**STATEMENT OF BASIS FOR MAJOR MODIFICATION**
**OF ARIZONA POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT NO. AZ0026280**

Pursuant to A.C.C. R18-9-B906, on November 20, 2018, ADEQ received an application from the Glen Canyon Dam Power Plant Drainage Sumps to modify AZPDES Permit No. AZ0026280, which became effective on June 20, 2017. The request is to add a mixing zone for copper.

The Glen Canyon Dam Power Plant Drainage Sumps is a federally owned hydroelectric power plant. The receiving water for the Drainage Sumps Outfall 001 is Lake Powell to Lake Mead to the Colorado River tributary to the Colorado – Grand Canyon River Basin. The applicable designated uses for the Colorado River are as follows:

Aquatic and Wildlife cold water (A&Wc)
Full Body Contact (FBC)
Fish Consumption (FC)
Agricultural Irrigation (AgI)
Agricultural Livestock watering (AgL)
Domestic Water Supply (DWS)

The Glen Canyon Dam Power Plant Drainage Sumps currently discharge through Outfall 001 with no mixing zone. There are two sumps in conjunction with the Glen Canyon Dam and Power Plant. There is intermittent flow throughout the day on the small side of the sump while the large side only discharges when a generating unit is being dewatered. The average estimated flow per discharge from this sump is 0.33006 MGD.

The effluent treatment prior to discharge at Outfall 001, includes oil skimmers in the sump which allow for the removal of any oil that may be present. The Dewatering Sump collects wastewater from the eight generating units when they are taken out of service for maintenance, which is done approximately once per eight months per unit (on the average one unit is dewatered every month). The wastewater that is collected in turbine pits before being discharged to the Power Plant Gravity Drainage Sump includes leakage from various cooling water systems (such as generator guide bearings cooling water) and cooling/lubrication of the turbine wearing rings, packing boxes, and wicket gate seals on all eight generating units.

The permittee's addition of a mixing zone for copper is proposed to ensure that copper limits are being met. Recent sampling for the Drainage Sumps permit has shown a slight rise in copper levels.

ADEQ has reviewed the request and proposes to modify the permit as follows:

ADEQ evaluated the request and approved the establishment of the copper mixing zone. ADEQ determined the request met the requirements of the Arizona mixing zone rules policy based on the high dilution ratios associated with the effluent discharge to the Colorado River.

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The following factors in Arizona mixing zones 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 (47,000:1) 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 | No health based copper standard is applied to the discharge. The most stringent health based standard for copper is 1,300 µg/L, which is substantially greater than $C_d$ and $C_r$ in the model results below. |
| Location of drinking water plant intakes and public swimming areas | Copper concentrations in the effluent and receiving water are well below standards for FBC and DWS. |
| Predicted exposure of biota and the likelihood that resident biota will be adversely affected | There will be no likelihood the resident biota will be affected. A complete and rapid mix is assumed at the discharge point with the downstream concentration being below the aquatic and wildlife standard. |
| Bioaccumulation | The bioconcentration factor (BCF) for copper is 36. The bioaccumulation potential is generally not considered to be significant unless the BCF exceeds 100, therefore, copper's low BCF value will not create a bioaccumulation hazard. |
| Size of the zone of initial dilution | 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 – rapid and complete mixing will occur. |
| 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 copper. |
| Size of the mixing zone | A complete and rapid mix is assumed at the discharge point. |
| 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 concentration being below the aquatic and wildlife standard. |
| Concentration gradient of the pollutant within the mixing zone | A complete and rapid mix is assumed. |
| Sediment deposition | None |

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| Factor | Consideration |
|---|---|
| Potential to 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. The outfall from the drainage sumps enters into the tailrace area below the dam, which is also where water from Lake Powell 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 copper in consideration of the applicant's request for a mixing zone:

$Q_sC_s + Q_dC_d = Q_rC_r$

Where:
$Q_s$= background in-stream flow above discharge point during critical conditions (7-day low flow value over the past 10 years)
$C_s$= background in-stream copper concentration
$Q_d$= facility design capacity was used for maximum waste discharge flow
$C_d$= highest estimated maximum effluent concentration for copper (using the highest reported value and a multiplier to account for variability of data)
$Q_r$= critical downstream receiving water flow
$C_r$= resultant in-stream pollutant concentration.

Model Results:

$Q_S$ ((7Q10) flow from Colorado River above discharge point during critical conditions) = 5171 MGD
$C_S$ (average copper concentration from USGS sampling location above discharge point) = 12 µg/L
$Q_d$ (facility maximum flow rate) = 1.1 MGD
$C_d$ (maximum effluent copper concentration sampled) = 56 µg/L
$Q_r$ (low-flow value upstream flow plus discharge flow rate) = 5172 MGD
$C_r$ (resultant in-stream pollutant concentration) = 12 µg/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:
$C_r = (Q_SC_S+Q_dC_d)/Q_r$
$C_r$ = 12 µg/L

Because the $C_r$ value of 12 µg/L is less than the copper standard of 29.3 it was determined that there would not be RP for an exceedance of the chronic copper standard.

The following table is a list of changes made to the permit.

| Current Permit | Modification | Reason for Change |
|---|---|---|
| No mixing zone for copper | Mixing zone established for copper | Based on Arizona mixing zone rules policy, the mixing zone for copper was applied for and approved. |
| Copper limited | Limit removed | A mixing zone for copper was established and data allows the conclusion that no reasonable potential (RP) for an exceedance of a standard exists. |

Additional changes include a revised table of contents, and revised permit language to reflect current AZPDES requirements for Part IV Special Conditions, Mixing Zone.

**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.

Limits for copper 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.

This is considered allowable backsliding under 303(d)(4). The effluent limitations in the current permit for this parameter was based on state standards, the respective receiving waters are in attainment for this parameter, and the revisions are consistent with antidegradation requirements.

**Public Notice (A.A.C. R18-9-A907) / Public Comment Period:**

These changes are considered a major modification. This proposed modification will be public noticed for a 30-day comment period prior to issuance of the final permit decision.

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

A copy of this draft permit modification 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.

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