ADEQ Arizona Department of Environmental Quality

STATEMENT OF BASIS

STATEMENT OF BASIS FOR MODIFICATION

OF AZPDES PERMIT NO. AZ0026620

Pursuant to Arizona Administrative Code (A.A.C.) R18-9-B906, on November 25, 2025, ADEQ received an application from the Arizona State Parks Board, owner of Patagonia Lake State Park Wastewater Treatment Plant (WWTP) to modify Arizona Pollutant Discharge Elimination System (AZPDES) Permit No. AZ0026620 which became effective on January 18, 2024. The request is to modify the location of Outfall 001.

The Patagonia Lake State Park WWTP is a Publicly Owned Treatment Works (POTW). The receiving water for Outfall 001 is Patagonia Lake in the Santa Cruz River Basin.

The Patagonia Lake State Park WWTP has a design capacity of 0.025 million gallons per day (MGD) and discharges through Outfall 001. Treatment processes at the WWTP include: mechanical fine screening, anoxic and aeration zones, ultrafiltration membrane filtration units, ultraviolet (UV) disinfection, and membrane bioreactor (MBR) with biological nutrient removal. Sludge is stored in an aerated sludge chamber and subsequently hauled offsite for ultimate disposal.

The applicable designated uses for Patagonia Lake are Aquatic and Wildlife Warm Water (A&Ww), Full Body Contact (FBC), Fish Consumption (FC), Agricultural Irrigation (AgI), and Agricultural Livestock Watering (AgL).

The Patagonia Lake State Park WWTP discharges to an ephemeral wash upstream of Patagonia Lake. The proposed location of Outfall 001 will match the original outfall location that was permitted under the previously issued National Pollutant Discharge Elimination System (NPDES) permit for the facility, dated August 30, 1999. The proposed location of Outfall 001 is approximately 610 feet upstream of the current location of Outfall 001. The proposed location does not change the receiving water. The Patagonia Lake State Park WWTP will only discharge from the proposed outfall location during emergencies. The Patagonia Lake State Park WWTP will continue to discharge to bentonite clay-lined effluent holding ponds for evaporation under standard conditions.

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

Current Permit	Modification	Reason for Change
Outfall 001: 31° 29’ 25.16” N, 110° 51’ 24.20” W	Outfall 001: 31° 29’ 19.05” N, 110° 51’ 24.30” W	The Patagonia Lake State Park WWTP will relocate Outfall 001 to match the original outfall location that was previously permitted under the 1999 NPDES permit for the facility. The coordinates for Outfall 001 are updated to reflect this change.

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.

The state has assumed primacy for 208 planning absent a local 208 planning authority. 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.

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 Patagonia Lake State Park WWTP will be to a perennial water with Tier 2 antidegradation protection.

Because effluent data is available, a revised Tier 2 antidegradation review was conducted (See Statement of Basis – Appendix A), and found that the anticipated discharge will not cause a violation of the water quality standards.

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.

Anti-Backsliding Considerations

"Anti-backsliding" refers to statutory (Clean Water Act Section 402(o)) 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. 40 CFR 122.44(l)(2)(i)(B)(1) allows a permit to be modified to contain a less stringent effluent limitation if information becomes available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. This permit modification is not removing limitations from the permit.

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.

Information Sources

While developing the permit modification, the following information sources were used:

1. AZPDES Permit Application Forms 2A and 2S, received November 25, 2025, 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 October 23, 2025.
3. ADEQ files on the Patagonia Lake State Park WWTP.
4. ADEQ Geographic Information System (GIS) Website.
5. Arizona Administrative Code (A.A.C.) Title 18, Chapter 11, Article 1, *Water Quality Standards for Surface Waters*, adopted December 31, 2016.
6. A.A.C. Title 18, Chapter 9, Article 9, *Arizona Pollutant Discharge Elimination System* rules.

7. Code of Federal Regulations (CFR) Title 40:

   Part 122, *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System*

   Part 124, *Procedures for Decision Making*

   Part 133, *Secondary Treatment Regulation*

   Part 503, *Standards for the Use or Disposal of Sewage Sludge*

8. EPA Technical Support Document for Water Quality-based Toxics Control (EPA-505-2-90-001, 1991).

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

Appendix A. Antidegradation Review

Facility Name: Patagonia Lake State Park WWTP (AZ0026620)

Facility Type: Existing Facility

Discharge: Outfall 001

Design Flow for Outfall 001: 0.025 million gallons per day (MGD)

Receiving Water: Patagonia Lake, Santa Cruz County, AZ

The receiving water for Outfall 001 is a dry wash adjacent to Patagonia Lake. Patagonia Lake is listed in A.A.C. R18-11 Appendix B with the following designated uses (DUs):

- **Deep Lake:** Lake or reservoir with an average depth of more than 6 meters.
- **Aquatic and Wildlife (Warm Water) (A&Ww):** Use of a surface water by animals, plants, or other warmwater organisms, generally occurring at an elevation less than 5000 feet, for habitation, growth, or propagation.
    - **Aquatic and Wildlife Acute (A&Wa):** Short-term pollutant concentration limits to prevent immediate or severe toxic effects on aquatic organisms.
    - **Aquatic and Wildlife Chronic (A&Wc):** Long-term pollutant concentration limits to prevent adverse effects on aquatic ecosystems over extended exposure periods.
- **Full Body Contact (FBC):** Use of a surface water for swimming or other recreational activity that causes the human body to come into direct contact with the water to the point of complete submergence. The use is such that ingestion of the water is likely and sensitive body organs, such as the eyes, ears, or nose, may be exposed to direct contact with the water.
- **Fish Consumption (FC):** Use of a surface water by humans for harvesting aquatic organisms for consumption. Harvestable aquatic organisms include, but are not limited to, fish, clams, turtles, crayfish, and frogs.
- **Agricultural Irrigation (AgI):** Use of a surface water for crop irrigation.
- **Agricultural Livestock Watering (AgL):** Use of a surface water as a water supply for consumption by livestock.

ADEQ followed the steps outlined in A.A.C. R18-11-107 to determine whether degradation of Patagonia Lake surface water quality for ammonia, *E. coli*, and total suspended solids (TSS) are anticipated to result from the addition of permitted discharge from the Patagonia Lake State Park WWTP to Patagonia Lake.

APPLICABILITY

Under A.A.C. R18-11-107.01(B), the application of Tier 2 Antidegradation protection requires three criteria be met:

(1) The applicable receiving water must be perennial;

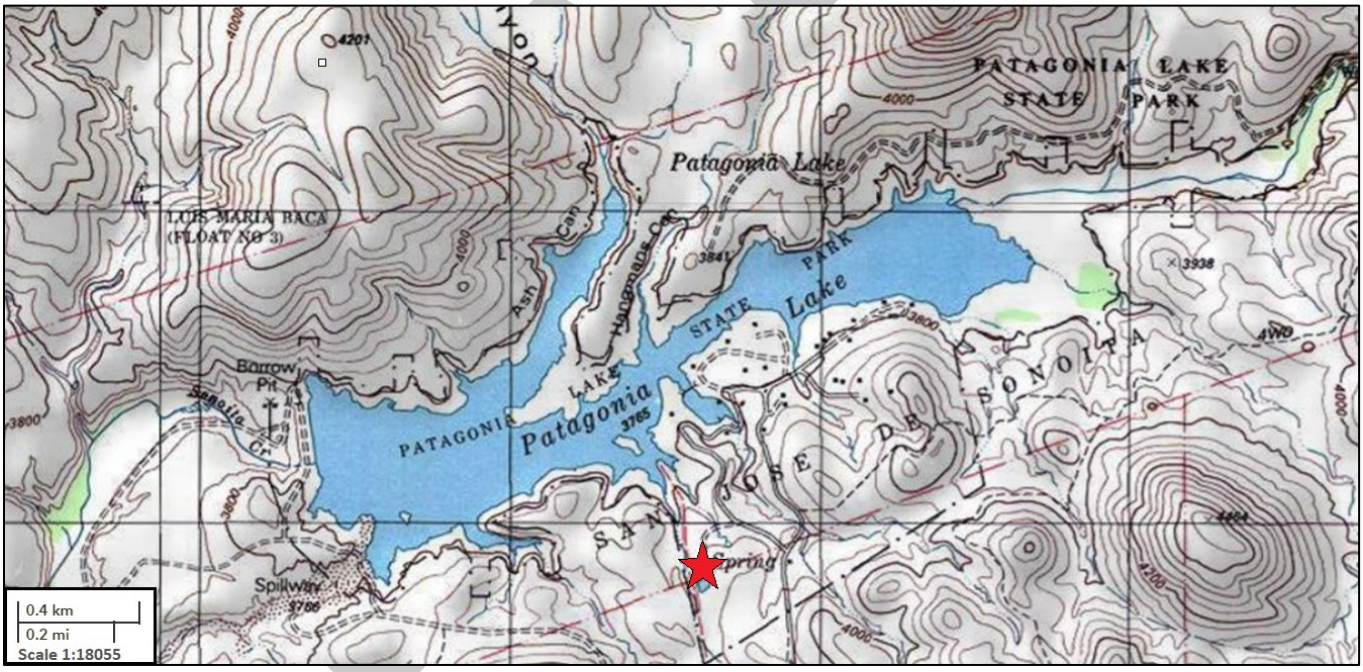
(2) The designated receiving water must have existing water quality that is better than applicable water quality standards; and

(3) The applicable receiving water must not be listed A.A.C. R18-11-107.01 (A)(1) nor classified as an Outstanding Arizona Water (OAW) under A.A.C. R18-9-112(G).

Criteria 1: Perennial Receiving Water

Patagonia Lake is a 260-acre manmade perennial reservoir located in southeastern Arizona, in Santa Cruz County (Figure 1). The reservoir was constructed in the late 1960's by damming Sonoita Creek. It has an average depth of 90 ft with a maximum depth of 120 ft and a normal storage of 7540 acre-feet. The lake is regularly used for recreation and is listed on A.A.C. R18-11 Appendix B.

Figure 1. Map of Patagonia Lake. Discharge from Patagonia Lake State Park WWTP (red star) will flow 0.2 miles down a dry unnamed wash to Patagonia Lake.



Criteria 2: Receiving Water Quality Is Better Than the WQS

ADEQ's Antidegradation Implementation Procedure requires assessing the baseline water quality (BWQ) of the perennial receiving water body on a parameter-by-parameter basis. BWQ is a characterization of selected pollutants in a perennial surface water as measured and expressed during a specified time period. Once established, BWQ is a fixed value unless it is updated by ADEQ to reflect changes in water quality. Facilities with discharges less than 0.1 MGD must evaluate BWQ for the following pollutants of concern (POC): flow, temperature, dissolved oxygen (DO), *E. coli*, total suspended solids (TSS), pH, total ammonia, total residual chlorine, total nitrogen, total phosphorus and total dissolved solids (TDS).

The provided BWQ are then compared to existing surface water quality standards (SWQS) to determine if the BWQ is better than SWQS. There are no applicable SWQS for flow, total nitrogen, total phosphorus, and total dissolved solids. Additionally, the Patagonia Lake State Park WWTP uses ultraviolet (UV) treatment for disinfection. TRC monitoring for evaluation is only required if chlorine or bromine is used as a backup disinfectant.

ADEQ evaluated ambient water quality data collected between September 26, 2018 and April 15, 2020 at two monitoring locations in Patagonia Lake to determine BWQ for the receiving water.

Table 1. Patagonia Lake Water Quality Monitoring Locations

Monitoring Location	Organization Name	Latitude	Longitude	Count
100060	ADEQ	31.4922222	-110.8694444	314
100327	ADEQ	31.4986111	-110.8480556	384

Table 2. Patagonia Lake Water Quality Data

Parameter	Count	BWQ	SWQS	Designated Use (1)	BWS > SWQS
Flow	N/A	N/A	N/A	N/A	N/A
Temperature	122	Minimum: 9.3°C Maximum: 26.8°C	+ 3.0°C (2)	A&Ww	No
Dissolved Oxygen (DO)	124	Minimum: 0.1 mg/L Maximum: 10.43 mg/L	> 6.0 mg/L (3)	A&Ww	No
E. coli	11	6.3 CFU/100 mL	126 CFU/100 mL (4)	FBC	**Yes**
Total Suspended Solids (TSS)	9	24 mg/L	80 mg/L (5)	A&Ww	**Yes**
pH	133	Minimum: 7.06 Maximum: 8.82	Minimum: 6.5 Maximum: 9.0	A&Ww, FBC	In range
Ammonia	11	0.99 mg/L	Acute: 10.1 mg/L (6) Chronic: 2.5 mg/L (7)	A&Ww	**Yes**
Total Residual Chlorine	N/A	N/A	N/A	N/A	N/A
Total Nitrogen	2	1.055 mg/L	N/A	N/A	N/A
Total Phosphorus	10	0.11 mg/L	N/A	N/A	N/A
Total Dissolved Solids (TDS)	133	747 mg/L	N/A	N/A	N/A

Footnotes

1. The abbreviations for applicable designated uses are as follows: Aquatic and Wildlife Warm (A&Ww), Full-Body Contact (FBC), Fish Consumption (FC), Agricultural Irrigation (AgI), and Agricultural Livestock Watering (AgL). See A.A.C. R18-11-101 for additional details.
2. Maximum allowable increase in ambient water temperature due to a thermal discharge
3. Single sample minimum concentration taken from a depth of no more than one meter (A.A.C. R18-11-109(C))
4. Single sample maximum (A.A.C. R18-11-109(A))
5. Median value from at least four samples, collected with seven-day intervals (A.A.C. R18-11-109(D)(1))
6. Calculated ammonia standard using the average receiving water pH of 7.9 S.U. (A.A.C. R18-11 Appendix A Table 11)
7. Calculated ammonia standard using the average receiving water pH of 7.9 S.U. and average receiving water temperature of 15.3°C (A.A.C. R18-11 Appendix A Table 12)

Based on this data, three POC exhibit better water quality than the SWQS:

- Ammonia
- *E. coli*
- TSS

Criteria 3: Receiving Water must not be listed A.A.C. R18-11-107.01 (A)(1) nor classified as an Outstanding Arizona Water (OAW) under A.A.C. R18-9-112(G).

Patagonia Lake is a perennial protected surface water body listed in A.A.C. R18-11 Appendix B. The lake is currently listed on the 303(d) list for mercury. Based on the pollutant-by-pollutant nature of the antidegradation review, Patagonia Lake qualifiers for Tier 1 antidegradation protection for mercury and Tier 2 antidegradation protection for all other POC. Patagonia Lake is not classified as an OAW. With the exception of the mercury impairment, Patagonia Lake satisfies Criteria 3.

Mixing Zone:

Under A.A.C. R18-11-206(G), the allowable mixing zone in lakes shall not exceed a total horizontal area of 10 percent of the surface area of the lake. Water quality standards must be met at the end of the mixing zone. Since the effluent will be discharged into a dry wash upstream of the lake, a mixing zone was not granted and no dilution factor was applied.

ASSIMILATIVE CAPACITY

Assimilative capacity is the amount of pollution a waterbody may accommodate without causing the concentration of any particular pollutant to be greater than the water quality standard for that pollutant. 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. R18-11-101(10).

The Tier 2 antidegradation review requires ADEQ to determine if the regulated discharge may cause significant degradation at critical flow or critical volume conditions, per A.A.C. R18-11-107.01(B)(2). To meet Tier 2 antidegradation protection of a perennial waterbody, it may be concluded that the discharge does not cause significant degradation if the following conditions are met:

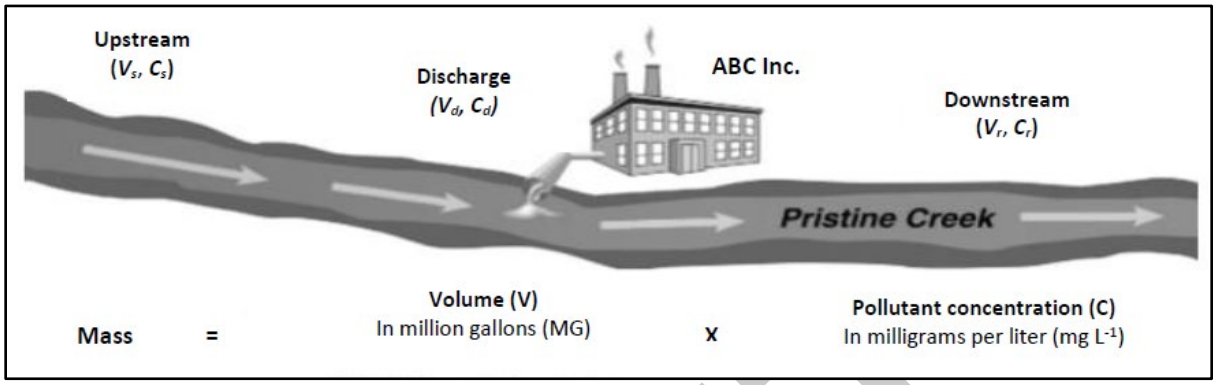
Condition 1 The regulated discharge consumes less than 20 percent of the available assimilative capacity for each POC.

Condition 2 If there are multiple dischargers, at least 50 percent of the assimilative capacity remains available in the surface water for each POC.

To date, there have been no regulated discharges to Patagonia Lake besides the Patagonia Lake State Park WWTP, thus Condition 2 is not applicable to this review.

For Condition 1, the regulated discharge is from the Patagonia Lake State Park WWTP, and the POC are ammonia, *E. coli*, and TSS. The calculation to determine if the discharge will result in significant degradation is a variation on the mass-balance equation shown in Figure 2 using critical conditions according to the two conditions specified above. Calculations follow the 2017 ADEQ Guidance Document, “Antidegradation Implementation Procedures.”

Figure 2. Exhibit of a mass-balance equation for discharge to a free-flowing receiving water. (Source: U.S. EPA NPDES Permit Writers' Manual)



$$V_s C_s + V_d C_d = V_r C_r$$

Where:

V_s 10% of normal lake storage (MG)

C_s Background lake concentration

V_d Maximum ten-month discharge (MG) from Patagonia Lake State Park WWTP

C_d Monitoring data for the Patagonia Lake State Park WWTP

V_r Critical downstream receiving water volume = V_s + V_d

C_r Resultant in-stream pollutant concentration

Rearrange to solve for C_d:

$$C_d = \frac{V_r C_r - V_s C_s}{V_d}$$

Make the following substitutions:

$$V_r = V_d + V_s$$

For Condition 1:

$$C_r = 0.2 \times (WQS - C_s) + C_s$$

(0.2 is the multiplier to calculate 20% of the assimilative capacity)

(WQS is the applicable water quality standard)

Final Steady State Formulas:

For Condition 1:

$$C_d = \frac{\left[\left(0.2 \times (WQS - C_s)\right) + C_s\right] \times (V_d + V_s) - (V_s C_s)}{V_d}$$

CRITICAL CRITERIA

The following assumptions were made:

- A steady-state water quality model was used because rapid and complete mixing is assumed to occur.
- The lake does not regularly discharge ten (10) months of the year and is thus a closed system during that time.

1. Critical Receiving Water Volume (V_s)

ADEQ defines critical flow as "the lowest flow over seven consecutive days that has the probability of occurring once in 10 years (7Q10)". Patagonia Lake is a man-made reservoir created by damming Sonoita Creek (31˚ 29' 21.4" N, 110˚ 52' 06" W). Santa Cruz County Flood District has operated a flood gage northeast of the Lake's spillway since 2014 and provided ADEQ gage height and flow data from November 2023 to March 2026. Over the three years, the gage height was recorded below the spillway 87% of the time, resulting in no flow from the reservoir and a 7Q10 of 0 cubic feet per second (cfs) (Figure 3).

Given there is zero discharge from the reservoir 87% of the time, ADEQ concluded a critical volume should be used in place of 7Q10 flow in the steady-state model. To be conservative, ADEQ calculated critical volume as 10% of the normal lake storage of 7,540 acre-feet or 2,457 million gallons (MG), which was provided by the Arizona Department of Water Resources (ADWR) 2023 Dam Safety Inspection of Lake Patagonia (Santa Cruz County, AZ).

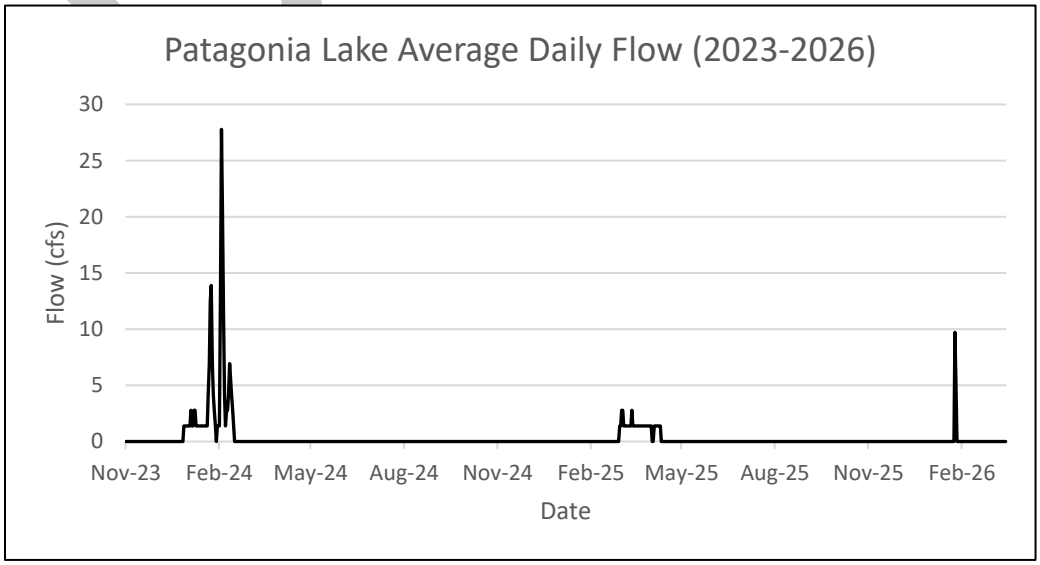
- 10% of Patagonia Lake Normal Storage (2,457 MG): 246 MG

2. Patagonia Lake State Park WWTP Discharge (V_d)

Based on the data in Figure 3, the lake is considered a closed system 87% of the time due to the absence of any discharge from the spillway. Being conservative, ADEQ evaluated how ten months' worth of maximum WWTP discharge would impact the assimilative capacity of the critical volume.

- Patagonia Lake State Park WWTP design capacity: 0.025 million gallons per day (MGD)
- Patagonia Lake WWTP design flow over ten months: 7.5 MG

Figure 3. Daily flow (cfs) out of the Patagonia Lake dam spillway from November 2023 to March 2026. Data was provided by Santa Cruz County's consultant, JE Fuller.



3. Patagonia Lake BWQ (C_s)

Table 3. Patagonia Lake BWQ Concentrations

Parameter	Baseline Water Quality (C_s)
Flow	N/A
Temperature	9.3 – 26.8°C
Dissolved Oxygen (DO)	0.1 – 10.43 mg/L
E. coli	6.3 CFU/100 mL
Total Suspended Solids (TSS)	24 mg/L
pH	7.06 – 8.82 S.U.
Ammonia	0.99 mg/L
Total Residual Chlorine	N/A
Total Nitrogen	1.055 mg/L
Total Phosphorus	0.11 mg/L
Total Dissolved Solids (TDS)	747 mg/L

4. Patagonia Lake State Park WWTP Discharge Concentrations for TSS, Ammonia, and *E. coli* (C_d)

Based on the AZPDES monitoring reports submitted by the Patagonia Lake State Park WWTP from 07/10/2025 to 02/23/2026, the maximum discharge concentrations for TSS, ammonia, and *E. coli* are as follows:

Table 4. Patagonia Lake State Park WWTP Critical Effluent Concentrations

Parameter	WWTP Critical Effluent Concentration (C_d)
Ammonia	7.73 mg/L
E. coli	< 0.5 CFU/100 mL (1)
Total Suspended Solids (TSS)	7 mg/L

Footnotes

1. All analytical results for E. coli were non-detect. For the purpose of assimilative capacity calculations, ADEQ applied a value of one-half the reporting limit to all non-detect results.

Table 5. Steady State Model Inputs for TSS, Ammonia, and *E. coli*

Parameter		V_s	C_s	V_d	C_d	WQS
Ammonia	Acute	246 MG	0.99 mg/L	7.5 MG	7.73 mg/L	10.1 mg/L
	Chronic	246 MG	0.99 mg/L	7.5 MG	7.73 mg/L	2.5 mg/L
E. coli		246 MG	6.3 CFU/100 mL	7.5 MG	0.5 CFU/100 mL	126 CFU/100 mL
TSS		246 MG	24 mg/L	7.5 MG	7 mg/L	80 mg/L

RESULTS:

At a discharge of 4.5 MG, the calculated discharge concentration for acute ammonia, chronic ammonia, *E. coli*, and TSS would have to be 62 mg/L, 11 mg/L, 815 CFU/100 mL, and 402 mg/L, respectively, to exceed the 20% assimilative capacity of Patagonia Lake. In comparison to the maximum discharge concentrations for ammonia, *E. coli*, and TSS of 7.73 mg/L, 0.5 CFU/100 mL, and 7 mg/L, respectively, it is evident that the calculated discharge concentrations are greater than the proposed concentrations at the conservative critical condition. **It can therefore be concluded that the regulated discharge should not cause significant degradation to Patagonia Lake for TSS, ammonia, *E. coli*, and TSS per A.A.C. R18-11-107.01(B)(2).**

Table 6. Patagonia Lake Assimilative Capacity Review

Parameter		Lake Flow (V_s)	Lake BWQ (C_s)	WWTP Flow (V_d)	WWTP Critical Effluent Concentration (C_d)	C_d 20% Assimilative Capacity	Significant Degradation? (1)
Ammonia	Acute	246 MG	0.99 mg/L	7.5 MG	7.73 mg/L	62 mg/	No
	Chronic	246 MG	0.99 mg/L	7.5 MG	7.73 mg/L	11 mg/L	No
E. coli		246 MG	6.3 CFU/100 mL	7.5 MG	0.5 CFU/100 mL	815 CFU/100 mL	No
TSS		246 MG	24 mg/L	7.5 MG	7 mg/L	402 mg/L	No

Footnotes

1. To meet Tier 2 antidegradation protection of a perennial waterbody, it may be concluded that the discharge does not cause significant degradation if the regulated discharge consumes less than 20 percent of the available assimilative capacity for each pollutant of concern.

REFERENCES:

1. Arizona Administrative Code (A.A.C.) Title 18, Chapter 9, Article 9. *Arizona Pollutant Discharge Elimination System* rules.
2. A.A.C. Title 18, Chapter 11, Article 1, *Water Quality Standards for Surface Waters,* adopted December 31, 2016.
3. Arizona Department of Environmental Quality (ADEQ). 2008. *Draft 2008 Antidegradation Implementation Procedure.*
4. Arizona Department of Water Resources (ADWR). 2023. Dam Safety Inspection – Lake Patagonia (Santa Cruz County, AZ).
5. United States Environmental Protection Agency (U.S. EPA). 2010. NPDES Permit Writers' Manual, September 2010