

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

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Standards and Technical Services

Facility: Bronco Utah Operations; Emery Deep Mine
UPDES No. UT0022616

Receiving water: Quitchupah Creek (2B, 3C, 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.

Maximum Effluent Discharge = 3.0 mgd total from all outfalls

- 001 Mine water discharge, Pond 1
- 002 Sedimentation Pond 2
- 003 Mine water discharge, Pond 6
- 004 Mine water discharge, Pond 4
- 005 Sedimentation Pond 3
- 006 Sedimentation Pond 8
- 007 Sedimentation Pond 5
- 008 Sedimentation Pond 7 (slurry pond)
- 009 Sedimentation Pond 9

Receiving Water

The receiving water for Outfalls 001-008 is Quitchupah Creek.

The receiving water for Outfall 009 is Christiansen Wash, a tributary to Quitchupah Creek.

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Per UAC R317-2-13.1, the designated beneficial uses of Quitchupah Creek and Christiansen Wash (tributaries of Muddy Creek) are: Muddy Creek and tributaries, from confluence with Fremont River to Highway U-10 crossing, (with exceptions) are 2B, 3C, 4.

- *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 degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.*
- *Class 3C - Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering.*

As per R317-2, Table 2.14.1, footnote (4), the segment of Quitchupah Creek from the confluence with Ivie Creek to U-10 has a site-specific TDS standard of 3,800 mg/l provided that total sulfate not exceed 2,000 mg/l to protect the livestock watering agricultural existing use.

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). However due to limited flow data, the average seasonal flows were used in this wasteload. (**Table 1**).

Table 1. Seasonal Critical Flows for Outfalls 001-008

Season	Flow (average cfs)
Summer	3.41
Fall	2.85
Winter	6.52
Spring	37.64
Average	12.09
20 th Percentile	0.025

Outfalls 001-008

For the purposes of the wasteload calculations, discharge points (outfalls) 001-008 were aggregated.

The source of flow and water parameters data was Division of Oil, Gas and Mining (DOG M).

The receiving water body was characterized using sampling station #1A; (QUITCHUPAH CK AT ST RD #10 BRIDGE) for the period 2002-2022.

The discharge data was characterized using site UT0022616-003 (UT0022616-003 SED POND #6 Q TO QUITCHUP) for the period 2002-2022. Details are summarized in Table 2.

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Table 2. WLA data sources for outfalls 001-008

Site Description	Name	Type	Period	Data Source	Comment
QUITCHUPAH CK AT ST RD #10 BRIDGE	1A	Stream	2002- 2022	Division of Oil, Gas and Mining (DOGM)	Upstream data source
UT0022616-003 SED POND #6 Q TO QUITCHUP	UT0022616 -003	UPDES Permit discharge point	2002- 2022	Division of Oil, Gas and Mining (DOGM)	Discharge date source

Outfall 009

The source of flow and water parameters data was Division of Oil, Gas and Mining (DOGM). 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). However due to limited flow data, the average seasonal flows were used in this wasteload. (**Table 3**).

Table 3. Seasonal Critical Flows Outfall 009 (cfs)

Season	Flow (average cfs)
Summer	0.88
Fall	0.36
Winter	2.59
Spring	1.39
Average	1.32
20 th Percentile	0.002772

The receiving water body was characterized using sampling station #2 (CHRISTIANSEN WASH UPSTREAM OF MINE FACILITY).

The discharge data was characterized using site UT0022616-003 (UT0022616-003 SED POND #6 Q TO QUITCHUP) for the period 2002-2022. Details are summarized in **Table 4**.

Table 4. WLA Data sources for Outfall 009

Site Description	Name	Type	Period	Data Source	Comment
CHRISTIANSEN WASH UPSTREAM OF MINE FACIL	2.0	Stream	2002- 2022	Division of Oil, Gas and Mining (DOGM)	Upstream data source
UT0022616-003 SED POND #6 Q TO QUITCHUP	UT0022616- 003	UPDES Permit discharge point	2002- 2022	Division of Oil, Gas and Mining (DOGM)	Discharge date source

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TMDL

According to the Utah's 2022 303(d) Water Quality Assessment, the assessment unit for this section of Quitchupah Creek (Quitchipah Creek and tributaries from confluence with Ivie Creek to U-10 crossing; UT14070002-007_00) was listed as impaired for benthic invertebrate assessment and total dissolved solids (TDS). TDS values in this area are naturally elevated due to the presence of shale layers. Several site-specific TDS standards have been developed in the watershed (Quitchupah, Ivie and Muddy Creeks). Quitchupah Creek's listing for TDS was based on samples obtained from Christiansen Wash, a tributary to Quitchupah Creek, where values were compared to the state standard of 1200 mg/l, instead of Quitchupah Creek's site-specific standard of 3,800 mg/l. While it shares the same characteristics as Quitchupah, Christiansen Wash was inadvertently not included in the site-specific language for Quitchupah Creek and should share the same 3,800 mg/l standard. The standard will be modified in the upcoming triannual review.

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.

Since the receiving water low flow is equal to or less than twice the flow of a point source discharge, the combined flows are considered to be totally mixed. Acute limits were calculated using 50% of the seasonal critical low flow.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were TDS, sulfate and iron, as determined in consultation with the UPDES Permit Writer.

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 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.

IC₂₅ WET limits for Outfalls 001-008 should be based on 57.6% effluent.

IC₂₅ WET limits for Outfall 009 should be based on 84.1% 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 the Wasteload Addendums.

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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). The analysis is summarized in the Wasteload Addendum.

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 required for this facility. The proposed permit has an increase of total effluent flow to 3.0 mgd from the existing UPDES permit of 1.5 mgd.

Documents:

WLA Document: *Bronco_Emery WLADoc_2022.docx*

Wasteload Analysis and Addendums:

Bronco_Emery_001-008_WLA_2022.xlsm,

Bronco_Emery_009_WLA_2022.xlsm

References:

Utah Division of Water Quality. 2012. *Utah Wasteload Analysis Procedures Version 1.0.*