

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

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Facility: Skyline Mine
UPDES No. UT0023540

Outfalls: 001, 002, 003, and 004

Receiving Water: Schofield Reservoir Tributaries (1C, 2B, 3A, and 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.

Discharge

Outfall 001: Discharge of mine water, stormwater, and washdown water; 16.848 MGD

Outfall 002: Discharge of stormwater and washdown water; 0.000017 MGD

Outfall 003: Discharge of stormwater; 0.0 MGD

Outfall 004: Discharge of mine water and stormwater; 0.0 MGD

All outfalls include water from sediment ponds.

Receiving Water

Outfall 001: Eccles Creek → Mud Creek → Scofield Reservoir

Outfall 002: Eccles Creek → Mud Creek → Scofield Reservoir

Outfall 003: UP Canyon Creek → Mud Creek → Scofield Reservoir

Outfall 004: Winter Quarters Canyon Creek → Mud Creek → Schofield Reservoir

Per UAC R317-2-13.12(d), the designated beneficial uses for Scofield Reservoir and tributaries are 1A, 2B, 3A, and 4:

- *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*

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low 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.*

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). Due to a lack of flow records for Eccles Creek, the 20th percentile of flow measurements was calculated on an annual basis. The source of flow data for Eccles Creek was from a summation of Utah Division of Oil, Gas and Mining (DOG M) sampling sites CS-3, CS-9, and CS-11 for 2010-2018.

Table 1: Annual critical low flow(cfs)

Receiving Water	Critical Low Flow (cfs)
Eccles Creek	0.079

Eccles Creek ambient water quality was characterized based on samples collected from DOGM sampling sites CS-3, CS-9, and CS-11 for 2010-2018.

Impaired Waters and TMDL

Scofield Reservoir tributaries, Assessment Unit UT14060007-002, are listed as impaired for dissolved oxygen in *Utah's 2016 Integrated Report*. Scofield Reservoir is listed as impaired for dissolved oxygen, pH and total phosphorus in *Utah's 2016 Integrated Report*. The *Scofield Reservoir TMDL* was completed to address the impairment for dissolved oxygen and total phosphorus. Skyline Mine did not receive a waste load allocation.

Mixing Zone

Per UAC R317-2-5, streams with a flow equal to or less than twice the flow of a point source discharge may be considered to be totally mixed. Therefore, no mixing zones are allowed for these discharges.

Parameters of Concern

The potential parameters of concern identified for the discharge and receiving waters were total dissolved solids (TDS) and metals as determined in consultation with the UPDES Permit Writer.

Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a mass balance mixing analysis (UDWQ 2012). No background flow was assumed for each of the outfalls; therefore, discharge limits were set to water quality criteria in the tributaries. The mass balance analysis is summarized in Appendix A. Models and supporting documentation are available for review upon request.

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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.

Table 2: WET Limits for IC₂₅

Outfall	Percent Effluent
Outfall 001-004	100%

Effluent Limits

Selected water quality based effluent limits for Outfalls 001-004 are summarized in Table 3. The complete list of WQBELs is attached in Appendix A.

Table 3: Selected Water Quality Based Effluent Limits for Outfalls 001-004

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Dissolved Oxygen, Min. (mg/L)	4.0	4.0	Minimum	6.5	6.5	30 days
Turbidity Increase (NTU)	10	10	Maximum			

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 Outfalls 001, 002, 003 and 004, as an increase in pollutant concentration and/or load is not proposed.

Documents:

WLA Document: *SkylineMineWLA*Doc_2020-07-30.docx
Wasteload Analysis: *SkylineMineWLA*_2020.xlsm

References:

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

Utah Division of Water Quality. 2016. *Utah's 2016 Integrated Report.*

WASTELOAD ANALYSIS [WLA]

Date: 7/30/2020

Appendix A: Mass Balance Mixing Analysis for Conservative Constituents

Discharging Facility:	Skyline Mine		
UPDES No:	UT-0023540		
Outfall No:	001, 002, 003, 004		
Permit Flow [MGD]:	Varies	Annual	Max. Daily
	Varies	Annual	Max. Monthly
Receiving Water:	Schofield Reservoir Tributaries		
Stream Classification:	1C, 2B, 3A, 4		
Stream Flows [cfs]:	0.000	All Seasons	Critical Low Flow
Fully Mixed:	YES		
Acute River Width:	100%		
Chronic River Width:	100%		
Mixed Flow [cfs]:	Varies		
Mixed Hardness [mg/L]:	318.3		

Modeling Information

A mass balance mixing analysis was used to determine the effluent limits.

All model numerical inputs, intermediate calculations, outputs and graphs are available for discussion, inspection and copy at the Division of Water Quality.

Effluent Limitations

Current State water quality standards are required to be met under a variety of conditions including in-stream flows targeted to the 7-day, 10-year low flow (R317-2-9).

Other conditions used in the modeling effort reflect the environmental conditions expected at low stream flows.

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Effluent Limitations for Protection of Drinking Water Sources (Class 1C Waters)

	Maximum Concentration		
	Standard	Background	Limit
Dissolved Metals (µg/L)			
Arsenic	10.0		10.0
Barium	1000		1000
Beryllium	4.0		4.0
Cadmium	10.0		10.0
Chromium	50.0		50.0
Lead	15.0		15.0
Mercury	2.0		2.0
Selenium	50.0		50.0
Silver	50.0		50.0
Inorganics			
Bromate (mg/L)	0.0		0.0
Chlorite (mg/L)	1.0		1.0
Fluoride (mg/L)	4.0		4.0
Nitrates as N (mg/L)	10.0		10.0
Radiological			
Gross Alpha (pCi/L)	15.0		15.0
Gross Beta (mrem/yr)	4.0		4.0
Radium 226, 228 (pCi/L)	5.0		5.0
Strontium 90 (pCi/L)	8.0		8.0
Tritium (pCi/L)	20000		20000
Uranium (pCi/L)	30.0		30.0

Effluent Limitations for Protection of Aquatic Wildlife (Class 3A Waters)

Physical Parameter	Concentration	
	Minimum	Maximum
pH	6.5	9.0
Turbidity Increase (NTU)		10.0
Temperature (deg C)		
	Maximum	
Instantaneous	20.0	
Change	2.0	
Dissolved Oxygen (mg/L)		
	Minimum Concentration	
Instantaneous	4.0	
7-day Average	5.0	
30-day Average	6.5	

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Metals-Total Recoverable

Parameter	Chronic (4-day ave)			Acute (1-hour ave)		
	Standard ¹	Background	Limit	Standard ¹	Background	Limit
Aluminum (µg/L)	87.0		N/A	750.0		750.0
Arsenic (µg/L)	150.0		150.0	340.0		340.0
Cadmium (µg/L)	0.5		0.5	6.2		6.2
Chromium VI (µg/L)	11.0		11.0	16.0		16.0
Chromium III (µg/L)	191.3		191.3	1470.6		1470.6
Copper (µg/L)	24.1		24.1	40.0		40.0
Cyanide (µg/L) ²	5.2		5.2	22.0		22.0
Iron (µg/L)				1000.0		1000.0
Lead (µg/L)	8.6		8.6	221.8		221.8
Mercury (µg/L) ²	0.012		0.012	2.4		2.4
Nickel (µg/L)	138.5		138.5	1246.9		1246.9
Selenium (µg/L)	4.6		4.6	18.4		18.4
Silver (µg/L)				23.6		23.6
Tributyltin (µg/L) ²	0.072		0.072	0.46		0.46
Zinc (µg/L)	315.1		315.1	312.5		312.5

1: Based upon a Hardness of 318.3 mg/l as CaCO₃

2: Background concentration assumed 67% of chronic standard

3: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCO₃ in the receiving water after mixing, the 87 ug/1 chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/1 acute aluminum criterion (expressed as total recoverable).

Effluent Limitation for Protection of Agriculture (Class 4 Waters)

Parameter	Maximum Concentration		
	Standard	Background	Limit
Total Dissolved Solids (mg/L)	1200		1200
Boron (mg/L)	0.75		0.75
Arsenic, Dissolved (µg/L)	100		100
Cadmium, Dissolved (µg/L)	10		10.0
Chromium, Dissolved (µg/L)	100		100
Copper, Dissolved (µg/L)	200		200
Lead, Dissolved (µg/L)	100		100
Selenium, Dissolved (µg/L)	50		50
Gross Alpha (pCi/L)	15		15