharge and at what levels. This monitoring will be used to assess RP per 40 CFR 122.44(d)(1)(iii)). EC monitoring is required in accordance with 40 CFR 122.43(a), 40 CFR 122.44(i), and 40 CFR 122.48(b) as well as A.R.S. §49-203(A)(7). If pollutants are noted at levels of concern during the permit term, this permit may also be reopened to add related limits or conditions.

**Permit Limitations and Monitoring Requirements**

The table that follows summarizes the parameters that are limited in the permit and the rationale for that decision. Also included are the parameters that require monitoring without any limitations or that have not been included in the permit at all and the basis for those decisions. The corresponding monitoring requirements are shown for each parameter. In general, the regulatory basis for monitoring requirements is per 40 CFR §122.44(i) *Monitoring requirements*, and 40 CFR §122.48(b), *Required monitoring*; all of which have been adopted by reference in A.A.C. R18-9-A905, *AZPDES Program Standards*.

Parameter (1)	Lowest Standard / Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/ Rationale (2)
Flow (Outfall 001 and 002)	---	---	---	---	---	Discharge flow is to be monitored on a continual basis using a flow meter.
Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS)	30 mg/L 30-day average 45 mg/L 7-day average/ Technology-based limits 40 CFR 133.102 only applies to Outfall 002	BOD: 15 mg/L TSS: < 10 mg/L	BOD: 16 TSS: 12	N/A	TBELs for BOD and TSS are always applicable to WWTPs.	Monitoring for influent and effluent BOD and TSS to be conducted using composite samples of the influent and the effluent. The sample type required was chosen to be representative of the discharge. The requirement to monitor influent BOD and suspended solids is included to assess compliance with the 85% removal requirement in this permit. At least one sample must coincide with WET testing to aid in the determination of the cause of toxicity, if toxicity is detected.
Chlorine, Total Residual (TRC)	11 µg/L/ A&Wc chronic	8.0 µg/L	52	N/A	RP always expected when chlorine or bromine is used for disinfection.	TRC is to be monitored as a discrete sample and a WQBEL remains in the permit. 40 CFR Part 136 specifies that discrete samples must be collected for chlorine. At least one sample per month must coincide with WET testing to aid in the determination of the cause of toxicity, if toxicity is detected.
<i>E. coli</i>	30-day geometric mean: 126 cfu /100 mL (4 sample minimum) Single sample maximum: 235 cfu /100 mL/ FBC	15.8 cfu/100mL	53	N/A	RP always expected for WWTPs. See explanation above.	<i>E. coli</i> is to be monitored as a discrete sample and a WQBEL remains in the permit.
pH (Effluent)	Minimum: 6.5 Maximum: 9.0 A&Wc and FBC A.A.C. R18-11-109(B)  Minimum: 6.0 Maximum: 9.0 Technology-based limits 40 CFR 133.102	6.7 – 8.4 S.U.	144	N/A	WQBEL or TBEL is always applicable to WWTPs.	Effluent pH is to be monitored using a discrete sample of the effluent and a WQBEL is set. 40 CFR Part 136 specifies that grab samples must be collected for pH. At least one sample must coincide with WET testing to aid in the determination of the cause of toxicity if toxicity is detected.
pH (4) (Receiving Water)	No applicable numeric standard	6.7 – 8.3 S.U.	53	N/A	N/A	Receiving water pH is to be monitored using a discrete sample. Receiving water pH is required for determination of the applicable ammonia standard. Therefore, receiving water pH sampling must coincide with ammonia sampling of the effluent when required.

Parameter (1)	Lowest Standard / Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/ Rationale (2)
Temperature (Effluent)	No applicable numeric standard	19.8 – 29.9 °C	18	N/A	N/A	Effluent temperature is to be monitored for effluent characterization by discrete sample. 40 CFR Part 136 specifies that discrete samples must be collected for temperature. Temperature sampling must also coincide with ammonia sampling when required.
Temperature (4) (Receiving Water)	No applicable numeric standard	13.2 - 22.1°C	53	N/A	N/A	Receiving water temperature is to be monitored using a discrete sample. Receiving water temperature is required for determination of the applicable ammonia standard. Therefore, receiving water temperature sampling must coincide with ammonia sampling of the effluent when required.
Total Dissolved Solids (TDS)	Net salt Load cannot be greater than 1 ton/day Per Colorado River Basin Salinity Control Forum requirements/ A.A.C. R18-11-110	Δ = 650 mg/L	18	N/A	Colorado River Basin Salinity Control Forum requirements always applicable	Monitoring required and a WQBEL remains in the permit. WQBEL in the form of a mass limit of 1 ton/day is applied.
Ammonia	Standard varies with temperature and pH / A&Wc chronic	0.64 mg/L  0.64 Ammonia Impact Ratio (AIR)	53	N/A	RP Indeterminate (7)	Ammonia is to be monitored by discrete sample and a WQBEL in the form of an ammonia impact ratio (AIR) of 1 remains in the permit (8). An ammonia data log with concurrent pH and temperature monitoring in the <u>receiving water</u> is also required. One sample must coincide with WET sampling to aid in the determination of the cause of toxicity, if toxicity is detected.
Nitrate (5)	10,000 µg/L/ DWS	24,000 µg/L	8	79,200 µg/L	No RP based on mixing zone model results	Monitoring required for effluent characterization.
Nitrite	1,000 µg/L/ DWS	< 200 µg/L	8	N/A	No RP	Monitoring required for effluent characterization.
Nutrients (Total Nitrogen and Total Phosphorus)	No applicable standards	N/A	N/A	N/A	N/A	Monitoring required for effluent characterization.
Oil & Grease	BPJ Technology-Based Level of 10 mg/L monthly average and 15 mg/L daily maximum	< 5.1 mg/L	12	N/A	RP Indeterminate (7)	Monitoring required and a TBEL remains in the permit.
Antimony	6 µg/L/ DWS	< 3 µg/L	4	N/A	No RP	Monitoring required for effluent characterization.

Parameter (1)	Lowest Standard / Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/ Rationale (2)
Arsenic (5)	10 µg/L/ DWS	12 µg/L	7	42 µg/L	No RP based on mixing zone model results	Monitoring required for effluent characterization.
Barium	2,000 µg/L/ DWS	120 µg/L	4	564 µg/L	No RP	Monitoring required for effluent characterization.
Beryllium	4 µg/L/ DWS	< 1 µg/L	4	N/A	No RP	Monitoring required for effluent characterization.
Boron	1,000 µg/L/ Agl	180 µg/L	5	756 µg/L	No RP	Monitoring required for effluent characterization.
Cadmium (3)	0.509 µg/L/ A&Wc chronic	< 1 µg/L	4	N/A	RP Indeterminate	Monitoring required for effluent characterization.
Chromium (Total)	100 µg/L/ DWS	8.1 µg/L	5	34 µg/L	No RP	Monitoring required as an indicator parameter for Chromium VI.
Chromium VI	11 µg/L/ A&Wc chronic	< 5 µg/L	4	N/A	No RP (Based on total chromium data)	Monitoring required for effluent characterization.
Copper (3)(5)	22 µg/L/ A&Wc chronic	44 µg/L	9	141 µg/L	No RP based on mixing zone model results	Monitoring required for effluent characterization.
Cyanide	5.2 µg/L/ A&Wc chronic	< 50 µg/L	6	N/A	RP Indeterminate (High LOQ)	Monitoring is required and an assessment level remains in the permit.
Hardness (4) (Receiving water)	No applicable standard. Hardness is used to determine standards for specific metal parameters.	330 mg/L	12	N/A	N/A	A&W standards for cadmium, chromium III, copper, lead, nickel, silver and zinc used for RP determinations were based on the average receiving water hardness value of 286 mg/L. Monitoring for hardness is required whenever monitoring for hardness dependent metals is required.
Hydrogen Sulfide	2 µg/L/ A&Wc chronic	< 50 µg/L	5	N/A	RP Indeterminate (High LOQ)	Monitoring is required for sulfides as an indicator parameter for hydrogen sulfide. If sulfides are detected, monitoring for hydrogen sulfide is required for the remainder of the permit term.
Iron	1,000 ug/L / A&Wc chronic	1,750 µg/L	8	5,775 µg/L	RP Exists	Monitoring is required and a WQBEL is set.
Lead (3)	7.73 µg/L / A&Wc chronic	12 µg/L	7	42 µg/L	RP Exists	Monitoring is required and a WQBEL is set.
Mercury	0.01 µg/L/ A&Wc chronic	0.0028 µg/L	6	0.01 µg/L	RP Indeterminate	Monitoring required and a WQBEL remains in the permit.
Nickel (3)	126 µg/L/ A&Wc chronic	10 µg/L	4	47 µg/L	No RP	Monitoring required for effluent characterization.

Parameter (1)	Lowest Standard / Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/ Rationale (2)	
Selenium	2 µg/L/ A&Wc chronic	1.7 µg/L	7	6 µg/L	RP Exists	Monitoring required and a WQBEL remains in the permit.	
Silver (3)	4.40 µg/L/ A&Wc chronic	< 1 µg/L	4	N/A	No RP	Monitoring required for effluent characterization.	
Sulfides	No applicable standard	< 50 µg/L	5	N/A	N/A	Indicator parameter for hydrogen sulfide. Monitoring required. If sulfides are detected, monitoring for hydrogen sulfide is required for the remainder of the permit term.	
Thallium	2 µg/L/ DWS	< 1 µg/L	4	N/A	No RP	Monitoring required for effluent characterization.	
Zinc (3)	285 µg/L/ A&Wc acute and chronic	32 µg/L	4	150 µg/L	No RP	Monitoring required for effluent characterization.	
Whole Effluent Toxicity (WET)	No toxicity (A.A.C. R18-11-108(A)(6) )	<i>Pseudo-kirchneriella subcapitata</i> (6)	1.0 TUc	1	N/A	RP Indeterminate (7)	Monitoring required and an action level remains in the permit.
		<i>Pimephales promelas</i>	1.0 TUc	1	N/A	RP Indeterminate (7)	Monitoring required and an action level remains in the permit.
		<i>Ceriodaphnia dubia</i>	1.0 TUc	1	N/A	RP Indeterminate (7)	Monitoring required and an action level remains in the permit.

**Footnotes:**

- (1) All effluent parameters except for BOD5, TSS, and TRC are to be sampled at the MIX Water Holding Tank ("Mix Tank") after addition of the filter backwash from the water treatment plant (WTP) but prior to mixing with the receiving water at Outfall 001. TRC is to be sampled after dechlorination of the combined WWTP effluent and WTP filter backwash but prior to mixing with the receiving water at Outfall 001. WWTP effluent BOD5 and TSS are to be sampled at the Mix Tank prior to addition of the WTP filter backwash. This sampling point also represents the internal Outfall 002. Effluent flow from the WWTP is to be measured prior to discharge into Mix Tank while the combined flow of the WWTP effluent and WTP filter backwash is to be measured prior to discharge at Outfall 001.
- (2) The monitoring frequencies are as specified in the permit.
- (3) Hardness-dependent metal - the standard for this parameter is based on the average hardness value of the receiving water as indicated above.
- (4) All receiving water (Colorado River) background samples shall be taken from approximately 0.5 meter below the water surface at the southern end of the Boat Dock approximately 40 feet upstream of the point of discharge (Outfall 001).
- (5) A mixing zone was approved in the previous permit for these parameters and reestablished in this permit. See Part V.B (Special Conditions: Mixing Zone) in the permit.
- (6) Formerly known as *Selenastrum capricornutum* or *Raphidocelis subcapitata*.
- (7) Monitoring with ALs or Action Levels always required for WWTPs for these parameters unless RP exists and limits are set.
- (8) An AIR will be calculated by dividing effluent ammonia concentration by the applicable standard using the receiving water pH and temperature.



**VIII. NARRATIVE WATER QUALITY STANDARDS**

All narrative limitations in A.A.C. R18-11-108 that are applicable to the receiving water are included in Part I, Sections E and F of the draft permit.

**IX. MONITORING AND REPORTING REQUIREMENTS (Part II of Permit)**

Section 308 of the Clean Water Act and 40 CFR Part 122.44(i) require that monitoring be included in permits to determine compliance with effluent limitations. Additionally, monitoring may be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality.

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Monitoring frequencies for some parameters may be reduced in subsequent permits if all monitoring requirements have been met and the limits or ALS for those parameters have not been exceeded during the first permit term.

For the purposes of this permit, an "8-hour composite" sample has been defined as a flow-proportioned mixture of two or more discrete samples (aliquots) obtained at equal time intervals over an 8-hour period (if only two samples are collected, they should be taken approximately 8 hours apart). The volume of each aliquot shall be directly proportional to the discharge flow rate at the time of sampling.

These criteria for composite sampling are included in order to obtain samples that are representative of the discharge given the potential variability in the duration, frequency and magnitude of discharges from this facility.

Discrete (i.e., grab) samples are specified in the permit for parameters that for varying reasons are not amenable to compositing.

Monitoring locations are specified in the permit (Part I.A and Part I.J) in order to ensure that representative samples of the influent and effluent are consistently obtained.

The requirements in the permit pertaining to Part II, Monitoring and Reporting, are included to ensure that the monitoring data submitted under this permit is accurate in accordance with 40 CFR 122.41(e). The permittee has the responsibility to determine that all data collected for purposes of this permit meet the requirements specified in this permit and is collected, analyzed, and properly reported to ADEQ.

The permit (Part II.A.2) requires the permittee to keep a Quality Assurance (QA) manual at the facility, describing sample collection and analysis processes; the required elements of the QA manual are outlined.

Reporting requirements for monitoring results are detailed in Part II, Sections B.1 through B.4 of the permit, including completion and submittal of Discharge Monitoring Reports (DMRs), and Ammonia Data Logs. The permittee is responsible for conducting all required monitoring and reporting the results to ADEQ on DMRs or as otherwise specified in the permit.

**Electronic reporting**

The US EPA has published a final regulation that requires electronic reporting and sharing of Clean Water Act National Pollutant Discharge Elimination System (NPDES) program information instead of the current paper-based reporting (Federal Register, Vol. 80, No. 204, October 22, 2015). Beginning December 21, 2016 (one year after the effective date of the regulation), the Federal rule required permittees to make electronic submittals of any monitoring reports and forms called for in their permits. ADEQ has created an online portal called myDEQ that allows users to submit their discharge monitoring reports and other applicable reports required in the permit.

The permit also requires annual submittal of an Ammonia Data Log that records the results for temperature, pH, and ammonia samples and date of sampling (Part II.B.3). Because the ammonia standards in 18 A.A.C. 11, Article 1, Appendix A are contingent upon the pH and temperature at the time of sampling for ammonia, the permittee must

**IX. MONITORING AND REPORTING REQUIREMENTS (Part II of Permit)**

determine the applicable ammonia standard using the ammonia criteria table(s) and calculate the Ammonia Impact Ratio for that ammonia sample result. The AIR is recorded on the DMR.

Requirements for retention of monitoring records are detailed in Part II.D of the permit.

**X. BIOSOLIDS REQUIREMENTS (Part III in Permit)**

Standard requirements for the monitoring, reporting, record keeping, and handling of biosolids, as well as minimum treatment requirements for biosolids according to 40 CFR Part 503 are incorporated in the draft permit.

**XI. SPECIAL CONDITIONS (Part V in Permit)**

**Operation**

This permit condition requires the permittee to ensure that the WWTP has an operator who is certified at the appropriate level for the facility, in accordance with A.A.C. R18-5-104 through -114. The required certification level for the WWTP operator is based on the class (Wastewater Treatment Plant) and grade of the facility, which is determined by population served, level of treatment, and other factors.

**Mixing Zone for Arsenic, Copper, and Nitrate**

The permittee submitted an application in 2010 with supporting documentation to establish a mixing zone for arsenic, copper, and nitrate in the receiving water (Colorado River) as per A.A.C. R18-11-114.B. Pursuant to A.A.C. R18-11-114.A, ADEQ reviewed the application and granted a mixing zone. Discharge from the Hoover Dam WWTP contains arsenic, copper, and nitrate in concentrations that routinely exceed the applicable standards. The mixing zone was approved on the basis of dilution of the facility discharges with the Colorado River. Due to rapid flows and unsafe conditions for taking samples in the Colorado River below the Hoover Dam, downstream samples will not be required. Instead, compliance with arsenic, copper, and nitrate limitations (standards) shall be assessed through the use of the steady-state model to determine if RP exists for any of these parameters in the mixing zone.

For the 2019 permit renewal, the U.S. Department of Interior has requested to reestablish the mixing zone. A mixing zone has been reestablished for arsenic, copper, and nitrate in the Colorado River. The analysis of the discharge into the Colorado River using a steady-state mass balance model indicated there would be no reasonable potential for arsenic, copper, or nitrate to exceed the applicable water quality standard. Monitoring and reporting for arsenic, copper, and nitrate is required for effluent characterization.

**Permit Reopener**

This permit may be modified based on newly available information; to add conditions or limits to address demonstrated effluent toxicity; to implement any EPA-approved new Arizona water quality standard; or to re-evaluate reasonable potential (RP), if assessment levels in this permit are exceeded [A.A.C. R18-9-B906 and 40 CFR Part 122.62 (a) and (b)].

## **XII. ANTIDEGRADATION**

Antidegradation rules have been established under A.A.C. R18-11-107 to ensure that existing surface water quality is maintained and protected. The discharge from the Hoover Dam WWTP will be to a perennial water with Tier 2 antidegradation protection. Tier 2 requirements state that the current water quality must be maintained and protected. This is a renewal permit for an existing facility with no new or expanded discharge, and the existing uses have been maintained. Therefore, an antidegradation review is not required at this time. In the previous permit an antidegradation review was conducted for arsenic, copper, and nitrate. The review involved comparing upstream (background) water quality data collected for these parameters (except for nitrate for which the laboratory detection limit was used due to lack of upstream data) during the existing permit term to the effluent data during the same period. These three parameters were present in the discharge at concentrations above the background levels but the concentrations in the mixing zone were well below the background concentrations plus 20 percent assimilative capacity. In addition, the new analysis showed that due to the large dilution factor (26,000:1) the mixing zone is assumed to be completely mixed. Effluent quality limitations and monitoring requirements have been established under the proposed permit to ensure that the discharge will meet the applicable water quality standards. As long as the permittee maintains consistent compliance with these provisions, the designated uses of the receiving water will be presumed protected, and the facility will be deemed to meet currently applicable antidegradation requirements under A.A.C. R18-11-107.

## **XIII. STANDARD CONDITIONS**

Conditions applicable to all NPDES permits in accordance with 40 CFR, Part 122 are attached as an appendix to this permit.

## **XIV. ADMINISTRATIVE INFORMATION**

### **Public Notice (A.A.C. R18-9-A907)**

The public notice is the vehicle for informing all interested parties and members of the general public of the contents of a draft AZPDES permit or other significant action with respect to an AZPDES permit or application. The basic intent of this requirement is to ensure that all interested parties have an opportunity to comment on significant actions of the permitting agency with respect to a permit application or permit. This permit will be public noticed in a local newspaper after a pre-notice review by the applicant and other affected agencies.

### **Public Comment Period (A.A.C. R18-9-A908)**

Rules require that permits be public noticed in a newspaper of general circulation within the area affected by the facility or activity and provide a minimum of 30 calendar days for interested parties to respond in writing to ADEQ. After the closing of the public comment period, ADEQ is required to respond to all significant comments at the time a final permit decision is reached or at the same time a final permit is actually issued.

### **Public Hearing (A.A.C. R18-9-A908(B))**

A public hearing may be requested in writing by any interested party. The request should state the nature of the issues proposed to be raised during the hearing. A public hearing will be held if the Director determines there is a significant amount of interest expressed during the 30-day public comment period, or if significant new issues arise that were not considered during the permitting process.

### **EPA Review (A.A.C. R18-9-A908(C))**

A copy of this draft permit and any revisions made to this draft as a result of public comments received will be sent to EPA Region 9 for review. If EPA objects to a provision of the draft, ADEQ will not issue the permit until the objection is resolved.

**XV. ADDITIONAL INFORMATION**

Additional information relating to this proposed permit may be obtained from:

Arizona Department of Environmental Quality  
Water Quality Division – Surface Water Permits Unit  
Attn: Devin McAllister  
1110 West Washington Street  
Phoenix, Arizona 85007

Or by contacting Devin McAllister at (602) 771 – 4374 or by e-mail at [mcallister.devin@azdeq.gov](mailto:mcallister.devin@azdeq.gov).

**XVI. INFORMATION SOURCES**

While developing effluent limitations, monitoring requirements, and special conditions for the draft permit, the following information sources were used:

1. AZPDES Permit Application Form(s) 2A and 2S, received March 28, 2019, along with supporting data, facility diagram, and maps submitted by the applicant with the application forms.
2. Supplemental information to the application received by ADEQ on April 22, 2019.
3. ADEQ files on Hoover Dam WWTP.
4. ADEQ Geographic Information System (GIS) Web site
5. Arizona Administrative Code (AAC) Title 18, Chapter 11, Article 1, *Water Quality Standards for Surface Waters*, adopted December 31, 2016.
6. A.A.C. Title 18, Chapter 9, Article 9. *Arizona Pollutant Discharge Elimination System* rules.
7. Code of Federal Regulations (CFR) Title 40:
  - Part 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*.
  - Part 124, *Procedures for Decision Making*.
  - Part 133, *Secondary Treatment Regulation*.
  - Part 503, *Standards for the Use or Disposal of Sewage Sludge*.
8. EPA Technical Support Document for Water Quality-based Toxics Control dated March 1991.
9. *Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity Testing Programs*, US EPA, May 31, 1996.
10. *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA /821-R-02-013).
11. U.S. EPA NPDES Permit Writers' Manual, September 2010.