

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

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Facility: Fossil Rock Mine - Fossil Rock Resources, LLC
(Previously known as Trail Mountain Mine)
UPDES No. UT0023728

Receiving water: Cottonwood Canyon Creek (1C, 2B, 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 considers 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.

Discharge

Outfall 001 Sedimentation Pond (on-site)
Outfall 002 Mine water discharge (on-site)
Outfall 003 Sedimentation Pond (off-site waste rock location)

Effluent Design Flow **0.5 MGD** (as provide by the permittee)

Receiving Water

The receiving water for Outfalls 001 and 002 is Cottonwood Canyon Creek, an intermittent tributary of Cottonwood Creek. The receiving water for outfall 003 is Grimes Wash, an intermittent tributary of Cottonwood Creek.

Per UAC R317-2-13.1(b), the designated beneficial uses for Cottonwood Creek and tributaries from Highway U-57 crossing to headwaters are:

- *Class 1C - Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water*
- *Class 2B - Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low*

**Utah Division of Water Quality
Wasteload Analysis
Fossil Rock Mine
UPDES No. UT0023738**

degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.

- *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.*

Flow

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten-year return frequency (7Q10). Cottonwood Canyon Creek is an intermittent stream that has no flow for large parts of the year. As a result, the annual critical low flow was determined to be zero. As a result, water quality based effluent limits revert to end-of-pipe water quality standards.

Cottonwood Canyon Creek and Grimes Wash water quality inputs were estimated due to a lack of available data.

TMDL

According to DWQ's 2022 Integrated Report and 303(d) Assessment, Cottonwood Creek Upper (Cottonwood Creek and tributaries from USFS boundary to headwaters and Joes Valley Reservoir, UT14060009-007_00) is listed as impaired for pH (1C, 2B and 3A use classes), temperature (3A), and total dissolved solids (TDS) (4).

A Total Maximum Daily Load (TMDL) addressing the TDS impairment for the San Rafael River and tributaries was completed as part of the West Colorado River Watershed TMDL in August of 2004. As part of the TMDL, site specific standards were developed for several stream segments in the watershed. A site-specific standard of 3,500 mg/l TDS was developed for Cottonwood Creek (and has since been incorporated into the Utah Water Quality Standards) from the confluence with Huntington Creek to Highway 57.

The Fossil Rock Mine (formerly known as the 'Trail Mountain Mine'), as well as the Cottonwood-Wilberg reclaimed mine site (UPDES Permit No. UT0022896), discharge to Cottonwood Creek approximately 8 miles above this stream segment. The TMDL indicated a TDS permit limit of 1,136 mg/l for the 'Trail Mountain Mine' facility in order to be protective of downstream uses.

Protection of Downstream Uses

Per UAC R317-2-8, *all actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses.* For this discharge, 3A numeric aquatic life use criteria apply to the immediate receiving water (Huntington Creek).

Mixing Zone

The maximum allowable mixing zone is 15 minutes of travel time for acute conditions, not to exceed 50% of stream width, and 2,500 feet for chronic conditions, per UAC R317-2-5. Water quality standards must be met at the end of the mixing zone.

Because the critical low flow for the receiving water is zero, no mixing zone was considered.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were TDS, pH, temperature and total iron based on review of the past permit and the impairment status of the receiving water. Additional parameters of concern may become apparent as a result of reasonable potential analysis, technology-based standards, or other factors as determined by the UPDES Permit Writer.

WET Limits

The percentage 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 LC₅₀ (lethal concentration, 50%) percent effluent for acute toxicity and the IC₂₅ (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 LC₅₀ is typically 100% effluent and does not need to be determined by the WLA.

Because the critical low flow of the receiving water was determined to be zero, WET limits for Outfall 001 for IC₂₅ should be based on 100% effluent.

Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a simple mass balance mixing analysis (UDWQ 2012). The mass balance analysis is summarized in Appendix A.

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. The AMMTOX Model developed by University of Colorado and adapted by Utah DWQ and EPA Region VIII was used to determine ammonia effluent limits (Lewis et al. 2002).

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, with no increase in flow or concentration over that which was approved in the existing permit.

Documents:

WLA Document : FossilRockMine_WLADoc_9-2-23.docx
Wasteload Analysis: FossilRockMine_WLADoc_2023.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*.

Utah Division of Water Quality. 2004. *Price River, San Rafael River, and Muddy Creek TMDLs for Total Dissolved Solids, West Colorado Management Unit*.

Lewis, B., J. Saunders, and M. Murphy. 2002. *Ammonia Toxicity Model (AMMTOX, Version2): A Tool for Determining Effluent Ammonia Limits*. University of Colorado, Center for Limnology.