

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 federally owned and operated wastewater treatment plant (WWTP) with a design capacity of 0.03 million gallons per day (MGD). The WWTP effluent combines with filter backwash water from a water treatment plant (WTP) for a maximum combine discharge flow of 0.061 MGD and is considered to be a minor facility under the AZPDES 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.

I. PERMITTEE INFORMATION	
Permittee's Name:	U.S. Department of the Interior – Bureau of Reclamation (USBR)
Permittee's Mailing Address:	P.O. Box 60400 Boulder City, NV 89006
Facility Name:	Hoover Dam Wastewater Treatment Plant and Water Treatment Plant (WWTP/WTP)
Facility Address or Location:	Hoover Dam U.S. Hwy. 93, Nevada SR 172 Boulder City, NV 89005
County:	Mohave
Contact Person(s): Phone/e-mail address	Joshua Chavez, Supervisory Environmental Protection Specialist & Operator (702) 494-2823 / jdchavez@usbr.gov
AZPDES Permit Number:	AZ0025160
Inventory Number:	102131
LTF Number:	102447

II. STATUS OF PERMIT(s)	
AZPDES permit applied for:	Renewal
Date application received:	02/01/2024
Date application was determined administratively complete:	02/12/2024
Previous permit number (if different):	N/A
Previous permit expiration date:	08/01/2024

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.

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.

USBR has the following permits issued by ADEQ applicable to the Hoover Dam WWTP/WTP:

Type of Permit

Aquifer Protection Permit (APP)	P-102131	Regulates discharges to the local aquifer
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III. GENERAL FACILITY INFORMATION

Type of Facility:	Federally-owned wastewater treatment plant (WWTP) and water treatment plant (WTP)
Facility Location Description:	Just below Hoover Dam on the Colorado River, northeast of Boulder City, Nevada
Permitted Design Flow:	0.061 MGD
Treatment Level (WWTP):	Secondary
Treatment Processes:	<p>Domestic septic sewage flows into the WWTP and first collects in the 8,500-gallon equalization tank. From there, it is pumped through grinders that deposit it into the 25,000-gallon equalization basin, where it is aerated and mixed with Return Activated Sludge (RAS) to form a mixed liquor.</p> <p>From the basin, the aerated mixed liquor is pumped through a grinder to an anoxic zone for mixing. Wastewater then moves to an anaerobic zone for further mixing. Wastewater is next aerated for polishing and then enters the Clarifier.</p> <p>Water that goes over the weir of the Clarifier goes to the Mix Water Holding Tank (Mix Tank). Sludge from the bottom of the Clarifier is returned to the 25,000-gallon basin as RAS. Periodically, the RAS is diverted to the Waste Tank, where it is then pumped to the Evaporation Ponds.</p> <p>The Mix Tank is mixed with Clarified Wastewater, as well as Rinse and Backwash water from the Water Treatment Plant. The Water Treatment Plant consists of two mixed media filters that use Ferric Chloride ($FeCl_3^+$) and polymer. The Mix Tank is also mixed with chlorine for disinfection.</p> <p>Prior to discharge from Outfall 001 to the Colorado River, water pumped from the Mix Tank is dechlorinated using Sodium Sulfite.</p>
Sludge Handling and Disposal:	Sludge is disposed at two drying beds/evaporation ponds located on-site at Latitude 36° 00' 33" N, Longitude 114° 44' 00" W for long-term storage prior to landfill disposal. Landfill disposal is not expected during the permit renewal term. The drying beds have a large storage capacity.

Nature of Facility Discharge:	Domestic wastewater generated by tourists and employees comingled with filter rinse and backwash water from the Hoover Dam WTP
Total Number of Significant Industrial Users (SIUs):	None
Average Flow Per Discharge:	0.017 MGD
Service Area:	Hoover Dam staff and visitors
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 occurs 12 months per year on most days. Multiple discharges may occur each day with an average discharge duration of 30 minutes.

Outfall 001 is the external discharge point to the Colorado River. The discharge at Outfall 001 may include WTP filter rinse backwash combined with the WWTP effluent following mixing in the Mix Water Holding Tank (Mix Tank).

Internal Monitoring Point located at Latitude 36° 00' 45" N, Longitude 114° 44' 15" W was previously identified as Outfall 002. This Internal Monitoring Point is required for monitoring Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) in WWTP effluent prior to any comingling with WTP discharge in the Mix Water Holding Tank to ensure the WWTP meets the treatment standards for BOD and TSS specified by the technology-based effluent limitations (TBELs).

IV. RECEIVING WATER

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.

Receiving Water (Federal):	The Water of the U.S. Protected Surface Water (WOTUS PSW) for facility/ outfall is the Colorado River – Lake Mead to Topock Marsh.
River Basin:	Colorado – Lower Gila River Basin
Outfall Location(s):	Outfall 001: Township 30 N, Range 23 W, Section 3 Latitude 36° 00' 50" N, Longitude 114° 44' 22" W
Designated uses for the receiving water listed above:	Aquatic and Wildlife cold water (A&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?</p>	<p>No – However, it is notable that Lake Mohave located approximately 13.5 miles downstream is situated within the defined boundary of the receiving segment of the Colorado River from Lake Mead to Topock Marsh and is listed as impaired for Selenium. Because Lake Mohave is listed as a surface water with designated uses separate from the Colorado River in A.A.C R18-11 Appendix B, the impairment conditions for Lake Mohave do not apply for this permit renewal.</p> <p>There are no TMDL issues associated.</p>
<p>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>	
<p>Colorado River Salinity Standard</p> <p>In addition to the above, the Colorado River has a salinity standard. A.A.C. R18-11-110 incorporates by reference the plan of implementation contained in the “2014 Review, Water Quality Standards for Salinity, Colorado River System” (2014 Review), approved October 2014. The plan of implementation is a basin-wide approach to salinity control developed by the Colorado River Basin Salinity Control Forum. Dischargers to the Colorado River and its tributaries upstream of the Imperial Dam must meet the plan of implementation requirements.</p> <p>In order for a permittee to be in compliance with Forum Policy, the increase in total dissolved solids (TDS) concentration between inflow and outflow cannot be greater than 400 mg/L for municipal users or 1.00 ton/day for industrial users. Under Forum policy there can be granted exceptions to these limitations by the states. The 2014 Review lists Hoover Dam WWTP/WTP as a municipal user in compliance with Forum policy based on salt loading averaging less than 1.00 ton/day. In alignment with the current permit (LTF No. 76335), the 1.00 ton/day industrial mass-based discharge limit for TDS Net Increase will continue to be applied in the permit renewal rather than the 400 mg/L municipal concentration-based discharge limit based on the following considerations:</p> <ul style="list-style-type: none"> • The 2014 Review lists Hoover Dam WWTP/WTP as a municipal user in compliance with Forum policy (M) without specifying compliance as based on the 400 mg/L increment increase provision (M-A). • The maximum TDS Net Increase calculated from monitoring results during the current permit term was 1,000 mg/L, which equates to 231 kg/day for a discharge at the facility design flow of 0.061 MGD. This mass loading is well below the 1.00 ton/day (907 kg/day) threshold established in the 2014 Review by which compliance with Forum policy is determined. <p>TDS Net Increase shall be limited follow:</p> <p style="text-align: center;">Daily maximum net increases of TDS shall not exceed 1.00 ton/day, where</p> <p style="text-align: center;">TDS Net Increase = [TDS concentration in the discharge] – [TDS concentration in the supply or source water]</p>	

V. DESCRIPTION OF DISCHARGE		
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	16
Total Suspended Solids (TSS)	mg/L	23
Total Kjeldahl Nitrogen (TKN)	mg/L	1.7
<i>E. coli</i>	cfu/100 mL	1,553
Facility Design Removal Rates:		BOD: 85 % TSS: 85 % N: N/A

VI. STATUS OF COMPLIANCE WITH THE EXISTING AZPDES PERMIT	
Date of Most Recent Inspection:	06/08/2023; no potential violations were noted as a result of this inspection.
Discharge Monitoring Reports (DMR) Reviewed:	08/2019 through 04/2024
Lab Reports Reviewed:	09/2019 through 04/2024
DMR Exceedances:	Ammonia Nitrogen (April 2022); E. Coli (March and January 2024); Total Recoverable Iron (February 2022 and January 2023); Total Residual Chlorine (November 2019); Total Suspended Solids % removal (June 2020)
Notice(s) of Violation (NOV) Issued:	None
NOVs Closed:	N/A
Formal Enforcement Action(s):	None

VII. PROPOSED PERMIT CHANGES

The following table lists the major changes from the previous permit in this permit.

Parameter	Existing Permit	Proposed Permit	Reason for Change
Noncompliance Reporting Hotline	(602) 771-2330	Noncompliance resulting in imminent threat to human health or the environment must be reported to (602) 771-2330, while all other noncompliance must be reported to (602) 771-1440.	Routing emergency calls to the emergency hotline, but all other calls to a non-emergency number.
Reporting Location for Effluent Characterization Monitoring	Submit results through DMRs	Report results on the EC Monitoring Data Sheet Excel form provided by ADEQ and submit annually to azpdes_data@azdeq.gov by January 28 th following each annual reporting period. See Part I.D.2 and Part II.B.3 of permit. Laboratory reports for EC monitoring shall be submitted through myDEQ with the last DMR of the calendar year. See Part II.B.3.b. of the permit.	ADEQ is implementing this new procedure to facilitate data analysis by ADEQ and reporting by permittees. Outcomes include expedited data processing and improved data quality review, per ADEQ Surface Water Protection Quality Assurance Program Plan (2022).
Sufficiently Sensitive Test Methods and Limit of Quantitation (LOQ) Reporting Requirements	Limited explanation of analytical requirements for LOQ and sufficiently sensitive test method requirements.	Analytical test sensitivity requirements are specified in the footnotes of Part I Tables 1–4 of the permit and associated definitions in Appendix A. Part B. The requirement to use sufficiently sensitive test methods is specified in Part II.A.5.	The Limit of Quantitation (LOQ) must be low enough to allow comparison of the results to the applicable water quality standards (WQS) to be protective of the receiving water designated uses. New language clarifies the requirement that parameters must be analyzed using sufficiently sensitive test methods in accordance with 40 CFR 136.1(c).

PROPOSED PERMIT CHANGES (Continued)			
Parameter	Existing Permit	Proposed Permit	Reason for Change
Use of Metal Translators to Calculate Total Recoverable Permit Limits from Dissolved Criteria (Applicable to Cadmium, Chromium VI, Copper, Lead, Mercury, Nickel, Silver, and Zinc).	No metal translators were used. Assumed the ratio of dissolved to total recoverable is 1 to 1 for all metals with water quality criteria expressed as dissolved.	WQBELs and ALs were converted from dissolved to total recoverable using the default metal translators from the EPA's <i>The Metals Translator: Guidance for Calculating A Total Recoverable Permit Limit from A Dissolved Criterion</i> .	New procedure for ADEQ to incorporate default metal translators when calculating total recoverable WQBELs and ALs from dissolved criteria.
Reclassify Outfall 002 as the Internal Monitoring Point	Established as an internal outfall	Established as the Internal Monitoring Point	The Internal Monitoring Point located at Latitude 36° 00' 45" N, Longitude 114° 44' 15" W is necessary for monitoring BOD and TSS in WWTP effluent prior to any comingling with WTP discharge. This Internal Monitoring Point is necessary to ensure the WWTP meets the treatment standards specified by TBELs. The Internal Monitoring Point is not an outfall to a protected receiving water and reclassification is appropriate to properly characterize facility design and discharge.
Sample Collection and Monitoring Points	Any specific requirements are listed in the fact sheet or table footnotes	Requirements clearly specified in Part II of the permit See Part II.A.1 of the permit	Hoover Dam WWTP/WTP unique design and special conditions necessitates clear requirements for monitoring points for representative sampling and interpretation of results. See Parts III and IX of this fact sheet for details.

PROPOSED PERMIT CHANGES (Continued)			
Parameter	Existing Permit	Proposed Permit	Reason for Change
Mixing Zone Monitoring and Reporting Requirements	Reference to Arizona mixing zones rules listed in A.A.C. R18-11-114(D)	Monitoring and reporting requirements specified in the permit apply to parameters for which a mixing zone is approved as well as parameters for which the permittee plans to apply for a mixing zone during the permit term or at the next permit renewal. See Part V.B of the permit	ADEQ requires adequate representative monitoring data to confirm the approved mixing zone conditions are protective to support all designates uses of the receiving water. Minimum monitoring and reporting requirements are required as part of a complete mixing zone application, per A.A.C. R18-11-114(B).
Zinc	Effluent Characterization	Limited See Table 1.a of the permit	Data submitted indicate reasonable potential (RP) for an exceedance of a standard.
Cadmium	Effluent Characterization	Assessment Level See Table 2 of the permit	Data submitted are all non-detect, however the Limit of Quantitation (LOQ) exceeds the lowest applicable WQS and therefore it was not possible to make a reasonable potential determination. ADEQ now requires annual reporting using the Effluent Characterization form allowing the permittee to provide necessary analytical information including the detection limit to improve data evaluation of censored datasets. See Part II.B.3 of the Permit.
Asbestos, Barium, Boron, Fluoride, Hydrogen Sulfide, Manganese, Sulfides, Uranium	No effluent characterization monitoring requirement	Effluent Characterization Monitoring Required See Table 4.a of the permit	Monitoring necessary to ensure all applicable numeric water quality standards are met for the designated uses of the receiving water, per A.A.C. R18-11 Appendix A. Exclusion of this monitoring requirement in the previous permit was less conservative in approach.

PROPOSED PERMIT CHANGES (Continued)			
Parameter	Existing Permit	Proposed Permit	Reason for Change
Suspended Sediment Concentration (SSC)	No monitoring requirement	Assessment Level Set and Effluent Characterization Monitoring Required See Tables 2 and 4.a of the permit	Monitoring necessary to meet regulatory requirements. Numeric water quality standard applies to A&Wc designated use, per A.A.C. R18-11-109(D) and sediment deposition is a factor that must be considered by ADEQ during review of a mixing zone application, per A.A.C. R18-11-114(C)(11). SSC and TSS data collected from natural water should not be used interchangeably (USGS 2000). Exclusion in the previous permit was less conservative in approach.
Special Conditions: Facility Hardware Installation	Facility discharge monitoring approved in the Mix Tank for 1. Internal Monitoring Point, WWTP Effluent 2. Outfall 001 discharge	Approval of sample collection from the Mix Tank temporarily extended . Completion of the Special Conditions for Facility Hardware Installation shall trigger the requirement to collect samples and monitor flow such that results are representative of the monitoring activity, per 40 CFR 122.41(j) incorporated by reference in A.A.C. R18-9-A905(3). See Parts II.A and V.D of the permit	In the absence of proper hardware to sample for all parameters in discharge following the last treatment process, but prior to either comingling with other waste streams or mixing with the receiving water, approval to sample from the Mix Tank is temporarily extended. WTP discharge may dilute BOD and TSS concentrations in WWTP effluent samples and a deadline of September 28, 2024 is set to install hardware to sample at the Internal Monitoring Point. Dechlorination is not expected to significantly affect discharge monitoring results and there is no expectation for resulting harm to human health or the environment during the interim. However, the practice is improper. A four-year deadline is set.
<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>No limits have been removed from the permit. Limits are retained in the 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.</p>			

VIII. DETERMINATION OF EFFLUENT LIMITATIONS and ASSESSMENT LEVELS

When determining what parameters need monitoring and/or limits included in the 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).

Water Quality-Based Effluent Limitations:

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. Numeric water quality standards are outlined in A.A.C. R18-11-109 and Appendix A. RP refers to an analysis, 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 permit contains WQBELs for *E. coli* and TRC which applies to the combined discharge at Outfall 001.

Water Quality-Based Effluent Limitations (Continued)

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.)

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 Sections 5.4.4 and 5.5.3 of the TSD.

Mixing Zone – Factors Considered During Review

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. USBR 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 approved mixing zone accounts for both human health and aquatic & wildlife designated uses and the associated water quality standards. The following factors in Arizona mixing zone rules listed in A.A.C. R18-11-114(D) were considered prior to approval:

1. Assimilative Capacity

Assimilative capacity means the difference between the baseline water quality concentration for a pollutant and the most stringent applicable water quality for the pollutant as defined in A.A.C. R-18-11-101(10). Water quality of the Colorado River below Hoover Dam is dependent on the natural surface water quality variability of Lake Mead. The application included water quality data from the Colorado River upstream of the outfall discharge. Due to the small sample sets, a conservative approach was taken to evaluate assimilative capacity by assuming that variation in pollutant concentrations in the receiving water fit a lognormal distribution. The 99th percentile maximum concentration was taken to equal a critical concentration, which was calculated for arsenic, copper, and nitrate at a 99% confidence level. This critical concentration was used as the baseline water quality for comparison to the lowest applicable water quality standard to determine available assimilative capacity. For all three pollutants, assimilative capacity exists and therefore the receiving water is expected to support all designated uses if discharge limits are not exceeded.

- **Arsenic** - The highest reported concentration in the receiving water was 2.6 µg/L and the calculated critical concentration was 9.2 µg/L. The lowest applicable water quality standard is 10 µg/L for DWS. The assimilative capacity of the receiving water for arsenic estimated to support all designated uses is 7.4 µg/L.
- **Copper** - All reported concentrations in the receiving water were non-detect with a reporting limit (RL) of 10 µg/L. A substitution-based approach using ½ RL was applied to this censored data set resulting in an estimated maximum receiving water concentration of 5 µg/L, which is also taken to be the critical concentration. The lowest applicable water quality standard is 17.4 µg/L for A&Wc (chronic) calculated using an average receiving water hardness value of 218 mg/L supplied in the application. The assimilative capacity of the receiving water for copper estimated to support all designated uses is 12.4 µg/L.

Mixing Zone – Factors Considered During Review (Continued)

- **Nitrate** - The highest reported concentration in the receiving water was 460 µg/L and the calculated critical concentration was 6,070 µg/L. The lowest applicable water quality standard is 10,000 µg/L for DWS. The assimilative capacity of the receiving water for nitrate estimated to support all designated uses is 3,930 µg/L.

2. Likelihood of adverse human health effects

The critical effluent concentrations were calculated for arsenic, copper, and nitrate assuming complete and rapid mixing. When factoring in the dilution allowance the downstream concentration under critical conditions will not exceed the lowest applicable human health water quality standard for arsenic, copper, or nitrate. Additionally, none of the pollutants for which a mixing zone was approved are considered persistent, bioaccumulating pollutants, per A.A.C. R18-11-114(H).

3. Location of drinking water plant intakes and public swimming areas

The receiving water designated uses include domestic water source (DWS) and full body contact (FBC) and thus drinking water uptakes and public swimming are considered by applying the lowest water quality standard. The receiving water is not impaired for arsenic, copper, or nitrate and there is no TMDL associated. Therefore, if there is no RP for exceedance of a water quality standard downstream of the discharge point under critical conditions then there should be no reasonable expectation for risk to human health by way of drinking water or full body contact exposure.

4. Predicted exposure of biota and that the resident biota will be adversely affected

The receiving water designated uses include aquatic and wildlife (cold water) (A&Wc)) and thus biota exposure is considered in application of the lowest water quality standard. The receiving water is not impaired for arsenic, copper, or nitrate and there is no TMDL associated. Therefore, if there is no RP for exceedance of a water quality standard downstream of the discharge point under critical conditions then there should be no reasonable expectation for risk to resident biota. Whole effluent toxicity testing is required during the permit term to evaluate if toxicity may be present as indicated by a statistically significant negative biological response among indicator species.

5. Bioaccumulation

The mixing zone request did not include any of the bioaccumulative pollutants listed A.A.C. R18-11-114(H).

6. Acute Toxicity within the mixing zone

The receiving water designated uses include aquatic and wildlife (cold water - A&Wc) which includes water quality standards for acute exposure and thus acute toxicity to all pollutants of concern for which an applicable numeric water quality standard exists is considered in determination of RP and calculation of discharge limits. The receiving water is not impaired for arsenic, copper, or nitrate and there is no TMDL associated. Therefore, if there is no RP for exceedance of a water quality standard downstream of the discharge point under critical conditions then there should be no reasonable expectation for risk of resident biota to acute toxicity. Additionally, whole effluent toxicity testing is required during the permit term and includes evaluation of indicator species against the lethal endpoint to evaluate if acute toxicity exists. There were no failures for the WET test performed during the current permit term.

7. Known or predicted safe exposure levels for the pollutant for which the mixing zone is granted

The mixing zone approved for arsenic, copper, and nitrate is a renewal of mixing zone allowance and there were no discharge limit exceedances reported for these pollutant parameters during the current permit term. The critical effluent concentrations were calculated for arsenic, copper, and nitrate assuming complete and rapid mixing. When factoring in the dilution allowance the downstream concentration under critical conditions is not expected to exceed the lowest applicable water quality standard for arsenic, copper, or nitrate.

Mixing Zone – Factors Considered During Review (Continued)

8. Size of the mixing zone

Per A.A.C. R18-11-114(G), A mixing zone shall be as small as practicable in that it shall not extend beyond the point in the waterbody at which complete mixing occurs under the critical flow conditions of the discharge and of the receiving water. Initial dilution is considered to be instantaneous due to the large dilution factor and the location of the outfall immediately downstream of the tailrace area below the dam. Thus, rapid and complete mixing is assumed and the boundary of the mixing zone is constrained to the “zone of initial dilution.”

9. Location of the mixing zone relative to biologically sensitive areas in the receiving water

The receiving water designated uses include aquatic and wildlife (cold water) (A&Wc) and thus biota exposure is considered in application of the lowest water quality standard. The receiving water is not impaired for arsenic, copper, or nitrate and there is no TMDL associated. The current EPA approved 2024 Arizona's 2024 Clean Water Act Assessment Draft Integrated 305(b) Assessment and 303(d) Listing Report lists the receiving segment of the Colorado River as attaining, meaning that it is meeting all assessed criteria to indicate that all designated uses are supported, which accounts for aquatic and wildlife (cold water) acute and chronic exposure.

10. Concentration gradient of the pollutant in the mixing zone

Initial dilution is considered to be instantaneous due to the large dilution factor and the location of the outfall immediately downstream of the tailrace area below the dam. Thus, rapid and complete mixing is assumed and the boundary of the mixing zone is constrained to the “zone of initial dilution.”

11. Sediment Deposition

The location of the outfall immediately downstream of the tailrace area below the dam results in discharge of treated effluent to a zone of high turbulence. Negative environmental impact due to sediment deposition is not anticipated, however discharge characterization monitoring for total dissolved solids (TDS) and total suspended solids (TSS) is required during the permit term. The approved mixing zone is a renewal of a previously approved dilution allowance outlined in the current permit. During the current permit term there were no exceedances reported for in the mixing zone allowance and there were no discharge limit exceedances reported for TDS or TSS effluent discharge concentrations. However suspended sediment concentration (SSC) and TSS data collected from natural water are not comparable and should not be used interchangeably (USGS 2000). Effluent characterization monitoring for SSC is required in the permit.

12. Potential for attracting aquatic life to the mixing zone

Initial dilution is considered to be instantaneous due to the large dilution factor and the location of the outfall immediately downstream of the tailrace area below the dam. Thus, rapid and complete mixing is assumed and the boundary of the mixing zone is constrained to the “zone of initial dilution.” In addition to the constrained size of the defined mixing zone and because the point of discharge is immediately downstream of the tailrace area, known to be a zone of high turbulence, it is not expected that aquatic life will be attracted to the mixing zone.

13. Cumulative impacts of other mixing zones and other discharges to the surface water

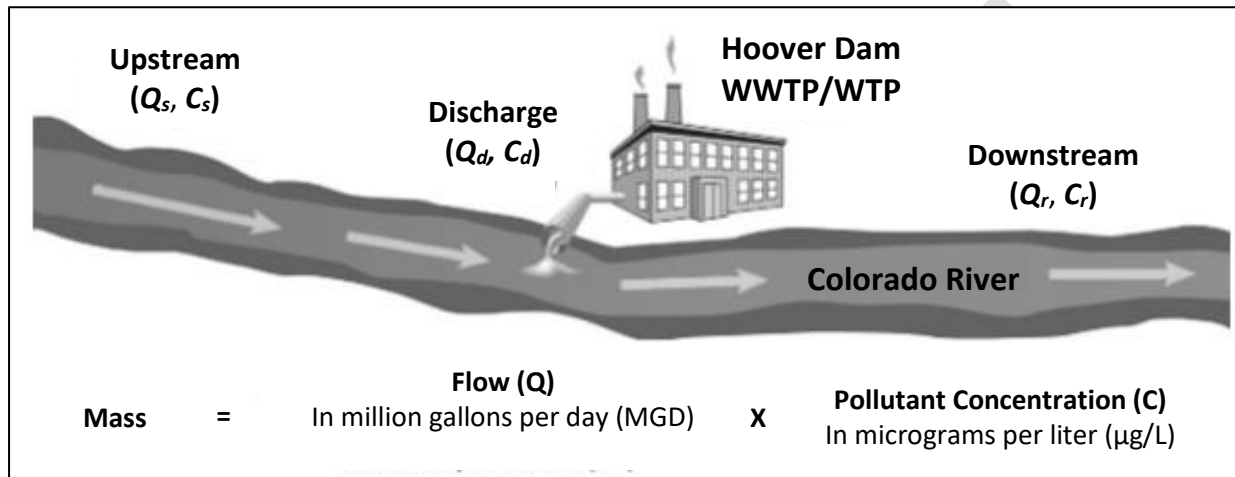
Willow Beach National Fish Hatchery (AZ0000132) owned and operated by the U.S. Fish and Wildlife Services discharges to the Colorado River approximately 11 miles downstream of Hoover Dam WWTP/WTP. The limits in this permit were determined without the use of a mixing zone.

Virgin River Domestic Wastewater Improvement District WWTP (AZ0023655) discharges to the Colorado River approximately 35 miles upstream of Lake Mead. The limits in this permit were determined without the use of a mixing zone.

Mixing Zone Calculations:

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 at 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 (Figure 1).

Figure 1. Exhibit of a simple mass-balance equation for discharge of a pollutant to a free-flowing receiving water. (Source: adapted from U.S. EPA NPDES Permit Writers' Manual)



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:

$$Q_s C_s + Q_d C_d = Q_r C_r \quad \text{(Equation 1)}$$

Rearrange the Equation 1 to Solve for C_r

$$C_r = \frac{Q_s C_s + Q_d C_d}{Q_r} \quad \text{(Equation 2)}$$

Where:

Q_s = Background in-stream critical low flow of the receiving water measured upstream from the discharge point.

A.A.C. R18-11-101 states that "Critical flow conditions of the receiving water" means the hydrologically based receiving water low flow averages that the director uses to calculate and implement applicable water quality criteria:

- For acute aquatic water quality standard criteria, the receiving water critical condition is represented as the lowest one-day average flow event expected to occur once every ten years, on average (1Q10). 1Q10 for the Colorado River receiving water is 5,000 cubic feet per second (CFS) or approximately 3,200 MGD. This critical receiving water flow was used for RP calculations for the following applicable designated uses: A&Wc (acute).

Mixing Zone Calculations – (Continued)

- For chronic aquatic water quality standard criteria, the receiving water critical flow condition is represented as the lowest seven-consecutive-day average flow expected to occur once every 10 years, on average (7Q10). 7Q10 for the Colorado River receiving water is 5,000 cubic feet per second (CFS) or approximately 3,200 MGD. This critical receiving water flow was used for RP calculations for the following applicable designated uses: A&Wc (chronic), AgI, and AgL.
- For human health-based water quality standard criteria, in order to simulate long-term exposure, the receiving water critical flow condition is the harmonic mean flow. Harmonic mean flow for the Colorado River receiving water is 1,978 cubic feet per second (CFS) or approximately 1,300 MGD. This critical receiving water flow was used for RP calculations for the following applicable designated uses: DWS, FBC, and FC.

C_s = Background in-stream critical pollutant concentration of the receiving water (99th percentile maximum concentration assuming a lognormal distribution at a 99% confidence level)

- Arsenic: 9.2 µg/L
- Copper: 5 µg/L
All receiving water concentrations for copper were non-detect with a reporting limit of 10 µg/L. A substitution-based approach using ½ RL was applied to this left-censored data set to determine the critical concentration.
- Nitrate: 6,070 µg/L

Q_d = Maximum daily flow from Outfall 001

Facility design capacity is used for maximum water discharge flow.

- 0.061 MGD

C_d = Critical effluent concentration of the pollutant (99th percentile maximum concentration assuming a lognormal distribution at a 99% confidence level)

- Arsenic: 52.5 µg/L
- Copper: 70.7 µg/L
All receiving water concentrations for copper were non-detect with a reporting limit of 10 µg/L. A substitution-based approach using ½ RL was applied to this left-censored data set to determine the critical concentration.
- Nitrate: 146,763 µg/L

Q_r = Critical downstream receiving water flow (Q_s + Q_d).

- 3,200 MGD (A&Wc (acute), A&Wc (chronic), AgL, and AgI)
- 1,300 MGD (DWS, FBC, and FC)

C_r = Resultant in-stream critical (maximum) pollutant concentration. Compared against the lowest applicable numeric water quality standard for RP determination.

Mixing Zone Calculations – (Continued)

The steady-state mass-balance calculation was carried out for all designated uses of the receiving water (DWS, FBC, FC, AgI, AgL, A&Wc (chronic), and A&Wc (acute)). The highest resulting critical downstream pollutant concentration predicted from the steady-state mixing zone model was compared against the lowest applicable numeric water quality standard to determine RP. For all pollutants for which a mixing zone was requested (arsenic, copper, and nitrate), the high dilution factor resulted in a projected downstream concentration equal to the receiving water concentration and there was no variability in predicted downstream concentrations among the different values of critical receiving water flow (1Q10, 7Q10, and Harmonic Mean). Therefore, one example for each parameter is provided below including input values and the resulting critical downstream pollutant concentration predicted from the steady-state mixing zone model with the accompanying RP determination.

Model Results (Arsenic):

No RP, $C_r < 10 \mu\text{g/L}$

$Q_s = 1,300 \text{ MGD}, C_s = 9.2 \mu\text{g/L}$

$Q_d = 0.061 \text{ MGD}, C_d = 52.5 \mu\text{g/L}$

$Q_r = 1,300.061 \text{ MGD}, C_r = 9.2 \mu\text{g/L}$

Lowest WQS & Corresponding Designated Use: 10 $\mu\text{g/L}$ DWS

Model Results (Copper):

No RP, $C_r < 17.4 \mu\text{g/L}$

$Q_s = 1,300 \text{ MGD}, C_s = 5 \mu\text{g/L}$

$Q_d = 0.061 \text{ MGD}, C_d = 70.7 \mu\text{g/L}$

$Q_r = 1,300.061 \text{ MGD}, C_r = 5 \mu\text{g/L}$

Lowest WQS & Corresponding Designated Use: 17.4 $\mu\text{g/L}$ A&Wc (chronic)

Model Results (Nitrate):

No RP, $C_r < 10,000 \mu\text{g/L}$

$Q_s = 1,300 \text{ MGD}, C_s = 6,070 \mu\text{g/L}$

$Q_d = 0.061 \text{ MGD}, C_d = 146,763 \mu\text{g/L}$

$Q_r = 1,300.061 \text{ MGD}, C_r = 6,076 \mu\text{g/L}$

Lowest WQS & Corresponding Designated Use: 10,000 DWS

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 permit should future monitoring data indicate water quality standards are being exceeded.

The requirement to monitor for these parameters is included in the 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 Water Quality-Based Effluent Limitations above).

Hardness

The permittee is required to sample hardness as CaCO₃ 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 218 mg/L (the average hardness of the receiving water as supplied in the application) 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 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 is required. The requirement to conduct chronic toxicity testing is contingent upon the frequency or duration of discharges. Since completion of the chronic WET test requires a minimum of three samples be taken for renewals, the chronic WET test must be performed during the specified monitoring period in which the discharge occurs over seven consecutive calendar days.

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 Toxic Unit-Chronic (TUC) for a four-day exposure period. Using this benchmark, the limitations and/or action levels for WET included in the 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 a limit or action level will trigger follow-up testing to determine if effluent toxicity is persistent. If toxicity above a limit or 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 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 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 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 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. through 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 Protected Surface Water 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

Table 1 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*.

Table 1. Permit limitations and monitoring requirements for Outfall 001.

Parameter	Lowest Standard/Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/Rationale (1)
Flow	---	---	---	---	---	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	BOD: 16 mg/L TSS: 23 mg/L	BOD: 52 TSS: 53	N/A	TBELs for BOD and TSS are always applicable to WWTPs.	Monitoring for WWTP influent and effluent. Effluent is to be monitored at the Internal Monitoring Point prior to any comingling with WTP discharge to ensure the WWTP meets the treatment standards specified by the TBELs. 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	16 µg/L	54	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	1,553 cfu/100mL	41	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.
Suspended Sediment Concentration (SSC)	25 mg/L A&Wc (4 sample median)	No Data	N/A	N/A	N/A	Monitoring required and an assessment level is set. SSC measurement is to be conducted using composite samples of the effluent. Sample type required was chosen to be representative of the discharge. Per A.A.C. R18-11-109(D) the numeric standard is expressed for a median value determined from a minimum of four samples collected at least seven days apart. Samples should not be collected during or within 48 hours after a local storm event to determine the median value.

Table 1. Permit limitations and monitoring requirements for Outfall 001.

Parameter	Lowest Standard/Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/Rationale (1)
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	8.27 S.U.	108	N/A	WQBEL or TBEL is always applicable to WWTPs.	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 (Receiving Water)	No applicable numeric standard	8.3 S.U.	28	N/A	N/A	Receiving water pH is to be monitored using a discrete sample type. 40 CFR Part 136 specifies that grab samples must be collected for pH. 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.
Temperature (Effluent)	R18-11-109(C) the discharge shall not cause an increase in the ambient water temperature. A&Wc: no more than 1°C	29.3 °C	54	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 (Receiving Water)	R18-11-109(C) the discharge shall not cause an increase in the ambient water temperature. A&Wc: no more than 1°C	18.8 °C	29	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)	Colorado River Basin Salinity Control Forum requirements applies to dischargers to the Colorado River and its tributaries above Imperial Dam	Effluent 2,200 mg/L Source 1,200 mg/L Net Increase 1,000 mg/L	Effluent 22 Source 20 Net Increase 20	N/A N/A N/A	Colorado River Basin Salinity Control Forum requirements always applicable	Monitoring required and a limit remains in the permit; both the source water and the effluent shall be monitored for TDS to determine compliance with Colorado River Basin Salinity Control Forum requirement. A WQBEL in the form of a 1.00 ton/day (907 kg/day) net increase above source water remains in the permit.

Table 1. Permit limitations and monitoring requirements for Outfall 001.

Parameter	Lowest Standard/Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/Rationale (1)
Ammonia	Standard varies with temperature and pH / A&Wc Chronic	1.26 Ammonia Impact Ratio (AIR)	55	N/A	RP Exists (2)	Ammonia is to be monitored by discrete sample and a WQBEL in the form of an ammonia impact ratio (AIR) of 1 is set in the permit (3). An ammonia data log with concurrent pH and temperature monitoring 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 (4)	10,000 µg/L/ DWS	Effluent 60,000 ug/L Receiving Water 500 ug/L	Effluent 21 Receiving Water 1 (5)	Effluent 100,000 ug/L Receiving Water 6,000 ug/L	No RP (Mixing Zone)	Mixing zone is approved. Monitoring required for effluent characterization. No RP determination based on projected downstream concentration of 6,000 ug/L under critical conditions.
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	<4.9 mg/L	8	N/A	RP Exists (2)	Monitoring required and an TBEL remains in the permit.
Antimony	6 µg/L DWS	<1	4	ND	No RP	Monitoring required for effluent characterization.
Arsenic (4)	10 ug/L DWS	Effluent 15 µg/L Receiving Water 2.6 µg/L	Effluent 11 Receiving Water 6	Effluent 52 µg/L Receiving Water 9.2 ug/L	No RP (Mixing Zone)	Mixing zone is approved. Monitoring required for effluent characterization. No RP determination based on projected downstream concentration of 9.2 ug/L under critical conditions.
Beryllium	4 µg/L DWS	<1 µg/L	4	ND	No RP	Monitoring required for effluent characterization.
Boron	1,000 µg/L Agl	200 µg/L	4	900 µg/L	No RP	Monitoring required for effluent characterization.
Cadmium (6)	0.5 µg/L A&Wc chronic	<2 µg/L	4	ND	RP Indeterminate (High LOQ) (7)	Monitoring required and an assessment level is set.
Chromium (Total)	100 µg/L DWS	<10 µg/L	2	ND	No RP	Monitoring required as an indicator parameter for Chromium VI.
Chromium VI	11 µg/L/ A&Wc chronic	<5 µg/L	4	ND	No RP (Based on total chromium data)	Monitoring required for effluent characterization.

Table 1. Permit limitations and monitoring requirements for Outfall 001.

Parameter	Lowest Standard/Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/Rationale (1)
Copper (4) (6)	17 µg/L A&Wc chronic	Effluent 29 µg/L Receiving Water <10 µg/L	Effluent 11 Receiving Water 7	Effluent 71 µg/L Receiving Water <5 µg/L	No RP (Mixing Zone)	Mixing zone is approved. Monitoring required for effluent characterization. No RP determination based on projected downstream concentration of 5.0 ug/L under critical conditions.
Cyanide	5.2 µg/L A&Wc chronic	<50 ug/L	11	ND	RP Indeterminate (High LOQ) (7)	Monitoring required and an assessment level remains in the permit.
Hardness (6) (Receiving Water)	No applicable standard. Hardness is used to determine standards for specific metal parameters.	320 mg/L	6	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 218 mg/L supplied in the application. Monitoring for receiving water hardness is required whenever monitoring for hardness dependent metals is required.
Hydrogen sulfide	2 µg/L A&Wc chronic	N/A	No Data	N/A	RP Indeterminate (No Data)	Monitoring is required for sulfides as an indicator parameter for hydrogen sulfide and an assessment level remains in the permit. 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	1,500 µg/L	13	6,000 µg/L	RP Exists	Monitoring required and a WQBEL remains in the permit.
Lead (6)	5.8 µg/L A&Wc chronic	<15 ug/L	12	ND	No RP	Monitoring required for effluent characterization.
Mercury	0.01 µg/L A&Wc chronic	<0.2 µg/L	12	1.73 µg/L (8)	RP Exists	Monitoring required and a WQBEL remains in the permit.
Nickel (6)	100 µg/L A&Wc chronic	<10 µg/L	4	ND	No RP	Monitoring required for effluent characterization.
Selenium	2 µg/L A&Wc chronic	18 µg/L	11	200 µg/L	RP Exists	Monitoring required and a WQBEL remains in the permit.
Silver (6)	12 µg/L A&Wc acute	<10 µg/L	5	ND	No RP	Monitoring required for effluent characterization.
Sulfides	No applicable standard	<50 µg/L	8	ND	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	<0.1 µg/L	4	NDL	No RP	Monitoring required for effluent characterization.
Zinc (6)	260 µg/L A&Wc acute and chronic	230 µg/L	4	570 ug/L	RP Exists	Monitoring required and a WQBEL is set.

Table 1. Permit limitations and monitoring requirements for Outfall 001.

Parameter	Lowest Standard/Designated Use	Maximum Reported Daily Value	No. of Samples	Estimated Maximum Value	RP Determination	Proposed Monitoring Requirement/Rationale (1)	
Whole Effluent Toxicity (WET)	No toxicity (A.A.C. R18-11-108(A))	<i>Pseudo-kirchneriella subcapitata</i> (9)	1.0 TUc	1	N/A	RP Indeterminate (2)	Monitoring required and an action level is set.
		<i>Pimephales promelas</i>	1.0 TUc	1	N/A	RP Indeterminate (2)	Monitoring required and an action level is set.
		<i>Ceriodaphnia dubia</i>	1.0 TUc	1	N/A	RP Indeterminate (2)	Monitoring required and an action level is set.

Footnotes:

1. The monitoring frequencies are as specified in the permit.
2. Monitoring with ALs or Action Levels always required for WWTPs for these parameters unless RP exists and limits are set.
3. An AIR will be calculated by dividing effluent ammonia concentration by the applicable standard using the receiving water pH and temperature.
4. A mixing zone was approved in the previous permit for these parameters and reestablished in this permit. See Part V.B of the permit.
5. Submitted nitrate concentration data for the receiving water that could not be validated against submitted certified laboratory reports were excluded.
6. Hardness-dependent metal - the standard for this parameter is based on the average hardness value of the receiving water as indicated above.
7. All analytical results were non-detect, however the limit of quantitation (LOQ) exceeded the lowest applicable WQS for the receiving water designated uses.
8. High estimated value calculated for the dataset due to one non-detect monitoring result with a significantly higher LOQ. This high LOQ value caused the coefficient of variation to be high.
9. Formerly known as *Selenastrum capricornutum* or *Raphidocelis subcapitata*.

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 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 for the effluent as well as receiving water that for varying reasons are not amenable to compositing. Receiving water quality is not expected to be highly variable within an 8-hour timeframe.

Monitoring locations are specified in the permit (Part I.A and Part III.J) in order to ensure that representative samples of the influent and effluent are consistently obtained. All Chain of custody forms and certified laboratory reports for sampling performed shall clearly specify the sample collection location consistently to avoid ambiguity. Unique considerations and decisions for monitoring locations are outlined below:

- All effluent samples shall be taken downstream from the last treatment process and complete mixing of WWTP and WTP discharges, but prior to mixing with the receiving water. For example, dechlorination by sodium sulfite occurs after the effluent exits the Mix Tank and prior to discharge and therefore Total Residual Chlorine (TRC) samples shall be taken downstream from the last treatment process and prior to mixing with the receiving water and may not be taken from the Mix Tank. However, due to the current infrastructure and equipment available at the facility and unique facility design, certain exceptions are outlined below:
 - Special Condition 1:
To ensure the WWTP meets the treatment standards specified by the TBELs, BOD and TSS measurements of the effluent shall instead be taken downstream from the last treatment process of the WWTP, but prior to any comingling with any WTP discharge at the Internal Monitoring Point.
 - Special Condition 2:
In the absence of proper hardware necessary to perform sampling for all monitoring parameters in the discharge following the last treatment process, but prior to mixing with the receiving water, sampling is temporarily approved from the end of the second chamber of the Mix Water Holding Tank (Mix Tank) following complete mixing of WWTP and WTP discharges. Dechlorination is not expected to significantly affect pollutant concentrations in the discharge, however, the practice is improper and this exception is only approved until the required facility upgrades are complete. See Part V.D "Facility Hardware Installation" of

the permit for the special condition requirement to install monitoring and sampling hardware. At the time of permit renewal the last treatment process is dechlorination.

- Receiving water monitoring must be performed for all mixing zone parameters. If the permittee wishes to apply for a mixing zone for additional parameters during the permit term or at the next permit renewal the same monitoring is required. See Part II.A and Part V.B of the permit.

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(j). 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.3) 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, Section B of the permit, including completion and submittal of Discharge Monitoring Reports (DMRs), Ammonia Data Logs, and AZPDES Flow Record forms.

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.4). 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 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.1 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 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

The permittee must submit a mixing zone application in accordance with A.A.C. R18-11-114(B) for all parameters for which a mixing zone is requested to accompany the permit renewal application submission. Minimum monitoring and reporting requirements are specified under Special Conditions – Mixing Zone (Part V.B of the permit) for all pollutant parameters for which USBR will request a mixing zone in the next permit renewal. Pursuant to A.A.C. R18-11-114(A), ADEQ will use the submitted monitoring data to reviewed the mixing zone application on a pollutant-by-pollutant basis according to the factors specified in A.A.C. R18-11-114(C).

All bench sheets and laboratory reports for all monitoring performed for the mixing zone during a monitoring period must be submitted electronically as attachments to the DMR by the 28th day of the month following the end of a monitoring period and receiving water monitoring data shall be submitted with the 2028 annual reporting. See Part II.B.2 of the permit for requirements.

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)].

Facility Hardware Installation

Part V.D.1 – Internal Monitoring Point

At the time of permit renewal, the facility lacks the proper hardware necessary to sample for BOD and TSS at the Internal Monitoring Point prior to any comingling with WTP discharge to ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitoring activity, per 40 CFR 122.41(j) incorporated by reference in A.A.C. R18-9-A905(3).

The permit establishes a September 28, 2024 deadline to install the required sampling hardware to make proper sample collection possible. The permittee is responsible for reporting the date of completion to ADEQ by email at AZPDES@azdeq.gov.

Part V.D.2 – Effluent, Outfall 001

At the time of permit renewal, the facility lacks the proper hardware necessary to (1) sample for all monitoring parameters in the effluent or (2) monitor discharge flow rate following the last treatment process, but prior to mixing with the receiving water to ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitoring activity, per 40 CFR 122.41(j) incorporated by reference in A.A.C. R18-9-A905(3).

The permit establishes an allowed timeframe of four years from the date of permit issuance to install the required sampling hardware, install the required flow meter, and complete associated facility upgrades and safety measures necessary to make installation and sample collection possible. The permittee is responsible for reporting the date of completion to ADEQ by email at AZPDES@azdeq.gov. Sample collection from the Mix Tank for analysis of parameters in the effluent will no longer be authorized following either the date of notification or the four-year deadline.

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/WTP will be to a perennial water with Tier 2 antidegradation protection. 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. 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 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: Corin Hammond
1110 West Washington Street
Phoenix, Arizona 85007

Or by contacting Corin Hammond at (602) 771 – 4144 or by e-mail at hammond.corin@azdeq.gov

XVI. INFORMATION SOURCES

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

1. AZPDES Permit Application Form(s) 2A and 2S, received 02/01/2024, 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 04/05/2024, 04/17/2024, 04/24/2024, 05/13/2024, and 05/21/2024 – 05/23/2024).
3. ADEQ files on Hoover Dam WWTP and ADEQ Geographic Information System (GIS) Website.
4. Arizona Administrative Code (AAC) Title 18, Chapter 11, Article 1, *Water Quality Standards for Surface Waters*, adopted December 31, 2016.
5. A.A.C. Title 18, Chapter 9, Article 9. *Arizona Pollutant Discharge Elimination System* rules.
6. 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*.
7. EPA Technical Support Document for Water Quality-based Toxics Control dated March 1991.
8. *Regions 9 & 10 Guidance for Implementing Whole Effluent Toxicity Testing Programs*, US EPA, May 31, 1996.
9. *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA /821-R-02-013).
10. U.S. EPA NPDES Permit Writers' Manual, September 2010.
11. ADEQ Arizona's 2024 Clean Water Act Assessment (July 1, 2017 To June 30, 2022) Integrated 305(b) Assessment and 303(d) Listing Report, May 2023.
12. Gray, J. R., Glysson, G. G., Turcios, L. M., & Schwarz, G. E. Comparability of suspended-sediment concentrations and total suspended solids data. U.S. Geological Survey Water-Resources Investigations Report 2000-4191. U.S. Department of the Interior, U.S. Geological Survey, 10.3133/wri004191, August 2000.
13. *2014 Review, Water Quality Standards for Salinity Colorado River System*, Colorado River Basin Salinity Control Forum, October 2014.