

**Utah Division of Water Quality  
Statement of Basis  
ADDENDUM  
Preliminary Wasteload Analysis and Antidegradation Level I Review**

**Date:** August 29, 2022

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Standards and Technical Services

**Facility:** USBR Flaming Gorge Dam Wastewater Treatment Plant  
UPDES Permit No. UT-0020338

**Receiving water:** Green River (2A, 3A, 4)

This addendum summarizes the wasteload analysis that was performed to determine water quality based effluent limits (WQBEL) for this discharge. Wasteload analyses are performed to determine point source effluent limitations necessary to maintain designated beneficial uses by evaluating projected effects of discharge concentrations on in-stream water quality. The wasteload analysis also takes into account downstream designated uses (UAC R317-2-8). Projected concentrations are compared to numeric water quality standards to determine acceptability. The numeric criteria in this wasteload analysis may be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality (DWQ).

Discharge

Outfall 001: Flaming Gorge WWTP discharge 0.006 MGD

Receiving Water

The receiving water for Outfall 001 is the Green River immediately below the Flaming Gorge Dam.

Per UAC R317-2-13.4(a), the designated beneficial use of the assessment unit in the immediate downstream area is: *Green River and tributaries, from Utah-Colorado state line to Flaming Gorge Dam except as listed below: 2A,3A,4.*

- *Class 2A - Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.*
- *Class 3A - Protected for cold water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow

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### Wasteload Analysis

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averaged over seven consecutive days with a ten-year return frequency (7Q10). The previous Wasteload Analysis stated that since Flaming Gorge Dam operations require a minimum release of 800 ft<sup>3</sup>/s, this flow rate becomes the critical condition for the receiving water. However, data suggests that this evaluation is inaccurate.

Seasonal critical flow on the Green River was calculated using all available data from USGS 09234500 GREEN RIVER NEAR GREENDALE, UT. This site is located approximately 2000 ft downstream of the discharge but is the most proximal location to the discharge. Furthermore, since the effluent discharge is located at the dam for the Flaming Gorge Reservoir, this precludes the use of upstream flow data. The monitoring location data has a continuous flow record. DWQ used data from 2010 through 2022 to evaluate the 7Q10 critical flow conditions and to estimate the seasonal critical flow in the receiving water (Table 1). The average annual critical low flow condition is 408.1 ft<sup>3</sup>/s.

**Table 1: Seasonal Critical Flow at the Green River location for USGS 09234500.**

Season	Outfall 001 (ft <sup>3</sup> /s) USGS 09234500
Summer	606.50
Fall	428.86
Winter	415.27
Spring	856.14
<b>Annual Overall</b>	<b>408.08</b>

Ambient, upstream, background receiving water quality was characterized for Outfall 001 using data from monitoring location UDWQ 4938490 GREEN R BL FLAMING GORGE DAM. The 20<sup>th</sup> percentile seasonal value was calculated for each constituent with available monitoring and sampling data in the receiving water.

Effluent discharge parameters were not provided in the renewal application. The parameters were therefore, characterized using the limited data available from the Discharge Monitoring Report (DMR). Several analytes including biochemical oxygen demand, total ammonia, and hardness were not available. Therefore, UDWQ 4938500 FLAMING GORGE WWTP was used to support the Wasteload Analysis.

Per R317-2-5.1.b., individual mixing zones may be further limited or disallowed in consideration of the factors in the area affected by the discharge which includes, biologically important areas such as fish spawning/nursery areas or segments with occurrences of federally listed threatened or endangered species. According to US Fish and Wildlife Service (US FWS), endangered species in this area include Bonytail (*Gila elegans*), Colorado Pikeminnow (*Ptychocheilus lucius*), Humpback Chub (*Gila cypha*), and Razorback Sucker (*Xyrauchen texanus*). Because the critical habitat of these species is potentially affected, authorized additional study is required from agencies including but not limited to US EPA, US FWS, Utah Division of Wildlife Resources. In addition, early life species are present throughout the year. Therefore, no mixing zone is granted at this time and effluent limits must be met at the point of discharge (end-of-pipe).

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#### Total Maximum Daily Load (TMDL)

According to the Utah's 2022 303(d) [Water Quality Assessment Report](#) "Final 2022 Integrated Report on Water Quality", the receiving water for the discharge, *Green River and tributaries, from Utah-Colorado state line to Flaming Gorge Dam except as listed below (Green River-1, AU ID: UT14040106-019\_00)* is listed as Fully Supporting.

#### Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and for chronic conditions is 2500 ft, per UAC R317-2-5. Water quality standards must be met at the end of the mixing zone. Individual mixing zones may be further limited or disallowed.

As stated previously, individual mixing zones may be disallowed in consideration of site-specific factors. For the project location, biologically important areas such as fish spawning/nursery areas or segments with occurrences of federally listed threatened or endangered species are present (R317-2-5.1.b.). According to US Fish and Wildlife Service (US FWS), endangered species in this area include Bonytail (*Gila elegans*), Colorado Pikeminnow (*Ptychocheilus lucius*), Humpback Chub (*Gila cypha*), and Razorback Sucker (*Xyrauchen texanus*). Because the critical habitat of these species is potentially affected, authorized additional study is required from agencies including but not limited to US EPA, US FWS, Utah Division of Wildlife Resources. In addition, early life species are present throughout the year. Therefore, no mixing zone is granted at this time and effluent limits must be met at the point of discharge (end-of-pipe).

However, the dilution ratio (background flow relative to effluent flow) is 5,000:1 to 10,000:1. In addition, the outfall discharge location and engineering drawings suggest that the effluent flow is completely and instantaneously well-mixed. Therefore, DWQ is not providing numerical effluent limits because of the precedent of providing very large effluent limits for small discharges to large rivers. Water quality monitoring must continue.

#### Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water are chlorine, dissolved oxygen, biochemical oxygen demand, E. coli, total ammonia, total nitrogen, and total phosphorus as determined by the facility operations. These parameters of concern (POC) were determined in consultation with the UPDES Permit Writer and the Watershed Protection Specialist.

#### WET Limits

The percent of effluent in the receiving water in a fully mixed condition, and acute and chronic dilution in a not fully mixed condition are calculated in the WLA in order to generate WET limits. The LC<sub>50</sub> (lethal concentration, 50%) percent effluent for acute toxicity and the IC<sub>25</sub> (inhibition concentration, 25%) percent effluent for chronic toxicity, as determined by the WET test, needs to be below the WET limits, as determined by the WLA. The WET limit for LC<sub>50</sub> is typically 100% effluent and does not need to be determined by the WLA.

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IC25 WET limits for Outfall 001 should be based on 0.0121% effluent.

#### Wasteload Allocation Methods

Effluent limits were determined for all constituents using the Utah Rivers Model, a mass balance and mixing analysis (UDWQ, 2021). The analysis is summarized in the Wasteload Addendum.

The water quality standard for chronic ammonia toxicity is dependent on temperature and pH, and the water quality standard for acute ammonia toxicity is dependent on pH. However, temperature, pH, and ammonia concentration of the effluent were not provided. Background temperature and pH values were used in the analysis. The analysis is summarized in the Wasteload Addendum.

As described, a robust Wasteload Analysis was completed to develop water quality-based effluent limits. However, the effluent is instantaneously mixed at the base of the Flaming Gorge dam, which alleviates a need for a defined mixing zone. In addition, the dilution ratio of background critical flow to effluent discharge ranges from approximately 5,000:1 to 10,000:1. This means that the modeled effluent limits are extremely high and unrealistic. Therefore, no numeric effluent limits will be provided with this Wasteload Analysis. However, it is imperative that water quality monitoring be continued.

Models and supporting documentation are available for review upon request.

#### Antidegradation Level I Review

The objective of the Level I ADR is to ensure the protection of existing uses, defined as the beneficial uses attained in the receiving water on or after November 28, 1975. No evidence is known that the existing uses deviate from the designated beneficial uses for the receiving water. Therefore, the beneficial uses will be protected if the discharge remains below the WQBELs presented in this wasteload.

A Level II Antidegradation Review (ADR) is not required for this facility. The proposed permit is a simple renewal of an existing UPDES permit. No increase in flow or concentration of pollutants over those authorized in the existing permit is being requested.

#### Documents:

WLA Document: *Flaming\_Gorge\_WLA\_2022.docx*

Wasteload Analysis and Addendums: *Flaming\_Gorge\_WLA\_2022.xlsm*

#### References:

Utah Division of Water Quality. 2022. *Final 2022 Integrated Report on Water Quality*

Utah Division of Water Quality. 2021. *Utah Wasteload Analysis Procedures Version 2.0.*

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