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

Date: **January 18, 2022**

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Standards and Technical Services

Facility: **Autoliv ASP Inc., UPDES Permit No. UT0024911**
ATK Launch Systems, Inc., UPDES No. UT0024805

Receiving water: **Blue Creek, Promontory Point (2B, 3D, 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

Autoliv

Outfall 001: Blue Creek (Stream Discharge) → Bear River Migratory Bird Refuge → Bear River Bay of Great Salt Lake
0.03 MGD maximum daily discharge

ATK

Outfall 001: South Plant → Blue Creek → Bear River Migratory Bird Refuge → Bear River Bay of Great Salt Lake
The maximum daily design discharge is 0.50 MGD and the maximum monthly design discharge is 0.35 MGD for the facility.

Outfall 002: North Plant → Blue Creek → Bear River Migratory Bird Refuge → Bear River Bay of Great Salt Lake
The maximum daily design discharge is 0.25 MGD and the maximum monthly design discharge is 0.16 MGD for the facility.

Receiving Water

Per UAC R317-2-13.7.a, the designated beneficial uses of Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir, are 2B, 3D and 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 3D - Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.*

- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering. Site-specific total dissolved solids (TDS) criteria are associated with this use. Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir: March through October daily maximum 4,900 mg/l and an average of 3,800 mg/l; November through February daily maximum 6,300 mg/l and an average of 4,700 mg/l. Assessments will be based on TDS concentrations measured at the location of STORET 4960740.*

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). Flow data was insufficient to calculate the annual or seasonal 7Q10 values. The seasonal 20th percentile flow values were calculated using data from DWQ monitoring stations. For conservative effluent limits, a mass balance analysis was completed as discussed in the Wasteload Allocation Methods section. For this analysis, the upstream boundary condition was determined using monitoring location DWQ 4960740 BLUE CK AB MORTON-THIOKOL AT U83 to provide equivalent effluent discharge limits at full assimilative capacity for the three outfalls (ATK Outfall 002, Autoliv Outfall 001, and ATK Outfall 001).

For dissolved oxygen and biochemical oxygen demand, the upstream monitoring location above each ATK Outfall was utilized. For ATK outfalls 001 and 002, sites DWQ 4965020-THIOKOL 05 AB BLUE CK 2.1 MI S OF NORTH BNDRY and DWQ 4960740 BLUE CK AB MORTON-THIOKOL AT U83 XING were used, respectively. The seasonal 20th percentile and the overall flow values are displayed in Table 1.

Table 1: Seasonal and Overall Average Flow Data for monitoring locations

Season	20th percentile Flow Data (cfs)		
	DWQ 4960740	DWQ 4965020	DWQ 4965020
Summer	1.19	0.0001	0.0001
Fall	4.00	0.0001	0.0001
Winter	2.32	0.0001	0.0001
Spring	4.34	0.0001	0.0001
Overall	2.40	0.0001	0.0001

Ambient receiving water quality was characterized using data from the same DWQ monitoring stations and analysis methods described previously. For conservative effluent limits, the upstream boundary conditions at DWQ 4960740 BLUE CK AB MORTON-THIOKOL AT U83 XING were analyzed using a mass balance approach. For DO and BOD, monitoring location DWQ 4960740 BLUE CK AB MORTON-THIOKOL AT U83 XING was used for ATK Outfall 002 and DWQ

4965020-THIOKOL 05 AB BLUE CK 2.1 MI S OF NORTH BNDRYwas used for ATK Outfall 001.

Discharge data was characterized using data from the Autoliv ASP Inc. Facility Monitoring Data Parameters provided in the 2020 permit application. Autoliv has reported no discharges since the permit was issued on December 1, 2015 and so there is no DMR data available. The ATK Launch Systems, Inc. effluent discharge data from outfalls 001 and 002 were collected from the DMR report. When data was not available, DWQ monitoring locations were used. Moving downstream, the effluent monitoring locations were: (ATK outfall 002) 4960780-THIOKOL 02 OUTFALL TO BLUE CK .4 MI S OF N BNDRY, (Autoliv outfall 001) no data are available, and (ATK outfall 001) 4965070-THIOKOL 001 THIOKOL WWTP.

Total Maximum Daily Load (TMDL)

According to the Utah's 2021 303(d) Water Quality Assessment Report "Combined 2018/2020 Integrated Report Version 1.0", the receiving water for the discharge, Blue Creek (UT16020309-002_00) is impaired for boron, selenium, pH, E. coli, and total dissolved solids (TDS). Aluminum was delisted in this report because the more recent monitoring data is sufficient and is now supporting. A site specific standard for total dissolved solids was adopted for Blue Creek to address the impairment. The standard is as follows per UAC R317-2-14.1, Footnote (4).

> *Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir: March through October daily maximum 4,900 mg/l and an average of 3,800 mg/l; November through February daily maximum 6,300 mg/l and an average of 4,700 mg/l. Assessments will be based on TDS concentrations measured at the location of STORET 4960740.*

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.

A tracer study was conducted in 1997 at Outfall 001 and the discharge was determined to be fully mixed 200 feet downstream from the discharge location (Moellmer 1997). Based on the results of the mixing zone modeling, plume width was 2.27 ft or 100.0% of the river at 1125.0 feet. A total of 100 % of the seasonal critical low flow was used to calculate chronic limits. Acute limits were calculated using 50% of the seasonal critical low flow.

Parameters of Concern

As stated previously, Blue Creek is impaired for dissolved aluminum, dissolved selenium, pH, and total dissolved solids. Other potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), total dissolved solids (TDS), dissolved oxygen (DO), BOD5, nitrate/nitrite (NO3), total ammonia (TAN), dissolved metals, volatile organic compounds (VOC), and pH, 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 LC_{50} (lethal concentration, 50%) percent effluent for acute toxicity and the IC_{25} (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_{50} is typically 100% effluent and does not need to be determined by the WLA.

Table 2: WET Limits for IC_{25}

Outfall	Percent Effluent
Autoliv Outfall 001	2.0%
ATK Outfall 001	15.0%
ATK Outfall 002	8.0%

Wasteload Allocation Methods

Effluent limits were determined for conservative constituents using a simple mass balance mixing analysis (UDWQ, 2020). The mass balance approach was utilized to provide equivalent effluent discharge limits at full assimilative capacity in aggregate for each of the three outfalls into Blue Creek. The mass balance analysis is summarized in the Wasteload Appendix.

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 initially used to determine ammonia effluent limits (Lewis et al., 2002). However, the seasonal acute and chronic freshwater total ammonia criteria were calculated based on UAC R317.2.14.2 assuming that fish early life stages (ELS) are present. The analysis is summarized in the Wasteload Appendix.

Because ATK Outfalls 001 and 002 are wastewater treatment plant discharge locations, effluent limits for dissolved oxygen and biochemical oxygen demand were determined for each outfall using the Utah Rivers Model analysis (UDWQ, 2020).

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 permits are a simple renewal of existing UPDES permits. No increase in effluent flow or concentration of pollutants over those authorized in the existing permits is being requested.

Documents:

WLA Document*:*	*Combined_Autoliv_ATK_WLA_2021.docx*
Wasteload Analysis and Addendums:	*Combined_Autoliv_ATK_WLA_2021.xlsm*
	ATK_002_WLA_2021.xlsm
	ATK_001_WLA_2021.xlsm

References:

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.

Moellmer, W.O. 1997. Blue Creek Dye Study Memorandum dated 10/20/1997. Utah Division of Water Quality.

Utah Division of Water Quality. 2020. *Utah Wasteload Analysis Procedures Version 2.0*.

DWQ-2022-005634

WASTELOAD ANALYSIS [WLA] Date: 12/6/2021
Appendix A: Mass Balance Mixing Analysis for Conservative Constituents
Combined WLA for ATK and Autoliv

Discharger:	ATK Launch Systems, LLC	Autoliv ASP, Inc.
Outfall:	001 & 002	001
Receiving Stream:	Blue Creek	
Stream Classification:	2B,3D,4	
Aquatic Life Class 3:	3D	
Agriculture Class 4:	Yes	
Direct Drinking Water Source:	No	
Important Fishery for Human Consumption:	No	
Season:	Annual	

Stream Flow:					
Acute:	1.48	cfs			
Chronic:	2.96	cfs			
Stream Hardness:	521	mg/l as CaCO3			
Effluent Flow:	ATK		Autoliv		Combined
Max. Daily	0.22	MGD	0.02	MGD	0.24
Ave. Monthly	0.11	MGD	0.01	MGD	0.12
Effluent Hardness:	300	mg/l as CaCO3			
Mixed Flow:					
Acute:	1.86	cfs	Dilution Fact.	3.94	
Chronic:	3.15	cfs	Dilution Fact.	15.77	
Mixed Hardness:	400	mg/l as CaCO3	Not to Exceed	400 mg/L	495.9 mg/l as CaCO3

Aquatic Wildlife Criteria (Class 3 Waters)

Physical	Standard 30-Day Average	Standard Instantaneous	Upstream Concentration	Chronic Effluent Limit	Acute Effluent Limit
Dissolved Oxygen - Minimum (mg/L)	5.0	3.0		5.0	3.0
pH - Minimum		6.5			6.5
pH - Maximum		9.0			9.0

Chronic Metals, µg/L	Total Recoverable Standard	Conversion Factor	Dissolved Standard	Upstream Concentration	Dissolved Effluent Limit	Recoverable Effluent Limit
Aluminum[1]	87	1.000	87	14	N/A	N/A
Arsenic	150	1.000	150	35	1,963	1,963
Cadmium	0.76	0.851	0.64	0.13	8.73	10.26
Chromium III	268	0.860	231	6.4	3,767	4,380
ChromiumVI	11.0	1.000	11.0	6.4	83.5	83.5
Copper	30.5	0.960	29.3	4.1	426	444
Cyanide[2]	5.2	1.000	5.2	3.5	32.5	32.5
Lead	18.6	0.589	10.9	0.2	179.7	305.1
Mercury[2]	0.012	1.000	0.012	0.008	0.075	0.075
Nickel	169	0.997	168	6.7	2,712	2720
Selenium	4.6	1.000	4.6	6.1		CL[3]
Tributylin[2]	0.072	1.000	0.072	0.048	0.45	0.45
Zinc	388	0.986	382	19	6,120	6,207

Acute Metals, µg/L	Total Recoverable Standard	Conversion Factor	Dissolved Standard	Upstream Concentration	Dissolved Effluent Limit	Total Recoverable Effluent
Aluminum[3]	750	1.000	750	14		CL[3]
Arsenic	340	1.000	340	35	1542	1542
Cadmium	8.7	0.886	7.7	0.13	37.7	42.6
Chromium III	5612	0.316	1773	6.4	8,738	27,651
ChromiumVI	16.0	1.000	16.0	6.4	53.8	53.8
Copper	51.7	0.960	49.6	4.1	229	239
Cyanide	22.0	1.000	22.0	3.5	95.1	95.1
Iron	1000	1.000	1000	36	4,800	4,800
Lead	476.8	0.589	280.8	0.2	1,387	2,355
Mercury	2.400	1.000	2.400	0.008	11.828	11.828
Nickel	1516	0.998	1513	6.7	7,450	7465
Selenium	18.4	1.000	18.4	6.1	66.9	66.9
Silver	41.1	0.850	34.9	0.7	170	200
Tributylin	0.460	1.000	0.460	0.048	2.08	2.08
Zinc	388	0.978	379	19	1801	1842

1: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaC0_3$ in the receiving water after mixing, the 87 ug/L chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/L acute criterion (expressed as total recoverable).

2: Background concentration assumed 67% of chronic standard.

3: Receiving segment listed as impaired for consituent without an approved TMDL; limit to be set based on capping current load.

Effluent Limitation for Total Ammonia based upon Water Quality Standards

In-stream criteria of downstream segments for Total Ammonia will be met with an effluent limitation (expressed as Total Ammonia as N) as follows:

Season		Concentration	
Summer	4 Day Avg. - Chronic	3.7	mg/l as N
	1 Hour Avg. - Acute	19.9	mg/l as N
Fall	4 Day Avg. - Chronic	4.2	mg/l as N
	1 Hour Avg. - Acute	19.9	mg/l as N
Winter	4 Day Avg. - Chronic	4.4	mg/l as N
	1 Hour Avg. - Acute	19.9	mg/l as N
Spring	4 Day Avg. - Chronic	4.2	mg/l as N
	1 Hour Avg. - Acute	19.9	mg/l as N

Early Life Stages are assumed to be present per R317-2.14.2.

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 100.0%.

Inorganics, µg/L	Chronic Standard	Acute Standard	Upstream Concentration	Chronic Effluent Limit	Acute Effluent Limit
Chlorine, Total Residual (TRC)	11.0	19.0	11.0	11.0	50.5
Hydrogen Sulfide (un-disassociated)		2.0	1.0		5.9
Phenol (Maximum)		0.10	0.05		0.30

Radiological pCi/l	Chronic Standard	Acute Standard	Upstream Concentration	Chronic Effluent Limit	Acute Effluent Limit
Gross Alpha		15.00	7.50		881.7

Organics, µg/L	Chronic Standard	Acute Standard	Upstream Concentration	Chronic Effluent Limit	Acute Effluent Limit
Acrolein	3.00	3.00	1.50	26.6	8.9
Aldrin		1.50	0.75		4.5
Chlordane	0.0043	1.20	0.0022	0.0382	5.9
Chlorpyrifos	0.041	0.083	0.02		0.33
DDT, DDE	0.0010	0.55	0.0005	0.0089	2.72
Diazinon	0.17	0.17	0.09		0.51
Dieldrin	0.056	0.24	0.028	0.497	1.08
Alpha-Endosulfan	0.056	0.11	0.028	0.497	0.43
Beta-Endosulfan	0.056	0.11	0.028	0.497	0.43
Endrin	0.036	0.086	0.018	0.320	0.354
Heptachlor	0.0038	0.26	0.0019	0.0338	1.28
Heptachlor epoxide	0.0038	0.26	0.0019	0.0338	1.28
Lindane	0.08	1.00	0.04	0.71	4.78
Methoxychlor		0.03	0.02		0.09
Mirex		0.001	0.0005		0.003
Nonylphenol	6.6	28.00	3.30		125.4
Parathion	0.013	0.066	0.007		0.30
PCB's	0.014		0.007	0.124	
Pentachlorophenol (varies with pH)	15.00	19.00	7.50	133.2	64.3
Toxaphene	0.0002	0.73	0.0001	0.0018	3.61

WET Limits, IC_{25}	Percent Effluent
ATK Outfall 001	15%
ATK Outfall 002	8%
Autoliv Outfall 001	2%

Agricultural Criteria (Class 4 Waters)

Constituent - Maximum	Unit	Standard	Upstream Concentration	Effluent Limit
Total Dissolved Solids[1]				
Maximum Daily: Mar - Oct	mg/l	4900	N/A	4900
Maximum Daily: Nov - Feb	mg/l	6300	N/A	6300
Average: Mar - Oct	mg/l	3800	N/A	3800
Average: Nov - Feb	mg/l	4700	N/A	4700
Arsenic	µg/L	100	50	444
Boron	µg/L	750	375	3331
Cadmium	µg/L	10	5	44
Chromium	µg/L	100	50	444
Copper	µg/L	200	100	888
Lead	µg/L	100	50	444
Selenium	µg/L	50	25	222

1: Site Specific Standard - Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir: March through October daily maximum 4,900 mg/l and an average of 3,800 mg/l; November through February daily maximum 6,300 mg/l and an average of 4,700 mg/l.

Numeric Criteria for the Protection of Human Health from Consumption of Water and Fish

Parameter Maximum Conc., µg/L	Class 1C (Water and Organism)			Class 3 (Organism Only)	
Toxic Organics	Standard	Upstream Concentration	Acute Effluent Limitation	Standard	Acute Effluent Limitation
Antimony	5.6	2.8		640	3152
Arsenic					
Beryllium					
Cadmium					
Chromium III					
Chromium VI					
Copper	1300	650			
Lead					
Mercury					
Nickel	100	50		4600	22535
Selenium				4200	20755
Silver					
Thallium	0.24	0.12		0.47	1.85
Zinc	7400	3700		26000	113899
Cyanide	140	70		140	416
Asbestos (million fibers/L)	7	3.5			
2,3,7,8-TCDD Dioxin	5.00E-09	2.50E-09		5.1E-09	1.53483E-08
Acrolein	6	3		9	32.6
Acrylonitrile	0.051	0.0255		0.250	1.13
Alachlor	2	1			
Atrazine	3	1.5			
Benzene	2.2	1.1		51	248
Bromoform	4.3	2.15		140	683
Carbofuran	40	20			
Carbon Tetrachloride	0.23	0.115		1.6	7.5
Chlorobenzene	100	50		1600	7710
Chlorodibromomethane	0.4	0.2		13	63.5
Chloroethane					
2-Chloroethylvinyl Ether					
Chloroform	5.7	2.85		470	2311
Dalapon	200	100			
Di(2ethylhexl)adipate	400	200			
Dibromochloropropane	0.2	0.1			
Dichlorobromomethane	0.55	0.275		17	82.9
1,1-Dichloroethane					
1,2-Dichloroethane	0.38	0.19		37	182
1,1-Dichloroethylene	7	3.5		7100	35072
Dichloroethylene (cis-1,2	70	35			
Dinose	7	3.5			
Diquat	20	10			
1,2-Dichloropropane	0.5	0.25		15	73.1
1,3-Dichloropropene	0.34	0.17		21	103.1
Endothall	100	50			
Ethylbenzene	530	265		2100	9333
Ethylene Dibromide	0.05	0.025			
Glyphosate	700	350			
Haloacetic acids	60	30			
Methyl Bromide	47	23.5		1500	7320
Methyl Chloride					

Methylene Chloride	4.6	2.3		590	2907
Ocamyl (vidate)	200	100			
Picloram	500	250			
Simazine	4	2			
Styrene	100	50			
1,1,2,2-Tetrachloroethane	0.17	0.085		4	19.4
Tetrachloroethylene	0.69	0.345		3.3	14.9
Toluene	1000	500		15000	72154
1,2 -Trans-Dichloroethyle	100	50		10000	49219
1,1,1-Trichloroethane	200	100			
1,1,2-Trichloroethane	0.59	0.295		16	77.9
Trichloroethylene	2.5	1.25		30	143
Vinyl Chloride	0.025	0.0125		2.4	11.8
Xylenes	10000	5000			
2-Chlorophenol	81	40.5		150	582
2,4-Dichlorophenol	77	38.5		290	1281
2,4-Dimethylphenol	380	190		850	3451
2-Methyl-4,6-Dinitrophenol	13	6.5		280	1358
2,4-Dinitrophenol	69	34.5		5300	26055
2-Nitrophenol					
4-Nitrophenol					
3-Methyl-4-Chlorophenol					
Penetachlorophenol	0.27	0.135		3	0.0

Parameter Maximum Conc., µg/L	**Class 1C (Water and Organism)**			**Class 3 (Organism Only)**	
Toxic Organics	**Standard**	**Upstream Concentration**	**Acute Effluent Limitation**	**Standard**	**Acute Effluent Limitation**
Phenol	10000	5000		860000	4230113
2,4,6-Trichlorophenol	1.4	0.7		2.4	9.1
Acenaphthene	670	335		990	3572
Acenaphthylene					
Anthracene	8300	4150		40000	181308
Benzidine	0.000086	0.000043		0.0002	0.00082
BenzoaAnthracene	0.0038	0.0019		0.018	0.08146
BenzoaPyrene	0.0038	0.0019		0.018	0.08146
BenzobFluoranthene	0.0038	0.0019		0.018	0.08146
BenzoghiPerylene					
BenzokFluoranthene	0.0038	0.0019		0.018	0.08146
Bis2-ChloroethoxyMethane					
Bis2-ChloroethylEther	0.03	0.015		0.53	2.6
Bis2-Chloroisopropy1Ether	1400	700		65000	318448
Bis2-EthylhexylPhthalate	1.2	0.6		2.2	8.5
4-Bromophenyl Phenyl Ether					
Butylbenzyl Phthalate	1500	750		1900	6433
4-Chlorophenyl Phenyl Ether					
Chrysene	0.0038	0.0019		0.018	0.08146
Dibenzoa, (h)Anthracene	0.0038	0.0019		0.018	0.08146
1,2-Dichlorobenzene	420	210		1300	5596
1,3-Dichlorobenzene	320	160		960	4113
1,4-Dichlorobenzene	63	31.5		190	815
3,3-Dichlorobenzidine	0.021	0.0105		0.028	0.09698
Diethyl Phthalate	17000	8500		44000	183929
Dimethyl Phthalate	270000	135000		1100000	4903695
Di-n-Butyl Phthalate	2000	1000		4500	18296
2,4-Dinitrotoluene	0.11	0.055		3.4	16.6
2,6-Dinitrotoluene					
Di-n-Octyl Phthalate					
1,2-Diphenylhydrazine	0.036	0.018		0.2	0.92
Fluoranthene	130	65		140	436
Fluorene	1100	550		5300	24023
Hexachlorobenzene	0.00028	0.00014		0.00029	0.00088
Hexachlorobutedine	0.44	0.22		18	88.1
Hexachloroethane	1.4	0.7		3.3	13.5
Hexachlorocyclopentadiene	40	20		1100	5357
Ideno 1,2,3-cdPyrene	0.0038	0.0019		0.018	0.08146
Isophorone	35	17.5		960	4675
Naphthalene					
Nitrobenzene	17	8.5		690	3376
N-Nitrosodimethylamine	0.00069	0.000345		3	14.8
N-Nitrosodi-n-Propylamine	0.005	0.0025		0.51	2.5
N-Nitrosodiphenylamine	3.3	1.65		6	23.1
Phenanthrene					
Pyrene	830	415		4000	18131
1,2,4-Trichlorobenzene	35	17.5		70	277

Aldrin	0.000049	0.0000245	0.00005	0.00015
alpha-BHC	0.0026	0.0013	0.0049	0.01909
beta-BHC	0.0091	0.00455	0.017	0.06607
gamma-BHC (Lindane)	0.2	0.1	1.8	8.5
delta-BHC				
Chlordane	0.0008	0.0004	0.00081	0.00243
4,4-DDT	0.00022	0.00011	0.00022	0.00065
4,4-DDE	0.00022	0.00011	0.00022	0.00065
4,4-DDD	0.00031	0.000155	0.00031	0.00092
Dieldrin	0.000052	0.000026	0.000054	0.00016
alpha-Endosulfan	62	31	89	318
beta-Endosulfan	62	31	89	318
Endosulfan Sulfate	62	31	89	318
Endrin	0.059	0.0295	0.06	0.18022
Endrin Aldehyde	0.029	0.0145	0.3	1.4
Heptachlor	0.000079	0.0000395	0.000079	0.00023
Heptachlor Epoxide	0.000039	0.0000195	0.000039	0.000115862
Polychlorinated Biphenyls PCB's	0.000064	0.000032	0.000064	0.00019
Toxaphene	0.00028	0.00014	0.00028	0.00083

Summary - Dissolved Metals, µg/L

	Class 1C Human Health (Drinking Water	Class 1C Human Health (Drinking Water + Organism)	Class 3 Human Health (Organism Only)	Class 3 Acute Aquatic Wildlife	Class 4 Agricultural	Acute Most Stringent
Aluminum				0		0
Antimony			3,151.6			3,152
Arsenic				1,542.2	444.2	444.2
Barium						0.0
Beryllium						0.0
Cadmium				37.7	44.4	37.7
Chromium (Total)					444.2	444.2
Chromium (III)				8,738		8,738
Chromium (VI)				53.8		53.8
Copper				229.0	888.3	229.0
Cyanide			0.0	95.1		0.0
Iron				4,800		4,800
Lead				1,386.9	444.2	444.2
Mercury				11.8		11.8
Nickel			22,534.5	7,450		7,450
Selenium			20,754.9	66.9	222.1	66.9
Silver				169.8		169.8
Thallium						0.00
Tributylin				2.1		2.08
Zinc				1,801.4		1801.4

Summary - Total Recoverable Metals, µg/L

	Chronic Total Recoverable Limits	Acute Most Stringent Dissolved Limits	Total Recoverable to Dissolved Fraction Conversion Factor	Acute Most Stringent Total Recoverable Limits
Aluminum	N/A	0	1.000	0
Antimony		3151.6		3,151.6
Arsenic	1963	444	1.000	444
Barium		0	1.000	0
Beryllium		0.0		0.0
Cadmium	10.3	37.7	0.886	42.6
Chromium (Total)		444		444
Chromium (III)	4380	8738	0.316	27,651
Chromium (VI)	84	54	1.000	54
Copper	444	229	0.960	239
Cyanide	32.5	0		0
Iron		4800	1.000	4,800
Lead	305	444	0.589	754.1
Mercury	0.075	11.8	0.850	13.9
Nickel	2719.9	7450	0.998	7,465
Selenium	CL3	67	1.000	67
Silver		170	0.850	200
Thallium		0.00		0.0

Tributyltin	0.45	2.08		2.1
Zinc	6207	1801	0.978	1,842

Total Recoverable to Dissolved Fraction Conversion Factor
[Laboratory Correction Factor] EPA 823-B 96-007 June 1996

	Acute Factor	Chronic Factor
Aluminum	1.000	1.000
Antimony		
Arsenic	1.000	1.000
Barium	1.000	1.000
Beryllium		
Cadmium	0.886	0.851
Chromium III	0.316	0.860
Chromium VI	1.000	1.000
Copper	0.960	0.960
Cyanide		
Iron	1.000	1.000
Lead	0.589	0.589
Mercury	0.850	1.000
Nickel	0.998	0.997
Selenium	1.000	1.000
Silver	0.850	1.000
Thallium		
Tributyltin		
Zinc	0.978	0.986

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA] = not included in the WLA
Addendum: Statement of Basis

18-Jan-22
4:00 PM

Facilities: **ATK Launch Systems, LLC** **UPDES No: UT-0024805**
Outfall: **002**
Discharging to: **Blue Creek**

I. Introduction

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 [R317-2-8, UAC]. Projected concentrations are compared to numeric water quality standards to determine acceptability. The anti-degradation policy and procedures are also considered. The primary in-stream parameters of concern may include metals (as a function of hardness), total dissolved solids (TDS), total residual chlorine (TRC), un-ionized ammonia (as a function of pH and temperature, measured and evaluated interms of total ammonia), and dissolved oxygen.

Mathematical water quality modeling is employed to determine stream quality response to point source discharges. Models aid in the effort of anticipating stream quality at future effluent flows at critical environmental conditions (e.g., low stream flow, high temperature, high pH, etc).

The numeric criteria in this wasteload analysis may always be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

II. Receiving Water and Stream Classification

Blue Creek:	2B,3D,4
Antidegradation Review:	Level I review completed. Level II review is not required.

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards		
Chronic Total Residual Chlorine (TRC)	0.011	mg/l (4 Day Average)	
	0.019	mg/l (1 Hour Average)	
Chronic Dissolved Oxygen (DO)	5.0	mg/l (30 Day Average)	
	N/A	mg/l (7Day Average)	
	3.0	mg/l (1 Day Average)	
Maximum Total Dissolved Solids	3800.0	mg/l	Background

Acute and Chronic Heavy Metals (Dissolved)

Parameter	4 Day Average (Chronic) Standard Concentration		Load*	1 Hour Average (Acute) Standard Concentration		Load*
Aluminum	87.00	ug/l**	0.139 lbs/day	750.00	ug/l	1.202 lbs/day
Arsenic	150.00	ug/l	0.240 lbs/day	340.00	ug/l	0.545 lbs/day
Cadmium	2.77	ug/l	0.004 lbs/day	8.87	ug/l	0.014 lbs/day
Chromium III	312.79	ug/l	0.501 lbs/day	6544.25	ug/l	10.487 lbs/day
ChromiumVI	11.00	ug/l	0.018 lbs/day	16.00	ug/l	0.026 lbs/day
Copper	35.81	ug/l	0.057 lbs/day	61.68	ug/l	0.099 lbs/day
Iron				1000.00	ug/l	1.602 lbs/day
Lead	23.60	ug/l	0.038 lbs/day	605.52	ug/l	0.970 lbs/day
Mercury	0.0120	ug/l	0.000 lbs/day	2.40	ug/l	0.004 lbs/day
Nickel	197.55	ug/l	0.317 lbs/day	1776.82	ug/l	2.847 lbs/day
Selenium	4.60	ug/l	0.007 lbs/day	20.00	ug/l	0.032 lbs/day
Silver	N/A	ug/l	N/A lbs/day	56.72	ug/l	0.091 lbs/day
Zinc	454.69	ug/l	0.729 lbs/day	454.69	ug/l	0.729 lbs/day

* Allowed below discharge

**Chronic Aluminum standard applies only to waters with a pH < 7.0 and a Hardness < 50 mg/l as CaCO3

Metals Standards Based upon a Hardness of 482.6 mg/l as CaCO3

IV. Numeric Stream Standards for Protection of Agriculture

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Arsenic			100.0 ug/l	lbs/day
Boron			750.0 ug/l	lbs/day
Cadmium			10.0 ug/l	0.01 lbs/day
Chromium			100.0 ug/l	lbs/day
Copper			200.0 ug/l	lbs/day
Lead			100.0 ug/l	lbs/day
Selenium			50.0 ug/l	lbs/day
TDS, Summer			3800.0 mg/l	3.04 tons/day

V. Numeric Stream Standards for Protection of Human Health (Class 1C Waters)

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
Metals	Concentration	Load*	Concentration	Load*
Arsenic			ug/l	lbs/day
Barium			ug/l	lbs/day
Cadmium			ug/l	lbs/day
Chromium			ug/l	lbs/day
Lead			ug/l	lbs/day
Mercury			ug/l	lbs/day
Selenium			ug/l	lbs/day
Silver			ug/l	lbs/day
Fluoride (3)			ug/l	lbs/day
to			ug/l	lbs/day
Nitrates as N			ug/l	lbs/day

VI. Numeric Stream Standards the Protection of Human Health from Water & Fish Consumption [Toxics]

	Maximum Conc., ug/l - Acute Standards			
	Class 1C		Class 3A, 3B	
Metals				
Antimony	ug/l	lbs/day		
Arsenic	ug/l	lbs/day	4300.00 ug/l	33.32 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	1704.61 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	35.64 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.05 lbs/day
Zinc				

There are additional standards that apply to this receiving water, but were not considered in this modeling/waste load allocation analysis.

VII. Mathematical Modeling of Stream Quality

Model configuration was accomplished utilizing standard modeling procedures. Data points were plotted and coefficients adjusted as required to match observed data as closely as possible.

The modeling approach used in this analysis included one or a combination of the following models.

(1) The Utah River Model, Utah Division of Water Quality, 1992. Based upon STREAMDO IV (Region VIII) and Supplemental Ammonia Toxicity Models; EPA Region VIII, Sept. 1990 and QUAL2E (EPA, Athens, GA).

(2) Utah Ammonia/Chlorine Model, Utah Division of Water Quality, 1992.

(3) AMMTOX Model, University of Colorado, Center of Limnology, and EPA Region 8

(4) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

Coefficients used in the model were based, in part, upon the following references:

(1) Rates, Constants, and Kinetics Formulations in Surface Water Quality Modeling. Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens Georgia. EPA/600/3-85/040 June 1985.

(2) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

VIII. Modeling Information

The required information for the model may include the following information for both the upstream conditions at low flow and the effluent conditions:

Flow, Q, (cfs or MGD)	D.O. mg/l
Temperature, Deg. C.	Total Residual Chlorine (TRC), mg/l
pH	Total NH3-N, mg/l
BOD5, mg/l	Total Dissolved Solids (TDS), mg/l
Metals, ug/l	Toxic Organics of Concern, ug/l

Other Conditions

In addition to the upstream and effluent conditions, the models require a variety of physical and biological coefficients and other technical information. In the process of actually establishing the permit limits for an effluent, values are used based upon the available data, model calibration, literature values, site visits and best professional judgement.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Current Upstream Information

	Stream Critical Low Flow cfs	Temp. Deg. C	pH	T-NH3 mg/l as N	BOD5 mg/l	DO mg/l	TRC mg/l	TDS mg/l
Summer (Irrig. Season)	1.2	20.8	8.5	0.05	2.83	6.82	0.00	3732.7
Fall	4.0	7.4	8.3	0.11	4.00	---	0.00	4420.3
Winter	2.3	3.0	8.0	0.12	2.95	---	0.00	4420.3
Spring	4.3	15.4	8.4	0.09	2.85	---	0.00	4420.3

Dissolved Metals	Al ug/l	As ug/l	Cd ug/l	CrIII ug/l	CrVI ug/l	Copper ug/l	Fe ug/l	Pb ug/l
All Seasons	30.00	36.30	0.50	3.26	2.65*	13.40	46.3	1.68

Dissolved Metals	Hg ug/l	Ni ug/l	Se ug/l	Ag ug/l	Zn ug/l	Boron ug/l	
All Seasons	0.0000	2.66	2.03	0.98	17.98	10.0	* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	0.16000	20.5	1158.58	0.77285
Fall	0.16000	12.9		
Winter	0.16000	7.9		
Spring	0.16000	16.6		

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

IX. 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 coincide with the environmental conditions expected at low stream flows.

Effluent Limitation for Flow based upon Water Quality Standards

In-stream criteria of downstream segments will be met with an effluent flow maximum value as follows:

Season	Daily Average	
Summer	0.160 MGD	0.248 cfs
Fall	0.160 MGD	0.248 cfs
Winter	0.160 MGD	0.248 cfs
Spring	0.160 MGD	0.248 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.16 MGD. If the discharger is allowed to have a flow greater than 0.16 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occuring, the permit writers must include the discharge flow limititation as indicated above; or, include loading effluent limits in the permit.

Effluent Limitation for Biological Oxygen Demand (BOD) based upon Water Quality Standards or Regulations

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent BOD limitation as follows:

Season	Concentration	
Summer	25.0 mg/l as BOD5	33.4 lbs/day
Fall	25.0 mg/l as BOD5	33.4 lbs/day
Winter	25.0 mg/l as BOD5	33.4 lbs/day
Spring	25.0 mg/l as BOD5	33.4 lbs/day

Effluent Limitation for Dissolved Oxygen (DO) based upon Water Quality Standards

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent D.O. limitation as follows:

Season	Concentration
Summer	5.00
Fall	5.00
Winter	5.00
Spring	5.00

Effluent Limitation for Total Ammonia based upon Water Quality Standards

In-stream criteria of downstream segments for Total Ammonia will be met with an effluent limitation (expressed as Total Ammonia as N) as follows:

Season		Concentration		Load	
Summer	4 Day Avg. - Chronic	5.3	mg/l as N	7.1	lbs/day
	1 Hour Avg. - Acute	21.4	mg/l as N	28.5	lbs/day
Fall	4 Day Avg. - Chronic	27.0	mg/l as N	36.0	lbs/day
	1 Hour Avg. - Acute	68.3	mg/l as N	91.1	lbs/day
Winter	4 Day Avg. - Chronic	23.0	mg/l as N	30.6	lbs/day
	1 Hour Avg. - Acute	60.6	mg/l as N	80.9	lbs/day
Spring	4 Day Avg. - Chronic	25.1	mg/l as N	33.4	lbs/day
	1 Hour Avg. - Acute	63.6	mg/l as N	84.9	lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 100.%.

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	40.8 Deg. C.	105.5 Deg. F
Fall	65.2 Deg. C.	149.3 Deg. F
Winter	38.2 Deg. C.	100.7 Deg. F
Spring	77.8 Deg. C.	172.1 Deg. F

Effluent Targets for Pollution Indicators Based upon Water Quality Standards

In-stream criteria of downstream segments for Pollution Indicators will be met with an effluent limit as follows:

	1 Hour Average Concentration		1 Hour Average Loading	
Gross Beta (pCi/l)	50.0	pCi/L		
BOD (mg/l)	5.0	mg/l	8.0	lbs/day
Nitrates as N	4.0	mg/l	6.4	lbs/day
Total Phosphorus as P	0.05	mg/l	0.1	lbs/day
Total Suspended Solids	90.0	mg/l	144.2	lbs/day

Note: Pollution indicator targets are for information purposes only.

Summary Effluent Limitations for Metals [Wasteload Allocation, TMDL]
[If Acute is more stringent than Chronic, then the Chronic takes on the Acute value.]

	WLA Acute ug/l	WLA Chronic ug/l
Other Effluent Limitations are based upon R317-1.		
E. coli	126.0 organisms per 100 ml	

X. Antidegradation Considerations

The Utah Antidegradation Policy allows for degradation of existing quality where it is determined that such lowering of water quality is necessary to accommodate important economic or social development in the area in which the waters are protected [R317-2-3]. It has been determined that certain chemical parameters introduced by this discharge will cause an increase of the concentration of said parameters in the receiving waters. Under no conditions will the increase in concentration be allowed to interfere with existing instream water uses.

The antidegradation rules and procedures allow for modification of effluent limits less than those based strictly upon mass balance equations utilizing 100% of the assimilative capacity of the receiving water. Additional factors include considerations for "Blue-ribbon" fisheries, special recreational areas, threatened and endangered species, and drinking water sources.

An Antidegradation Level I Review was conducted on this discharge and its effect on the receiving water. Based upon that review, it has been determined that an Antidegradation Level II Review is not required.

XI. Colorado River Salinity Forum Considerations

Discharges in the Colorado River Basin are required to have their discharge at a TDS loading of less than 1.00 tons/day unless certain exemptions apply. Refer to the Forum's Guidelines for additional information allowing for an exceedence of this value.
This doesn't apply to facilities that do not discharge to the Colorado River Basin.

XII. Summary Comments

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important down-stream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

XIII. Notice of UPDES Requirement

This Addendum to the Statement of Basis does not authorize any entity or party to discharge to the waters of the State of Utah. That authority is granted through a UPDES permit issued by the Utah Division of Water Quality. The numbers presented here may be changed as a function of other factors. Dischargers are strongly urged to contact the Permits Section for further information. Permit writers may utilize other information to adjust these limits and/or to determine other limits based upon best available technology and other considerations provided that the values in this wasteload analysis [TMDL] are not compromised. See special provisions in Utah Water Quality Standards for adjustments in the Total Dissolved Solids values based upon background concentration.

Utah Division of Water Quality
801-538-6052
File Name: ATK_002_WLA_2021.xlsm

APPENDIX - Coefficients and Other Model Information

CBOD Coeff. (Kd)20 1/day	CBOD Coeff. FORCED (Kd)/day	CBOD Coeff. (Ka)T 1/day	REAER. Coeff. (Ka)20 (Ka)/day	REAER. Coeff. FORCED 1/day	REAER. (Ka)T 1/day	NBOD Coeff. (Kn)20 1/day	NBOD Coeff. (Kn)T 1/day
2.000	0.000	2.078	131.166	0.000	133.792	0.400	0.427

Open Coeff. (K4)20 1/day	Open Coeff. (K4)T 1/day	NH3 LOSS (K5)20 1/day	NH3 (K5)T 1/day	NO2+NO3 LOSS (K6)20 1/day	NO2+NO3 (K6)T 1/day	TRC Decay K(Cl)20 1/day	TRC K(Cl)(T) 1/day
0.000	0.000	4.000	4.157	0.000	0.000	32.000	33.597

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	1.054

K1 CBOD	K2 Reaer.	K3 NH3	K4 Open	K5 NH3 Loss	K6 NO2+3	K(Cl) TRC	S Benthic

{theta}	{theta}	{theta}	{theta}	{theta}	{theta}	{theta}	{theta}
1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.1

Antidegredation Review

An antidegradation review (ADR) was conducted to determine whether the proposed activity complies with the applicable antidegradation requirements for receiving waters that may be affected. The Level I ADR evaluated the criteria of R317-2-3.5(b) and determined that a Level II antidegradation Review is not required.

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA] = not included in the WLA
Addendum: Statement of Basis

18-Jan-22
4:00 PM

Facilities: **ATK Launch Systems, LLC** **UPDES No: UT-0024805**
Outfall: **001**
Discharging to: **Blue Creek**

I. Introduction

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 [R317-2-8, UAC]. Projected concentrations are compared to numeric water quality standards to determine acceptability. The anti-degradation policy and procedures are also considered. The primary in-stream parameters of concern may include metals (as a function of hardness), total dissolved solids (TDS), total residual chlorine (TRC), un-ionized ammonia (as a function of pH and temperature, measured and evaluated interms of total ammonia), and dissolved oxygen.

Mathematical water quality modeling is employed to determine stream quality response to point source discharges. Models aid in the effort of anticipating stream quality at future effluent flows at critical environmental conditions (e.g., low stream flow, high temperature, high pH, etc).

The numeric criteria in this wasteload analysis may always be modified by narrative criteria and other conditions determined by staff of the Division of Water Quality.

II. Receiving Water and Stream Classification

Blue Creek:	2B,3D,4
Antidegradation Review:	Level I review completed. Level II review is not required.

III. Numeric Stream Standards for Protection of Aquatic Wildlife

Total Ammonia (TNH3)	Varies as a function of Temperature and pH Rebound. See Water Quality Standards		
Chronic Total Residual Chlorine (TRC)	0.011	mg/l (4 Day Average)	
	0.019	mg/l (1 Hour Average)	
Chronic Dissolved Oxygen (DO)	5.0	mg/l (30 Day Average)	
	N/A	mg/l (7Day Average)	
	3.0	mg/l (1 Day Average)	
Maximum Total Dissolved Solids	3800.0	mg/l	Background

Acute and Chronic Heavy Metals (Dissolved)

Parameter	4 Day Average (Chronic) Standard Concentration		Load*	1 Hour Average (Acute) Standard Concentration		Load*
Aluminum	87.00	ug/l**	0.305 lbs/day	750.00	ug/l	2.629 lbs/day
Arsenic	150.00	ug/l	0.526 lbs/day	340.00	ug/l	1.192 lbs/day
Cadmium	2.26	ug/l	0.008 lbs/day	6.88	ug/l	0.024 lbs/day
Chromium III	252.96	ug/l	0.887 lbs/day	5292.49	ug/l	18.552 lbs/day
ChromiumVI	11.00	ug/l	0.039 lbs/day	16.00	ug/l	0.056 lbs/day
Copper	28.69	ug/l	0.101 lbs/day	48.32	ug/l	0.169 lbs/day
Iron				1000.00	ug/l	3.505 lbs/day
Lead	16.96	ug/l	0.059 lbs/day	435.33	ug/l	1.526 lbs/day
Mercury	0.0120	ug/l	0.000 lbs/day	2.40	ug/l	0.008 lbs/day
Nickel	158.65	ug/l	0.556 lbs/day	1426.94	ug/l	5.002 lbs/day
Selenium	4.60	ug/l	0.016 lbs/day	20.00	ug/l	0.070 lbs/day
Silver	N/A	ug/l	N/A lbs/day	36.32	ug/l	0.127 lbs/day
Zinc	365.03	ug/l	1.280 lbs/day	365.03	ug/l	1.280 lbs/day

* Allowed below discharge

**Chronic Aluminum standard applies only to waters with a pH < 7.0 and a Hardness < 50 mg/l as CaCO3

Metals Standards Based upon a Hardness of 372.4 mg/l as CaCO3

IV. Numeric Stream Standards for Protection of Agriculture

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	**Load***	**Concentration**	**Load***
Arsenic			100.0 ug/l	lbs/day
Boron			750.0 ug/l	lbs/day
Cadmium			10.0 ug/l	0.02 lbs/day
Chromium			100.0 ug/l	lbs/day
Copper			200.0 ug/l	lbs/day
Lead			100.0 ug/l	lbs/day
Selenium			50.0 ug/l	lbs/day
TDS, Summer			3800.0 mg/l	6.66 tons/day

V. Numeric Stream Standards for Protection of Human Health (Class 1C Waters)

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
Metals	**Concentration**	**Load***	**Concentration**	**Load***
Arsenic			ug/l	lbs/day
Barium			ug/l	lbs/day
Cadmium			ug/l	lbs/day
Chromium			ug/l	lbs/day
Lead			ug/l	lbs/day
Mercury			ug/l	lbs/day
Selenium			ug/l	lbs/day
Silver			ug/l	lbs/day
Fluoride (3)			ug/l	lbs/day
to			ug/l	lbs/day
Nitrates as N			ug/l	lbs/day

VI. Numeric Stream Standards the Protection of Human Health from Water & Fish Consumption [Toxics]

	Maximum Conc., ug/l - Acute Standards			
	Class 1C		**Class 3A, 3B**	
Metals				
Antimony	ug/l	lbs/day		
Arsenic	ug/l	lbs/day	4300.00 ug/l	12.55 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	642.06 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	13.42 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.02 lbs/day
Zinc				

There are additional standards that apply to this receiving water, but were not considered in this modeling/waste load allocation analysis.

VII. Mathematical Modeling of Stream Quality

Model configuration was accomplished utilizing standard modeling procedures. Data points were plotted and coefficients adjusted as required to match observed data as closely as possible.

The modeling approach used in this analysis included one or a combination of the following models.

(1) The Utah River Model, Utah Division of Water Quality, 1992. Based upon STREAMDO IV (Region VIII) and Supplemental Ammonia Toxicity Models; EPA Region VIII, Sept. 1990 and QUAL2E (EPA, Athens, GA).

(2) Utah Ammonia/Chlorine Model, Utah Division of Water Quality, 1992.

(3) AMMTOX Model, University of Colorado, Center of Limnology, and EPA Region 8

(4) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

Coefficients used in the model were based, in part, upon the following references:

(1) Rates, Constants, and Kinetics Formulations in Surface Water Quality Modeling. Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens Georgia. EPA/600/3-85/040 June 1985.

(2) Principles of Surface Water Quality Modeling and Control. Robert V. Thomann, et.al. Harper Collins Publisher, Inc. 1987, pp. 644.

VIII. Modeling Information

The required information for the model may include the following information for both the upstream conditions at low flow and the effluent conditions:

Flow, Q, (cfs or MGD)	D.O. mg/l
Temperature, Deg. C.	Total Residual Chlorine (TRC), mg/l
pH	Total NH3-N, mg/l
BOD5, mg/l	Total Dissolved Solids (TDS), mg/l
Metals, ug/l	Toxic Organics of Concern, ug/l

Other Conditions

In addition to the upstream and effluent conditions, the models require a variety of physical and biological coefficients and other technical information. In the process of actually establishing the permit limits for an effluent, values are used based upon the available data, model calibration, literature values, site visits and best professional judgement.

Model Inputs

The following is upstream and discharge information that was utilized as inputs for the analysis. Dry washes are considered to have an upstream flow equal to the flow of the discharge.

Current Upstream Information

	Stream Critical Low Flow cfs	Temp. Deg. C	pH	T-NH3 mg/l as N	BOD5 mg/l	DO mg/l	TRC mg/l	TDS mg/l
Summer (Irrig. Season)	0.0	12.9	9.0	0.08	14.00	11.31	0.00	3190.0
Fall	0.0	12.9	9.0	0.08	14.00	---	0.00	3190.0
Winter	0.0	12.9	9.0	0.08	14.00	---	0.00	3190.0
Spring	0.0	12.9	9.0	0.08	14.00	---	0.00	3190.0

	Al	As	Cd	CrIII	CrVI	Copper	Fe	Pb
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
All Seasons	1.59*	10.00	6.00	25.00	2.65*	23.00	41.0	75.00

	Hg	Ni	Se	Ag	Zn	Boron
Dissolved Metals	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
All Seasons	0.0000	0.53*	1.00	1.00	300.00	10.0

* 1/2 MDL

Projected Discharge Information

Season	Flow, MGD	Temp.	TDS mg/l	TDS tons/day
Summer	0.35000	20.1	1393.09	2.03281
Fall	0.35000	11.0		
Winter	0.35000	6.9		
Spring	0.35000	14.5		

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

IX. 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 coincide with the environmental conditions expected at low stream flows.

Effluent Limitation for Flow based upon Water Quality Standards

In-stream criteria of downstream segments will be met with an effluent flow maximum value as follows:

Season	Daily Average	
Summer	0.350 MGD	0.541 cfs
Fall	0.350 MGD	0.541 cfs
Winter	0.350 MGD	0.541 cfs
Spring	0.350 MGD	0.541 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.35 MGD. If the discharger is allowed to have a flow greater than 0.35 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occuring, the permit writers must include the discharge flow limititation as indicated above; or, include loading effluent limits in the permit.

Effluent Limitation for Biological Oxygen Demand (BOD) based upon Water Quality Standards or Regulations

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent BOD limitation as follows:

Season	Concentration	
Summer	25.0 mg/l as BOD5	73.0 lbs/day
Fall	25.0 mg/l as BOD5	73.0 lbs/day
Winter	25.0 mg/l as BOD5	73.0 lbs/day
Spring	25.0 mg/l as BOD5	73.0 lbs/day

Effluent Limitation for Dissolved Oxygen (DO) based upon Water Quality Standards

In-stream criteria of downstream segments for Dissolved Oxygen will be met with an effluent D.O. limitation as follows:

Season	Concentration
Summer	5.00
Fall	5.00
Winter	5.00
Spring	5.00

Effluent Limitation for Total Ammonia based upon Water Quality Standards

In-stream criteria of downstream segments for Total Ammonia will be met with an effluent limitation (expressed as Total Ammonia as N) as follows:

Season		Concentration		Load	
Summer	4 Day Avg. - Chronic	2.5	mg/l as N	7.3	lbs/day
	1 Hour Avg. - Acute	9.6	mg/l as N	28.1	lbs/day
Fall	4 Day Avg. - Chronic	3.3	mg/l as N	9.5	lbs/day
	1 Hour Avg. - Acute	11.3	mg/l as N	33.1	lbs/day
Winter	4 Day Avg. - Chronic	3.8	mg/l as N	11.1	lbs/day
	1 Hour Avg. - Acute	13.2	mg/l as N	38.5	lbs/day
Spring	4 Day Avg. - Chronic	3.3	mg/l as N	9.5	lbs/day
	1 Hour Avg. - Acute	11.3	mg/l as N	33.1	lbs/day

Acute limit calculated with an Acute Zone of Initial Dilution (ZID) to be equal to 100.%.

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	16.9 Deg. C.	62.4 Deg. F
Fall	16.9 Deg. C.	62.4 Deg. F
Winter	16.9 Deg. C.	62.4 Deg. F
Spring	16.9 Deg. C.	62.4 Deg. F

Effluent Targets for Pollution Indicators Based upon Water Quality Standards

In-stream criteria of downstream segments for Pollution Indicators will be met with an effluent limit as follows:

		1 Hour Average	
	Concentration	Loading	
Gross Beta (pCi/l)	50.0 pCi/L		
BOD (mg/l)	5.0 mg/l	17.5	lbs/day
Nitrates as N	4.0 mg/l	14.0	lbs/day
Total Phosphorus as P	0.05 mg/l	0.2	lbs/day
Total Suspended Solids	90.0 mg/l	315.5	lbs/day

Note: Pollution indicator targets are for information purposes only.

Summary Effluent Limitations for Metals [Wasteload Allocation, TMDL]
[If Acute is more stringent than Chronic, then the Chronic takes on the Acute value.]

	WLA Acute ug/l	**WLA Chronic ug/l**
Other Effluent Limitations are based upon R317-1.		
E. coli	126.0 organisms per 100 ml	

X. Antidegradation Considerations

The Utah Antidegradation Policy allows for degradation of existing quality where it is determined that such lowering of water quality is necessary to accommodate important economic or social development in the area in which the waters are protected [R317-2-3]. It has been determined that certain chemical parameters introduced by this discharge will cause an increase of the concentration of said parameters in the receiving waters. Under no conditions will the increase in concentration be allowed to interfere with existing instream water uses.

The antidegradation rules and procedures allow for modification of effluent limits less than those based strictly upon mass balance equations utilizing 100% of the assimilative capacity of the receiving water. Additional factors include considerations for "Blue-ribbon" fisheries, special recreational areas, threatened and endangered species, and drinking water sources.

An Antidegradation Level I Review was conducted on this discharge and its effect on the receiving water. Based upon that review, it has been determined that an Antidegradation Level II Review is not required.

XI. Colorado River Salinity Forum Considerations

Discharges in the Colorado River Basin are required to have their discharge at a TDS loading of less than 1.00 tons/day unless certain exemptions apply. Refer to the Forum's Guidelines for additional information allowing for an exceedence of this value.
This doesn't apply to facilities that do not discharge to the Colorado River Basin.

XII. Summary Comments

The mathematical modeling and best professional judgement indicate that violations of receiving water beneficial uses with their associated water quality standards, including important down-stream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

XIII. Notice of UPDES Requirement

This Addendum to the Statement of Basis does not authorize any entity or party to discharge to the waters of the State of Utah. That authority is granted through a UPDES permit issued by the Utah Division of Water Quality. The numbers presented here may be changed as a function of other factors. Dischargers are strongly urged to contact the Permits Section for further information. Permit writers may utilize other information to adjust these limits and/or to determine other limits based upon best available technology and other considerations provided that the values in this wasteload analysis [TMDL] are not compromised. See special provisions in Utah Water Quality Standards for adjustments in the Total Dissolved Solids values based upon background concentration.

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APPENDIX - Coefficients and Other Model Information

CBOD Coeff. (Kd)20 1/day	CBOD Coeff. FORCED (Kd)/day	CBOD Coeff. (Ka)T 1/day	REAER. Coeff. (Ka)20 (Ka)/day	REAER. Coeff. FORCED 1/day	REAER. (Ka)T 1/day	NBOD Coeff. (Kn)20 1/day	NBOD Coeff. (Kn)T 1/day
2.000	0.000	0.798	49564.889	0.000	30845.250	0.400	0.086

Open Coeff. (K4)20 1/day	Open Coeff. (K4)T 1/day	NH3 LOSS (K5)20 1/day	NH3 (K5)T 1/day	NO2+NO3 LOSS (K6)20 1/day	NO2+NO3 (K6)T 1/day	TRC Decay K(Cl)20 1/day	TRC K(Cl)(T) 1/day
0.000	0.000	4.000	1.596	0.000	0.000	32.000	9.979

BENTHIC DEMAND (SOD)20 gm/m2/day	BENTHIC DEMAND (SOD)T gm/m2/day
1.000	0.284

K1 CBOD	K2 Reaer.	K3 NH3	K4 Open	K5 NH3 Loss	K6 NO2+3	K(Cl) TRC	S Benthic

{theta}	{theta}	{theta}	{theta}	{theta}	{theta}	{theta}	{theta}
1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.1

Antidegredation Review

An antidegradation review (ADR) was conducted to determine whether the proposed activity complies with the applicable antidegradation requirements for receiving waters that may be affected. The Level I ADR evaluated the criteria of R317-2-3.5(b) and determined that a Level II antidegradation Review is not required.