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

Date: **November 30, 2016**

Facility: **ATK Launch Systems, Inc.**
UPDES No. UT0024805

Receiving water: **Blue Creek (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
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
The receiving water for Outfall 001 and 002 is Blue Creek, which is tributary to the Bear River Migratory Bird Refuge, and Bear River Bay of the Great Salt Lake. Per UAC R317-2-13.7(a), the designated beneficial uses for Blue Creek and tributaries, from Great Salt Lake to Blue Creek Reservoir is 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.*

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 Blue Creek, the 20th percentile of flow measurements was calculated for all records and for the irrigation season. The sources of flow data was from DWQ sampling at 4960740 Blue Creek above ATK at U83 Crossing from 2000 to 2009 and ATK Launch Systems sampling at the same location from 2003 to 2014. Since the flow records provided by ATK are more recent, they are considered more representative of current conditions at the site. The 20th percentile flow rate for the irrigation season (March – October) was selected as the critical low flow for the wasteload allocation.

Table 1: Critical low flow (cfs)

Season	Blue Creek at UT-83 above ATK
Annual	3.5
Irrigation	3.0

Blue Creek water quality was characterized based on samples collected from monitoring station 4960740 Blue Creek above ATK at U83 Crossing from 2000 to 2010.

TMDL

Blue Creek is listed as impaired for aluminum, selenium, pH and TDS according to the 2012/2014 303(d) list. There isn't an approved TMDL for aluminum and selenium; therefore, the limits will be based on capping the load from the facility at current levels. For pH, the effluent limits were set equal to the water quality criteria, which are the same as secondary standards. A site specific standard was adopted for TDS that addresses the impairment (refer to TDS section below).

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.

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). Chronic limits were calculated using 100% of the streamflow and acute limits were calculated using 50% of the critical low flow.

Parameters of Concern

The potential parameters of concern identified for the discharge/receiving water were total suspended solids (TSS), total dissolved solids (TDS), dissolved oxygen (DO), BOD_5, nitrate/nitrite (NO3), total ammonia (TAN), dissolved metals, volatile organic compounds (VOC), and pH, as determined in consultation with the UPDES Permit Writer.

TDS

A site specific standard for TDS was adopted into Utah Administrative Code. Per UAC R317-2-14 Table 2.14.1:

> *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.*

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
Outfall 001	15%
Outfall 002	8%

Wasteload Allocation Methods

Since both ATK Launch Systems and Autoliv discharge to Blue Creek, the wasteload allocation evaluated the combined effects of each discharge. The permitted concentration was allocated proportionally to the flow, i.e. the same concentration limit was applied to each outfall.

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). The analysis is summarized in Appendix B.

Due to the lack of monitoring data, the effects of TP, TN, DO and BOD_5 in the effluent on the DO in the downstream receiving waters was not assessed. It is presumed that secondary standards for BOD_5 and minimum DO limits that match instream criteria would be sufficiently protective of the receiving water. Additional data should be collected during the permit cycle to support evaluation of compliance with the DO criteria.

Effluent Limits

Table 3 summarizes selected WQBELs for the parameters of concern. The complete list of WQBELs is attached in Appendix A. Models and supporting documentation are available for review upon request.

Table 3: Water Quality Based Effluent Limits Summary

Effluent Constituent	Acute			Chronic		
	Standard	Limit	Averaging Period	Standard	Limit	Averaging Period
Flow Outfall 001 (MGD)		0.5	1 day		0.35	30 days
Flow Outfall 002 (MGD)		0.25	1 day		0.16	30 days
Water quality limits apply to both Outfalls 001 and 002						
Ammonia (mg/L)						
Summer (Jul-Sep)		14			5	
Fall (Oct-Dec)	Varies	15	1 hour	Varies	9	30 days
Winter (Jan-Mar)		13			11	
Spring (Apr-Jun)		16			6	
Total Dissolved Solids (mg/L)						
November – February	6,300	6,300	1 day	4,700	4,700	30 days
March - October	4,900	4,900	1 day	3,800	3,800	30 days
Dissolved Oxygen Minimum (mg/L)	3.0	3.0	Instant	5.0	5.0	30 days
BOD_5 (mg/L)	N/A	35.0	7 day	N/A	25.0	30 days
Aluminum, Total Recoverable (µg/L)	750	*	1 hour	N/A	N/A	N/A
Selenium, Total Recoverable (µg/L)	18.4	*	1 hour	4.6	*	4 days
*: Receiving segment listed as impaired without an approved TMDL: limit to be set based on capping current load.						

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 discharge since the pollutant concentration and load is not increasing under this permit renewal.

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Documents:

WLA Document: *atk_wla_2016-11-30.docx*
Wasteload Analysis: *atk_autoliv_wla_2016.xlsm*
AMMTOX Model: *atk_autoliv_ammtox_reach_model_2014.xls*

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. 2012. *Utah Wasteload Analysis Procedures Version 1.0*.

WASTELOAD ANALYSIS [WLA] Date: 11/30/2016

Appendix A: Mass Balance Mixing Analysis for Conservative Constituents

Combined WLA for ATK and Autoliv

Discharger:	ATK Launch Systems Inc.	Autoliv
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:	1.50	cfs			
Chronic:	3.00	cfs			
Stream Hardness:	515	mg/l as CaCO3			
Effluent Flow:	ATK		Autoliv		Combined
Max. Daily	0.75	MGD	0.03	MGD	0.78
Ave. Monthly	0.51	MGD	0.03	MGD	0.54
Effluent Hardness:	300	mg/l as CaCO3			
Mixed Flow:					
Acute:	2.71	cfs	Dilution Fact.	1.24	
Chronic:	3.84	cfs	Dilution Fact.	3.59	
Mixed Hardness:	400	mg/l as CaCO3	Not to Exceed 400 mg/L		

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	563	563
Cadmium	0.76	0.851	0.64	0.13	2.49	2.92
Chromium III	268	0.860	231	6.4	1,036	1,205
ChromiumVI	11.0	1.000	11.0	6.4	27.5	27.5
Copper	30.5	0.960	29.3	4.1	120	125
Cyanide[2]	5.2	1.000	5.2	3.5	11.4	11.4
Lead	18.6	0.589	10.9	0.2	49.4	83.8
Mercury[2]	0.012	1.000	0.012	0.008	0.026	0.026
Nickel	169	0.997	168	6.7	747	750
Selenium	4.6	1.000	4.6	6.1		CL[3]
Tributylin[2]	0.072	1.000	0.072	0.048	0.16	0.16
Zinc	388	0.986	382	19	1,689	1,713

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	719	719
Cadmium	8.7	0.886	7.7	0.13	17.2	19.4
Chromium III	5612	0.316	1773	6.4	3,970	12,562
ChromiumVI	16.0	1.000	16.0	6.4	27.9	27.9
Copper	51.7	0.960	49.6	4.1	106	111
Cyanide	22.0	1.000	22.0	3.5	45.0	45.0
Iron	1000	1.000	1000	36	2,198	2,198
Lead	476.8	0.589	280.8	0.2	630	1,069
Mercury	2.400	1.000	2.400	0.008	5.373	5.373
Nickel	1516	0.998	1513	6.7	3,385	3392
Selenium	18.4	1.000	18.4	6.1	33.7	33.7
Silver	41.1	0.850	34.9	0.7	77	91
Tributylin	0.460	1.000	0.460	0.048	0.97	0.97
Zinc	388	0.978	379	19	828	846

1: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaCO_3$ 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.

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	28.9
Hydrogen Sulfide (un-disassociated)		2.0	1.0		3.2
Phenol (Maximum)		0.10	0.05		0.16

Radiological pCi/l	Chronic Standard	Acute Standard	Upstream Concentration	Chronic Effluent Limit	Acute Effluent Limit
Gross Alpha		15.00	7.50		978.3

Organics, µg/L	Chronic Standard	Acute Standard	Upstream Concentration	Chronic Effluent Limit	Acute Effluent Limit
Acrolein	3.00	3.00	1.50	8.4	4.9
Aldrin		1.50	0.75		2.4
Chlordane	0.0043	1.20	0.0022	0.0120	2.7
Chlorpyrifos	0.041	0.083	0.02		0.16
DDT, DDE	0.0010	0.55	0.0005	0.0028	1.23
Diazinon	0.17	0.17	0.09		0.28
Dieldrin	0.056	0.24	0.028	0.157	0.50
Alpha-Endosulfan	0.056	0.11	0.028	0.157	0.21
Beta-Endosulfan	0.056	0.11	0.028	0.157	0.21
Endrin	0.036	0.086	0.018	0.101	0.171
Heptachlor	0.0038	0.26	0.0019	0.0106	0.58
Heptachlor epoxide	0.0038	0.26	0.0019	0.0106	0.58
Lindane	0.08	1.00	0.04	0.22	2.19
Methoxychlor		0.03	0.02		0.05
Mirex		0.001	0.0005		0.002
Nonylphenol	6.6	28.00	3.30		58.7
Parathion	0.013	0.066	0.007		0.14
PCB's	0.014		0.007	0.039	
Pentachlorophenol (varies with pH)	15.00	19.00	7.50	41.9	33.3
Toxaphene	0.0002	0.73	0.0001	0.0006	1.64

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	194
Boron	µg/L	750	375	1452
Cadmium	µg/L	10	5	19
Chromium	µg/L	100	50	194
Copper	µg/L	200	100	387
Lead	µg/L	100	50	194
Selenium	µg/L	50	25	97

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	1432
Arsenic					
Beryllium					
Cadmium					
Chromium III					
Chromium VI					
Copper	1300	650			
Lead					
Mercury					
Nickel	100	50		4600	10256
Selenium				4200	9421
Silver					
Thallium	0.24	0.12		0.47	0.91
Zinc	7400	3700		26000	53721
Cyanide	140	70		140	227
Asbestos (million fibers/L)	7	3.5			
2,3,7,8-TCDD Dioxin	5.00E-09	2.50E-09		5.1E-09	8.33206E-09
Acrolein	6	3		9	16.5
Acrylonitrile	0.051	0.0255		0.250	0.53
Alachlor	2	1			
Atrazine	3	1.5			
Benzene	2.2	1.1		51	113
Bromoform	4.3	2.15		140	311
Carbofuran	40	20			
Carbon Tetrachloride	0.23	0.115		1.6	3.4
Chlorobenzene	100	50		1600	3527
Chlorodibromomethane	0.4	0.2		13	28.9
Chloroethane					
2-Chloroethylvinyl Ether					
Chloroform	5.7	2.85		470	1051
Dalapon	200	100			
Di(2ethylhexl)adipate	400	200			
Dibromochloropropane	0.2	0.1			
Dichlorobromomethane	0.55	0.275		17	37.8
1,1-Dichloroethane					
1,2-Dichloroethane	0.38	0.19		37	83
1,1-Dichloroethylene	7	3.5		7100	15922
Dichloroethylene (cis-1,2	70	35			
Dinose	7	3.5			
Diquat	20	10			
1,2-Dichloropropane	0.5	0.25		15	33.3
1,3-Dichloropropene	0.34	0.17		21	46.9
Endothall	100	50			
Ethylbenzene	530	265		2100	4381
Ethylene Dibromide	0.05	0.025			
Glyphosate	700	350			
Haloacetic acids	60	30			
Methyl Bromide	47	23.5		1500	3335
Methyl Chloride					
Methylene Chloride	4.6	2.3		590	1321
Ocamyl (vidate)	200	100			
Picloram	500	250			
Simazine	4	2			
Styrene	100	50			
1,1,2,2-Tetrachloroethane	0.17	0.085		4	8.9
Tetrachloroethylene	0.69	0.345		3.3	7.0
Toluene	1000	500		15000	33025
1,2 -Trans-Dichloroethyle	100	50		10000	22369
1,1,1-Trichloroethane	200	100			
1,1,2-Trichloroethane	0.59	0.295		16	35.5
Trichloroethylene	2.5	1.25		30	66
Vinyl Chloride	0.025	0.0125		2.4	5.4
Xylenes	10000	5000			
2-Chlorophenol	81	40.5		150	286
2,4-Dichlorophenol	77	38.5		290	603
2,4-Dimethylphenol	380	190		850	1670
2-Methyl-4,6-Dinitrophenol	13	6.5		280	620
2,4-Dinitrophenol	69	34.5		5300	11846
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	1922851
2,4,6-Trichlorophenol	1.4	0.7		2.4	4.5
Acenaphthene	670	335		990	1804
Acenaphthylene					
Anthracene	8300	4150		40000	84565
Benzidine	0.000086	0.000043		0.0002	0.00040
BenzoaAnthracene	0.0038	0.0019		0.018	0.03801
BenzoaPyrene	0.0038	0.0019		0.018	0.03801
BenzobFluoranthene	0.0038	0.0019		0.018	0.03801
BenzoghiPerylene					
BenzokFluoranthene	0.0038	0.0019		0.018	0.03801
Bis2-ChloroethoxyMethane					
Bis2-ChloroethylEther	0.03	0.015		0.53	1.2
Bis2-Chloroisopropy1Ether	1400	700		65000	144931
Bis2-EthylhexylPhthalate	1.2	0.6		2.2	4.2
4-Bromophenyl Phenyl Ether					
Butylbenzyl Phthalate	1500	750		1900	3330
4-Chlorophenyl Phenyl Ether					
Chrysene	0.0038	0.0019		0.018	0.03801
Dibenzoa, (h)Anthracene	0.0038	0.0019		0.018	0.03801
1,2-Dichlorobenzene	420	210		1300	2655
1,3-Dichlorobenzene	320	160		960	1954
1,4-Dichlorobenzene	63	31.5		190	387
3,3-Dichlorobenzidine	0.021	0.0105		0.028	0.04975
Diethyl Phthalate	17000	8500		44000	88130
Dimethyl Phthalate	270000	135000		1100000	2299592
Di-n-Butyl Phthalate	2000	1000		4500	8851
2,4-Dinitrotoluene	0.11	0.055		3.4	7.6
2,6-Dinitrotoluene					
Di-n-Octyl Phthalate					
1,2-Diphenylhydrazine	0.036	0.018		0.2	0.43
Fluoranthene	130	65		140	233
Fluorene	1100	550		5300	11205
Hexachlorobenzene	0.00028	0.00014		0.00029	0.00048
Hexachlorobutedine	0.44	0.22		18	40.1
Hexachloroethane	1.4	0.7		3.3	6.5
Hexachlorocyclopentadiene	40	20		1100	2443
Ideno 1,2,3-cdPyrene	0.0038	0.0019		0.018	0.03801
Isophorone	35	17.5		960	2132
Naphthalene					
Nitrobenzene	17	8.5		690	1537
N-Nitrosodimethylamine	0.00069	0.000345		3	6.7
N-Nitrosodi-n-Propylamine	0.005	0.0025		0.51	1.1
N-Nitrosodiphenylamine	3.3	1.65		6	11.4
Phenanthrene					
Pyrene	830	415		4000	8457
1,2,4-Trichlorobenzene	35	17.5		70	135
Aldrin	0.000049	0.0000245		0.00005	0.00008
alpha-BHC	0.0026	0.0013		0.0049	0.00938
beta-BHC	0.0091	0.00455		0.017	0.03248
gamma-BHC (Lindane)	0.2	0.1		1.8	3.9
delta-BHC					
Chlordane	0.0008	0.0004		0.00081	0.00132
4,4-DDT	0.00022	0.00011		0.00022	0.00036
4,4-DDE	0.00022	0.00011		0.00022	0.00036
4,4-DDD	0.00031	0.000155		0.00031	0.00050
Dieldrin	0.000052	0.000026		0.000054	0.00009
alpha-Endosulfan	62	31		89	161
beta-Endosulfan	62	31		89	161
Endosulfan Sulfate	62	31		89	161
Endrin	0.059	0.0295		0.06	0.09791
Endrin Aldehyde	0.029	0.0145		0.3	0.7
Heptachlor	0.000079	0.0000395		0.000079	0.00013
Heptachlor Epoxide	0.000039	0.0000195		0.000039	6.32405E-05
Polychlorinated Biphenyls	0.000064	0.000032		0.000064	0.00010
PCB's					
Toxaphene	0.00028	0.00014		0.00028	0.00045

Summary - Dissolved Metals, µg/L

	Class 1C Human Health (Drinking Water Only)	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			1,432.1			1,432
Arsenic				719.1	193.5	193.5
Barium						0.0
Beryllium						0.0
Cadmium				17.2	19.4	17.2
Chromium (Total)					193.5	193.5
Chromium (III)				3,970		3,970
Chromium (VI)				27.9		27.9
Copper				106.2	387.1	106.2
Cyanide			0.0	45.0		0.0
Iron				2,198		2,198
Lead				629.7	193.5	193.5
Mercury				5.4		5.4
Nickel			10,256.1	3,385		3,385
Selenium			9,421.0	33.7	96.8	33.7
Silver				77.4		77.4
Thallium						0.00
Tributylin				1.0		0.97
Zinc				827.8		827.8

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		1432.1		1,432.1
Arsenic	563	194	1.000	194
Barium		0	1.000	0
Beryllium		0.0		0.0
Cadmium	2.9	17.2	0.886	19.4
Chromium (Total)		194		194
Chromium (III)	1205	3970	0.316	12,562
Chromium (VI)	28	28	1.000	28
Copper	125	106	0.960	111
Cyanide	11.4	0		0
Iron		2198	1.000	2,198
Lead	84	194	0.589	328.6
Mercury	0.026	5.4	0.850	6.3
Nickel	749.7	3385	0.998	3,392
Selenium	CL3	34	1.000	34
Silver		77	0.850	91
Thallium		0.00		0.0
Tributyltin	0.16	0.97		1.0
Zinc	1713	828	0.978	846

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

WASTELOAD ANALYSIS [WLA] Date: 11/6/2014

Appendix B: AMMTOX Model

Discharging Facility:	ATK Launch Systems Inc. & Autoliv		
Permit Flow [MGD]:	Max. Daily	Ave. Monthly	
ATK Outfall 001	0.50	0.35	
ATK Outfall 002	0.25	0.16	
Autoliv Outfall 001	0.03	0.03	
Receiving Water:	Blue Creek		
Stream Classification:	2B, 3D, 4		
Stream Flows [cfs]:	2.4	All Seasons	Critical Low Flow
Fully Mixed:	NO		
Acute River Width:	50%		
Chronic River Width:	100%		

Modeling Information

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

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

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.

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

Model Input

Current Upstream Information

Season	Critical Low Flow cfs	Temp. Deg. C	pH Ave	NH3 mg/L as N
Summer	2.4	22.0	7.90	0.10
Fall	2.4	7.3	7.80	0.10
Winter	2.4	2.5	7.70	0.10
Spring	2.4	12.8	7.80	0.10

Projected Discharge Information

ATK Outfall 001	Flow (MGD)		Temp.	pH
Season	Max Daily	Ave Monthly	Deg. C	Ave
Summer	0.5	0.35	20.4	7.90
Fall	0.5	0.35	12.0	7.80
Winter	0.5	0.35	6.0	7.70
Spring	0.5	0.35	14.6	7.80

ATK Outfall 002	Flow (MGD)		Temp.	pH
Season	Max Daily	Ave Monthly	Deg. C	Ave
Summer	0.25	0.16	20.4	8.00
Fall	0.25	0.16	12.0	8.10
Winter	0.25	0.16	6.0	8.10
Spring	0.25	0.16	14.6	8.10

Autoliv Outfall 001	Flow (MGD)		Temp.	pH
Season	Max Daily	Ave Monthly	Deg. C	Ave
Summer	0.03	0.03	17.0	7.50
Fall	0.03	0.03	15.0	7.50
Winter	0.03	0.03	12.0	7.50
Spring	0.03	0.03	15.0	7.50

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.

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

Temperature (deg C)	Maximum
Instantaneous	27.0
Change	4.0

pH	Concentration
Minimum	6.5
Maximum	9.0

Ammonia-Total (mg/L)

	Chronic (30-day ave)			Acute (1-hour ave)		
Season	Standard	Background	Limit	Standard	Background	Limit
Summer	Varies	0.10	5.0	Varies	0.10	14.0
Fall	Varies	0.10	9.0	Varies	0.10	15.0
Winter	Varies	0.10	11.0	Varies	0.10	13.0
Spring	Varies	0.10	6.0	Varies	0.10	16.0