ADEQ Arizona Department of Environmental Quality

STATEMENT OF BASIS

STATEMENT OF BASIS FOR MODIFICATION
OF AZPDES PERMIT NO. AZ0025861

Pursuant to A.C.C. R18-9-B906, on May 26, 2022, ADEQ received request from the NXP USA, Inc. owner of the 56th Street and Earll Drive Water Quality Assistance Revolving Fund Groundwater Treatment System (GWTS) to modify AZPDES Permit No. AZ0025861 which became effective on April 20, 2022.

Section I. Background Information

The GWTS is designed to treat 1.44 million gallons per day (MGD), however NXP USA, Inc. requested that permit limitations and a mixing zone be developed using a maximum flow of 0.72 MGD.

The GWTS includes two groundwater extraction wells, DM-39 and DM-40, and an underground pipeline system (two 8-inch diameter below-ground force mains) to convey contaminated groundwater from the two extraction wells to an above-ground groundwater treatment plant. The extraction well water is conveyed through particulate filters for screening and sediment removal. The flow of water is then combined in a pipeline and conveyed for treatment of volatile organic compounds (VOCs) by Granular Activated Carbon (GAC) adsorption. The treated water is then conveyed by an underground pipeline through a Salt River Project (SRP) flow meter vault structure (with sample port for treated water sampling) to the northeast bank of the Grand Canal.

The treated water is discharged into the Grand Canal approximately 250 feet west of the treatment facility. The end of the discharge pipeline is capped with a flap valve that is generally flush with the canal lining. The SRP Grand Canal is concrete lined in this section of Phoenix. The pipe extends slightly beyond the canal bank and discharges into the canal. The top of the discharge pipeline is just below the high-water elevation of the canal. However, the discharge end of the pipeline is typically above the surface of the water. Water surface elevations in the canal provided by SRP indicate at time of unusual maximum operating conditions the pipeline outlet may be below the surface water elevation; therefore, a check valve has been installed to prevent water from siphoning from the Grand Canal back into the treatment system. During normal operating conditions, flow from the discharge pipe is projected outward and cascades onto the water surface.

The receiving water is the SRP Grand Canal, a Phoenix area canal. The segment description is Granite Reef Dam to all municipal water treatment plants intakes and the watershed is the Middle Gila Basin. The applicable designated uses are Agricultural Irrigation (AgI), Agricultural Livestock Watering (AgL), and Domestic Water Supply (DWS).

In December 2021, the City of Goodyear Water Treatment Plant was brought online and began receiving water from the Grand Canal thus changing the designated uses. NXP USA, Inc.'s modification is for approval of a mixing zone for arsenic and fluoride and to update the already approved boron mixing zone with the proposed maximum design flow. Several typographical errors were also corrected.

Section II. Proposed Permit Changes:

A. Proposed Permit Changes

Current Permit	Modification	Reason for Change
No flow limitations	Flow limited	Actual flows from facility are much lower than design capacity.
No mass loading limits	Mass loadings limited	Mixing zone calculations have been added to the permit and are based upon a maximum flow rate of 0.72 MGD from the GWTS.
Arsenic limited with no dilution	Arsenic limited with dilution	Mixing zone was calculated using a dilution factor calculated from data provided by the permittee. Arsenic samples will be collected at the point of discharge. Arsenic dilution limit is not applicable if arsenic limit with no dilution standard is met at the outfall.
A regulatory mixing zone was approved and boron limited with in-canal compliance monitoring.	The regulatory mixing zone has been updated and in-canal limits were removed.	Updated mixing zone for boron demonstrates no reasonable potential exists using dilution factor. Boron monitoring will be required as effluent characterization.
Fluoride limited with no dilution.	A regulatory mixing zone has been approved and limits were removed	Mixing for fluoride demonstrates no reasonable potential exists using dilution factor. Fluoride monitoring will be required as effluent characterization.
Compliance Monitoring for Mixing Zone	In-stream sampling	Monitoring location for discharge required at point-of-discharge.
No Uranium Limit	Uranium limited with no dilution	Data provided by the permittee demonstrates reasonable potential for exceedance of a surface water quality standard.
No ambient monitoring	Ambient monitoring required	In-canal monitoring is required to ensure that approved mixing zones are protective of the applicable designated uses.

B. Anti-backsliding Considerations

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 the following parameter 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 when the dilution factor calculated for the approved regulatory mixing zone is applied:

- Boron
- Fluoride

This is considered allowable backsliding under 303(d)(4). The effluent limitations in the current permit for these two 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.

C. 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 GWTS will be to a canal which is subject to Tier 1 antidegradation protection. 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.

Section II. Mixing Zone and Determination of Effluent Limitations

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. NXP USA, Inc. has requested a mixing zone for arsenic and fluoride, and an update to their previously approved boron mixing zone. This permit establishes a mixing zone for arsenic, boron, and fluoride as requested.

A. Mixing Zone Factors

ADEQ must consider the following factors when approving a mixing zone as required by Arizona Administrative Code (A.A.C.) R18-11-114(C);

1. Assimilative Capacity

The 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 entering the SRP Canal System is dependent on the natural surface water quality variability of the surface waters diverted into the canal system at the Granite Reef Dam. Surface water of the SRP Canal System is sourced from the Salt River, Verde River, and Central Arizona Project in seasonally variable amounts and supplemented with groundwater as needed to meet customer water orders and operational requirements. Currently, the Verde River is the

primary source water in the winter months (November to March) and the Salt River (mid-March to October) is the dominant source during the summer months.

The application included water quality data from SRP from monthly sampling completed in the Grand Canal between January 2016 and December 2021. Based upon this data, sufficient assimilative capacity exists in the Grand Canal for the GWTS discharge, as explained below.

- The average concentration of boron in the Grand Canal was 139 µg/L. The lowest applicable surface water quality standard is 1000 µg/L.
- The average concentration of fluoride in the Grand Canal was 318 µg/L. The lowest applicable surface water quality standard is 4000 ug/L.
- The mixing zone approval is conditionally approved based upon seasonal conditions and the dominant source water to address the variable background concentrations and assimilative capacity in the Grand Canal. The lowest applicable standard for arsenic is 10 µg/L. Assimilative capacity is available between mid-March and October when the primary source water is from the Salt River where average observed concentration was 5.85 µg/L. There is no assimilative capacity in the Grand Canal from November to mid-March, when the Verde River is the primary source water for the Grand Canal the average concentration of arsenic is 18 µg/L. The permit establishes end-of-pipe limits (no dilution) for arsenic from the GWTS when the Verde River is the primary source water in the Grand Canal.
- Discharges are prohibited when the canal is dried up for maintenance and no water is available for dilution.

2. Likelihood of adverse human health effects

The intake to the Goodyear Drinking Water Treatment system is 35 miles downstream of the approved mixing zone. Complete and rapid mixing is assumed. As long as the permittee maintains consistent compliance with the discharge limitations adverse human health effects are not expected based on reasonable potential analysis. A mixing zone study is required to validate the assumption of complete and rapid mixing.

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

The nearest drinking water intake is 35 miles downstream. Swimming is not permitted in the Phoenix Area Canals.

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

There are no applicable aquatic and wildlife designated uses for the receiving water.

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

There are no applicable Aquatic and Wildlife designated uses for the Phoenix Area Canals receiving water.

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

There are no applicable Partial Body Contact (PBC) or Full Body Contact (FBC) designated uses for the Phoenix Area Canals receiving water.

8. Size of the mixing zone

Complete and rapid mixing is assumed. The mixing zone boundary starts at the discharge pipeline outlet and extends downstream approximately 1,400 feet or 476 yards to the 32nd Street bridge crossing of the Grand Canal. The bottom width of the Grand Canal is about 35 to 40 feet and the top width is about 50 feet at the water line. The typical depth of the water in this portion of the canal is about 4 to 5 feet. The mixing zone is as small as practicable. The sampling point for the downstream boundary of the mixing zone is the upstream side of the bridge at 32nd Street or in close proximity to the bridge. This sampling location for the downstream samples of the mixing zone was selected based on ease of sampling and safety of access from the bridge or canal bank. A mixing zone study is required to validate the assumption of complete and rapid mixing

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

Not applicable

10. Concentration gradient of the pollutant in the mixing zone

Complete and rapid mixing is assumed. As long as the permittee maintains consistent compliance with the discharge limitations, the applicable surface water quality standards will be met at the boundary of the mixing zone based on reasonable potential analysis. A mixing zone study is required to validate the assumption of complete and rapid mixing.

11. Sediment Deposition

The discharge is treated groundwater and is not expected to cause sediment deposition.

12. Potential for attracting aquatic life to the mixing zone

Not applicable.

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

SRP utilizes groundwater to supplement surface water to meet customer demands. Some of these groundwater wells may exceed the DWS surface water quality standards for arsenic. The discharge of groundwater into the canal system is authorized under AZPDES Permit No. AZ0024341. SRP uses a “Blending Model” to meet the applicable water quality standards in the Grand Canal.

NXP USA, Inc. also operates two other groundwater treatment facilities that discharge into the Grand Canal associated with the Motorola 52nd Street Superfund Site which are identified as the OU1 and OU2 groundwater remediation facilities.

- The OU1 groundwater remediation (OU1) facility is approximately 9,700 feet upstream from the GWTS. The OU1 system has substantive approval for a boron mixing zone through the ADEQ Superfund Unit and the US Environmental Protection Agency (EPA). The extracted groundwater in OU1 also exceeds that DWS standards for arsenic and fluoride. The discharge to the Grand Canal has been temporarily suspended and redirected to the City of Phoenix sanitary sewer. NXP USA, Inc. is currently working with ADEQ and EPA through the Superfund process to demonstrate substantial compliance with Arizona’s surface water regulations for arsenic and fluoride to restore the option to discharge into the Grand Canal.
- The OU2 groundwater remediation (OU2) facility discharge is 800 feet upstream of the GWTS. Based upon historical results the OU2 discharge meets the drinking water standards for arsenic and fluoride, but exceeds the AgI standard for boron. ADEQ and EPA have determined that the OU2 discharge is in substantial compliance with the Arizona’s surface water regulations at the end of its mixing zone.

The proposed permits accounts and reserves assimilative capacity for the other discharges by:

- SRP and NXP USA, Inc. determined that a minimum receiving water flow of 12,000 gallons per minute (gpm) or 26.73 cubic feet per second (cfs) was necessary for achieving compliance with the water quality standards for the cumulative discharges. The example year was selected for the mixing zone calculations as it was a drought/dry year and therefore, represents a "worst-case" scenario for determining mixing zone compliance. A 50 percent safety factor was applied to reserve assimilative capacity for OU1 and OU2 discharges and a critical receiving water flow of 13 cubic feet per second (cfs) was used for calculating the end-of-pipe limits with dilution for the GWTS.
- The GWTS is designed to treat up to 1,100 gpm (1.584 MGD). The proposed permit limits the daily maximum flow from the facility to 0.72 MGD, resulting in a 1:18 dilution factor for effluent to receiving water.

B. Numeric Water Quality Standards (As outlined in A.A.C. R18-11-109)

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 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, including dilution, 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 Best Professional Judgement (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 Table II below.

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 designated 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. The basis for each parameter with a WQBEL is show in Table III.

C. Mixing Zone Calculations

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

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

Rearranged to solve for C_r:

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

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 = critical effluent concentration for arsenic/boron/fluoride (using the estimated value calculated from effluent data submitted)
Q_r = critical downstream receiving water flow = Q_s + Q_d
C_r = resultant in-stream pollutant concentration

Model Inputs for Arsenic

Q_s = background in-stream flow above discharge point during critical conditions in Grand Canal with 50% safety factor = **13 cfs**
C_s = maximum observed value of arsenic observed in Grand Canal from upstream sampling location = **9.26 µg/L**
Q_d = maximum daily flow from GWTS = **1.12 cfs**
C_d = critical effluent concentration for arsenic = **54** µg/L
Q_r = critical downstream receiving water flow = **14.12 cfs**
C_r = resultant in-stream pollutant concentration = **13 µg/L**

Model Inputs for Boron

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) = **13 cfs**
C_s = background in-stream boron = **190 µg/L**
Q_d = maximum daily flow from GWTS = **1.12 cfs**
C_d = highest estimated critical effluent concentration for boron = **6,731 µg/L**
Q_r = critical downstream receiving water flow = **14.12 cfs**
C_r = resultant in-stream pollutant concentration = **709 µg/L**

Model Inputs for Fluoride

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) = **13 cfs**
C_s = background in-stream fluoride concentration = **387 µg/L**
Q_d = facility design capacity was used for maximum water discharge flow = **1.12 cfs**
C_d = critical effluent concentration for fluoride = **35,964 µg/L**
Q_r = critical downstream receiving water flow = **14.12 cfs**
C_r = resultant in-stream pollutant concentration = **3,209 µg/L**

D. Effluent Characterization Monitoring

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. This monitoring is specified in Tables 3.a. through 3.e., Effluent Characterization Testing.

E. Permit Limitations and Monitoring Requirements

Table 1 summarizes the parameters that are limited in the permit and the rationale for that decision for the approved mixing zone. 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.

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. 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*.

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.

Discrete (i.e., grab) samples are specified in the permit for all parameters. The quality of the discharge is not expected to be highly variable.

Reporting requirements for monitoring results are detailed in Part II, Section B of the permit, including completion and submittal of Discharge Monitoring Reports (DMRs) 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.

F. Special Conditions

1. Mixing Zone

The permit approves a mixing zone for arsenic, boron, and fluoride.

2. Mixing Zone Study

A mixing zone study shall be completed to verify complete mixing is occurring and to designate the boundaries of the mixing zone. The study shall include cross-sectional sampling upstream and downstream of the GWTS and OU2. For the purposes of the study, "complete mixing" means the location at which concentration of a pollutant across a transect of a surface water differs by less than 5 percent per A.A.C. R18-11-101(12).

3. Ambient Monitoring

The proposed permit includes ambient in-canal sampling to ensure that the approved mixing zone is protective of the applicable surface water quality standards. The water quality data may also be utilized during future permit reissuance.

4. Best Management Practices

The permit requires NXP USA, Inc. to develop written procedures outlining the administrative controls, including communication and coordination with SRP, to ensure that the GWTS is not operated outside of the approved conditions, e.g. when the Verde River is the primary source water of the Grand Canal.

5. 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)].

Table II.a. Reasonable Potential (No dilution)

Parameter	Units	No. of Effluent Samples	Maximum Effluent Concentration	Reasonable Potential Multiplier	Critical Effluent Concentration	Most Stringent Criterion	Criterion Basis	Does Reasonable Potential Exist?
Arsenic, Total Recoverable	ug/L	9	17	3.16	53.70	10	DWS	**Yes**
Boron	ug/L	56	6180	1.09	6730.78	1,000	AgI	**Yes**
Fluoride	ug/L	8	10800	3.33	35964.37291	4000	DWS	**Yes**
Uranium, Total (as Ur)	ug/L	1	10	13.20	131.9687968	30	DWS	**Yes**

Table II.b. Reasonable Potential (Dilution) Tables

Parameter	Units	No. of Effluent Samples	Maximum Effluent Concentration	Reasonable Potential Multiplier	Critical Effluent Concentration	Projected Downstream Concentration	Most Stringent Criterion	Criterion Basis	Does RP Exist?
Arsenic, Total Recoverable	µg/L	9	17	3.16	53.70	13	10	DWS	**Yes**
Boron	µg/L	56	6180	1.09	6730.78	709	1,000	AgI	No
Fluoride	µg/L	8	10800	3.33	35964.37	3209	4000	DWS	No

Table III.a. Summary of WQBEL Calculations (No Dilution)

Parameter	Units	Minimum LTA	Minimum LTA Basis	AML Multiplier	MDEL Multiplier	AML	MDEL	AML Mass (g/day)	MDEL Mass (g/day)
Uranium, Total (as Ur)	ug/L	30	HLT	1.00	2.01	30	60	82	160

Table III.b. Summary of WQBEL Calculations (Dilution)

Parameter	Units	Minimum LTA	Minimum LTA Basis	AML Multiplier	MDEL Multiplier	AML	MDEL	AML Mass (g/day)	MDEL Mass (g/day)
Arsenic, Total Recoverable	µg/L	18.58928571	HLT	1.00	2.01	19	37	51	100

Section IV. 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.

Section V. 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.

Section VI. EPA Review (A.A.C. R18-9-A908(C))

A copy of this draft permit modification 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.

Section VII. 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: Mindi Cross
1110 West Washington Street
Phoenix, Arizona 85007

Or by contacting Mindi Cross at (602) 364 – 0720 or by e-mail at cross.mindi@azdeq.gov

Section VIII. Information Sources:

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

1. May 26, 2022, letter and supplemental information from NXP USA, Inc. requesting permit modification.

2. Additional information provided by NXP USA, Inc. on June 23, 2022, June 29, 2022, July 1, 2022, and July 15, 2022,

3. ADEQ files on NXP USA, Inc., 56th Street and Earll Drive WQARF Site Groundwater Treatment System

4. Arizona Administrative Code (AAC) Title 18, Chapter 11, Article 1, *Water Quality Standards for Surface Waters*

5. A.A.C. Title 18, Chapter 9, Article 9. *Arizona Pollutant Discharge Elimination System* rules.

6. Code of Federal Regulations (CFR) Title 40:
    a. Part 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System.*
    b. Part 124, *Procedures for Decision Making*.
    c. Part 133. *Secondary Treatment Regulation.*
    d. Part 503. *Standards for the Use or Disposal of Sewage Sludge*.

7. U.S. EPA NPDES Permit Writers' Manual, September 2010.