

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

Date: February 24, 2023

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Standards and Technical Services

Facility: Vobev, LLC.
UPDES No. UT0026247

Receiving water: Brighton Canal (2B,3E,4) → Gilbert Bay (GSL)(5A)

This addendum summarizes the 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

001 Outfall 0.1944 MGD (0.30 cfs) maximum daily discharge (design flow rate)

Receiving Water

The receiving water for Outfall 001 is Brighton Canal and then Gilbert Bay.

Beneficial uses for Brighton Canal are not specifically designated in Utah's Water Quality Standards. Therefore, the presumptive use classifications under UAC R317-2-13.9, "All irrigation canals and ditches statewide, except as otherwise designated: 2B, 3E, 4," apply.

- *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 3E -- Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.*
- *Class 4 - Protected for agricultural uses including irrigation of crops and stock watering*

Per UAC R317-2-13.11: National Wildlife Refuges and State Waterfowl Management Areas, and other Areas Associated with the Great Salt Lake

- *Class 5A – Gilbert Bay (Open Water below approximately 4,208 ft.)*

Flow

Typically, the critical flow for the wasteload analysis is considered the lowest stream flow for seven consecutive days with a ten-year return frequency (7Q10). Since no flow records were provided and based on a discussion with the canal company owner, Brighton canal might not have any background flows in the future. Under these circumstances, the facility will need to meet “end of pipe effluent” limits.

Typically, the receiving water quality is also analyzed for water quality parameters, but no data for the canal were provided therefore the wasteload analysts had to come up with some conservative assumptions.

Since the proposed plant is a new facility, the discharge characteristics could not be analyzed. The values in the WLA model are subject to change if in the future the canal company provides data.

TMDL

There are no existing impairments or TMDLs in the receiving waters. Per the Integrated Report assessment methods, canals without specifically designated uses are typically not assessed.

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.

The effluent was considered to be totally mixed as the ratio of receiving water flow (estimated 7Q10) to discharge flow was 0.003 (≤ 2).

Parameters of Concern

The potential parameters of concerns identified for the new discharge are TDS, aluminum, 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 (see Table 2), 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 Outfall 01 should be based on 99.7% effluent.

Wasteload Allocation Methods

Due to lack of data, Vobev will receive End of Pipe (EOP) limits.

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.

Documents:

WLA Document: *Vobev_WLADoc_2023.docx*

Wasteload Analysis and Addendum:

Vobev_WLA_2023.xlsm

Vobev_WLA_SOB_2023.pdf

References:

Utah Division of Water Quality. 2022. Final 2022 Integrated Report on Water Quality

Utah Division of Water Quality. 2021. Utah Wasteload Analysis Procedures Version 2.0.

Utah Division of Water Quality
Salt Lake City, Utah

WASTELOAD ANALYSIS [WLA]
Addendum: Statement of Basis

24-Feb-23
4:00 PM

Facilities: Vobev, LLC.
Discharging to: Brighton Canal->Gilbert Bay (GSL)

UPDES No: UT-26247

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 in terms 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

Brighton Canal->Gilbert Bay (GSL): 2B,3E,4,5A
Antidegradation Review: Level I review completed. Level II review 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)	5.50 mg/l (30 Day Average) 4.00 mg/l (7Day Average) 3.00 mg/l (1 Day Average)
Maximum Total Dissolved Solids	1200.0 mg/l

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Acute and Chronic Heavy Metals (Dissolved)

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aluminum	87.00 ug/l**	0.141 lbs/day	750.00	ug/l	1.218 lbs/day
Arsenic	190.00 ug/l	0.309 lbs/day	340.00	ug/l	0.552 lbs/day
Cadmium	0.56 ug/l	0.001 lbs/day	5.76	ug/l	0.009 lbs/day
Chromium III	191.91 ug/l	0.312 lbs/day	4015.05	ug/l	6.521 lbs/day
ChromiumVI	11.00 ug/l	0.018 lbs/day	16.00	ug/l	0.026 lbs/day
Copper	21.51 ug/l	0.035 lbs/day	35.16	ug/l	0.057 lbs/day
Iron			1000.00	ug/l	1.624 lbs/day
Lead	11.04 ug/l	0.018 lbs/day	283.37	ug/l	0.460 lbs/day
Mercury	0.0120 ug/l	0.000 lbs/day	2.40	ug/l	0.004 lbs/day
Nickel	119.26 ug/l	0.194 lbs/day	1072.70	ug/l	1.742 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	20.33	ug/l	0.033 lbs/day
Zinc	274.29 ug/l	0.445 lbs/day	274.29	ug/l	0.445 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 265.78 mg/l as CaCO3

Organics [Pesticides]

Parameter	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard		
	Concentration	Load*	Concentration		Load*
Aldrin			1.500	ug/l	0.002 lbs/day
Chlordane	0.004 ug/l	0.007 lbs/day	1.200	ug/l	0.002 lbs/day
DDT, DDE	0.001 ug/l	0.002 lbs/day	0.550	ug/l	0.001 lbs/day
Dieldrin	0.002 ug/l	0.003 lbs/day	1.250	ug/l	0.002 lbs/day
Endosulfan	0.056 ug/l	0.091 lbs/day	0.110	ug/l	0.000 lbs/day
Endrin	0.002 ug/l	0.004 lbs/day	0.090	ug/l	0.000 lbs/day
Guthion			0.010	ug/l	0.000 lbs/day
Heptachlor	0.004 ug/l	0.006 lbs/day	0.260	ug/l	0.000 lbs/day
Lindane	0.080 ug/l	0.130 lbs/day	1.000	ug/l	0.002 lbs/day
Methoxychlor			0.030	ug/l	0.000 lbs/day
Mirex			0.010	ug/l	0.000 lbs/day
Parathion			0.040	ug/l	0.000 lbs/day
PCB's	0.014 ug/l	0.023 lbs/day	2.000	ug/l	0.003 lbs/day
Pentachlorophenol	13.00 ug/l	21.143 lbs/day	20.000	ug/l	0.032 lbs/day
Toxephene	0.0002 ug/l	0.000 lbs/day	0.7300	ug/l	0.001 lbs/day

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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			1200.0 mg/l	0.97 tons/day

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

	4 Day Average (Chronic) Standard		1 Hour Average (Acute) Standard	
	Concentration	Load*	Concentration	Load*
Metals				
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) to			ug/l	lbs/day
Nitrates as N			ug/l	lbs/day
Chlorophenoxy Herbicides				
2,4-D			ug/l	lbs/day
2,4,5-TP			ug/l	lbs/day
Endrin			ug/l	lbs/day
hexane (Lindane)			ug/l	lbs/day
Methoxychlor			ug/l	lbs/day
Toxaphene			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	
	[2 Liters/Day for 70 Kg Person over 70 Yr.]		[6.5 g for 70 Kg Person over 70 Yr.]	
Toxic Organics				
Acenaphthene	ug/l	lbs/day	2700.0 ug/l	4.39 lbs/day
Acrolein	ug/l	lbs/day	780.0 ug/l	1.27 lbs/day
Acrylonitrile	ug/l	lbs/day	0.7 ug/l	0.00 lbs/day
Benzene	ug/l	lbs/day	71.0 ug/l	0.12 lbs/day
Benzidine	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Carbon tetrachloric	ug/l	lbs/day	4.4 ug/l	0.01 lbs/day
Chlorobenzene	ug/l	lbs/day	21000.0 ug/l	34.15 lbs/day
1,2,4-Trichlorobenzene				
Hexachlorobenzen	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Dichloroethane	ug/l	lbs/day	99.0 ug/l	0.16 lbs/day
1,1,1-Trichloroethane				
Hexachloroethane	ug/l	lbs/day	8.9 ug/l	0.01 lbs/day
1,1-Dichloroethane				
1,1,2-Trichloroethane	ug/l	lbs/day	42.0 ug/l	0.07 lbs/day
1,1,2,2-Tetrachloroethane	ug/l	lbs/day	11.0 ug/l	0.02 lbs/day
Chloroethane			0.0 ug/l	0.00 lbs/day
Bis(2-chloroethyl) ether	ug/l	lbs/day	1.4 ug/l	0.00 lbs/day
2-Chloroethyl vinyl ether	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
2-Chloronaphthalene	ug/l	lbs/day	4300.0 ug/l	6.99 lbs/day
2,4,6-Trichlorophenol	ug/l	lbs/day	6.5 ug/l	0.01 lbs/day
p-Chloro-m-cresol			0.0 ug/l	0.00 lbs/day
Chloroform (HM)	ug/l	lbs/day	470.0 ug/l	0.76 lbs/day
2-Chlorophenol	ug/l	lbs/day	400.0 ug/l	0.65 lbs/day
1,2-Dichlorobenzene	ug/l	lbs/day	17000.0 ug/l	27.65 lbs/day
1,3-Dichlorobenzene	ug/l	lbs/day	2600.0 ug/l	4.23 lbs/day
1,4-Dichlorobenzene	ug/l	lbs/day	2600.0 ug/l	4.23 lbs/day
3,3'-Dichlorobenzidine	ug/l	lbs/day	0.1 ug/l	0.00 lbs/day
1,1-Dichloroethylene	ug/l	lbs/day	3.2 ug/l	0.01 lbs/day
1,2-trans-Dichloroethene	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day

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2,4-Dichloropheno	ug/l	lbs/day	790.0 ug/l	1.28 lbs/day
1,2-Dichloropropan	ug/l	lbs/day	39.0 ug/l	0.06 lbs/day
1,3-Dichloropropyl	ug/l	lbs/day	1700.0 ug/l	2.76 lbs/day
2,4-Dimethylphenc	ug/l	lbs/day	2300.0 ug/l	3.74 lbs/day
2,4-Dinitrotoluene	ug/l	lbs/day	9.1 ug/l	0.01 lbs/day
2,6-Dinitrotoluene	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
1,2-Diphenylhydra:	ug/l	lbs/day	0.5 ug/l	0.00 lbs/day
Ethylbenzene	ug/l	lbs/day	29000.0 ug/l	47.16 lbs/day
Fluoranthene	ug/l	lbs/day	370.0 ug/l	0.60 lbs/day
4-Chlorophenyl phenyl ether				
4-Bromophenyl phenyl ether				
Bis(2-chloroisopro	ug/l	lbs/day	170000.0 ug/l	2.76E+02 lbs/day
Bis(2-chloroethoxy	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Methylene chloride	ug/l	lbs/day	1600.0 ug/l	2.60 lbs/day
Methyl chloride (H	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Methyl bromide (H	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Bromoform (HM)	ug/l	lbs/day	360.0 ug/l	0.59 lbs/day
Dichlorobromomet	ug/l	lbs/day	22.0 ug/l	0.04 lbs/day
Chlorodibromomet	ug/l	lbs/day	34.0 ug/l	0.06 lbs/day
Hexachlorobutadie	ug/l	lbs/day	50.0 ug/l	0.08 lbs/day
Hexachlorocyclope	ug/l	lbs/day	17000.0 ug/l	27.65 lbs/day
Isophorone	ug/l	lbs/day	600.0 ug/l	0.98 lbs/day
Naphthalene				
Nitrobenzene	ug/l	lbs/day	1900.0 ug/l	3.09 lbs/day
2-Nitrophenol	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4-Nitrophenol	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
2,4-Dinitrophenol	ug/l	lbs/day	14000.0 ug/l	22.77 lbs/day
4,6-Dinitro-o-creso	ug/l	lbs/day	765.0 ug/l	1.24 lbs/day
N-Nitrosodimethyl	ug/l	lbs/day	8.1 ug/l	0.01 lbs/day
N-Nitrosodiphenyl	ug/l	lbs/day	16.0 ug/l	0.03 lbs/day
N-Nitrosodi-n-prop	ug/l	lbs/day	1.4 ug/l	0.00 lbs/day
Pentachlorophenol	ug/l	lbs/day	8.2 ug/l	0.01 lbs/day
Phenol	ug/l	lbs/day	4.6E+06 ug/l	7.48E+03 lbs/day
Bis(2-ethylhexyl)pf	ug/l	lbs/day	5.9 ug/l	0.01 lbs/day
Butyl benzyl phthal	ug/l	lbs/day	5200.0 ug/l	8.46 lbs/day
Di-n-butyl phthalat	ug/l	lbs/day	12000.0 ug/l	19.52 lbs/day
Di-n-octyl phthlate				
Diethyl phthalate	ug/l	lbs/day	120000.0 ug/l	195.16 lbs/day
Dimethyl phthlate	ug/l	lbs/day	2.9E+06 ug/l	4.72E+03 lbs/day
Benzo(a)anthracen	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(a)pyrene (F	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(b)fluoranth	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Benzo(k)fluoranth	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Chrysene (PAH)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Acenaphthylene (PAH)				
Anthracene (PAH)	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Dibenzo(a,h)anthrac	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Indeno(1,2,3-cd)py	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Pyrene (PAH)	ug/l	lbs/day	11000.0 ug/l	17.89 lbs/day
Tetrachloroethylen	ug/l	lbs/day	8.9 ug/l	0.01 lbs/day
Toluene	ug/l	lbs/day	200000 ug/l	325.27 lbs/day
Trichloroethylene	ug/l	lbs/day	81.0 ug/l	0.13 lbs/day
Vinyl chloride	ug/l	lbs/day	525.0 ug/l	0.85 lbs/day
				lbs/day
				lbs/day
Pesticides				
Aldrin	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Dieldrin	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Chlordane	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDT	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDE	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
4,4'-DDD	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
alpha-Endosulfan	ug/l	lbs/day	2.0 ug/l	0.00 lbs/day
beta-Endosulfan	ug/l	lbs/day	2.0 ug/l	0.00 lbs/day
Endosulfan sulfate	ug/l	lbs/day	2.0 ug/l	0.00 lbs/day
Endrin	ug/l	lbs/day	0.8 ug/l	0.00 lbs/day
Endrin aldehyde	ug/l	lbs/day	0.8 ug/l	0.00 lbs/day
Heptachlor	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
Heptachlor epoxide				

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PCB's

PCB 1242 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1254 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1221 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1232 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1248 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1260 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day
PCB-1016 (Arochl	ug/l	lbs/day	0.0 ug/l	0.00 lbs/day

Pesticide

Toxaphene	ug/l		0.0 ug/l	0.00 lbs/day
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Dioxin

Dioxin (2,3,7,8-TCI	ug/l	lbs/day		
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Metals

Antimony	ug/l	lbs/day		
Arsenic	ug/l	lbs/day	4300.00 ug/l	6.99 lbs/day
Asbestos	ug/l	lbs/day		
Beryllium				
Cadmium				
Chromium (III)				
Chromium (VI)				
Copper				
Cyanide	ug/l	lbs/day	2.2E+05 ug/l	357.80 lbs/day
Lead	ug/l	lbs/day		
Mercury			0.15 ug/l	0.00 lbs/day
Nickel			4600.00 ug/l	7.48 lbs/day
Selenium	ug/l	lbs/day		
Silver	ug/l	lbs/day		
Thallium			6.30 ug/l	0.01 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.

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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	Temp.	pH	T-NH3	BOD5	DO	TRC	TDS
	cfs	Deg. C		mg/l as N	mg/l	mg/l	mg/l	mg/l
mer (Irrig. Season)	0.00	23.7	8.7	0.03	1.50	---	0.00	500.0
Fall	0.01	9.6	8.7	0.03	1.50	11.31	0.00	500.0
Winter	0.01	5.7	8.7	0.03	1.50	---	0.00	500.0
Spring	0.01	14.3	8.7	0.03	1.50	---	0.00	500.0
Dissolved Metals	Al	As	Cd	CrIII	CrVI	Copper	Fe	Pb
All Seasons	ug/l 2.385*	ug/l 0.795*	ug/l 0.0795*	ug/l 0.795*	ug/l 3.975*	ug/l 0.8*	ug/l 1.25*	ug/l 0.795*
Dissolved Metals	Hg	Ni	Se	Ag	Zn	Boron		
All Seasons	ug/l 0.0795*	ug/l 0.795*	ug/l 1.59*	ug/l 0.15*	ug/l 0.0795*	ug/l 1.59*		* ~80% MDL

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Projected Discharge Information

Season	Flow, MGD	Temp.
Summer	0.19440	15.0
Fall	0.19440	15.0
Winter	0.19440	15.0
Spring	0.19440	15.0

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	0.194 MGD	0.301 cfs
Fall	0.194 MGD	0.301 cfs
Winter	0.194 MGD	0.301 cfs
Spring	0.194 MGD	0.301 cfs

Flow Requirement or Loading Requirement

The calculations in this wasteload analysis utilize the maximum effluent discharge flow of 0.1944 MGD. If the discharger is allowed to have a flow greater than 0.1944 MGD during 7Q10 conditions, and effluent limit concentrations as indicated, then water quality standards will be violated. In order to prevent this from occurring, the permit writers must include the discharge flow limitation as indicated above; or, include loading effluent limits in the permit.

Effluent Limitation for Whole Effluent Toxicity (WET) based upon WET Policy

Effluent Toxicity will not occur in downstream segments if the values below are met.

WET Requirements	LC50 >	100.0% Effluent	[Acute]
	IC25 >	99.7% Effluent	[Chronic]

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Salt Lake City, Utah**

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	2.01 mg/l as N	3.3	lbs/day
	1 Hour Avg. - Acute	6.0 mg/l as N	9.8	lbs/day
Fall	4 Day Avg. - Chronic	2.0 mg/l as N	3.3	lbs/day
	1 Hour Avg. - Acute	6.1 mg/l as N	9.9	lbs/day
Winter	4 Day Avg. - Chronic	2.0 mg/l as N	3.3	lbs/day
	1 Hour Avg. - Acute	6.1 mg/l as N	9.8	lbs/day
Spring	4 Day Avg. - Chronic	2.0 mg/l as N	3.3	lbs/day
	1 Hour Avg. - Acute	6.1 mg/l as N	9.9	lbs/day

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

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Salt Lake City, Utah**

Effluent Limitations for Total Dissolved Solids based upon Water Quality Standards

Season		Concentration		Load	
Summer	Maximum, Acute	1202.3	mg/l	0.97	tons/day
Fall	Maximum, Acute	1223.3	mg/l	0.99	tons/day
Winter	Maximum, Acute	1223.3	mg/l	0.99	tons/day
Spring	Maximum, Acute	1223.3	mg/l	0.99	tons/day

Colorado Salinity Forum Limits

Determined by Permitting Section

Effluent Limitations for Total Recoverable Metals based upon Water Quality Standards

In-stream criteria of downstream segments for Dissolved Metals will be met with an effluent limitation as follows (based upon a hardness of 265.78 mg/l):

	4 Day Average		1 Hour Average		
	Concentration	Load	Concentration		Load
Aluminum*	N/A	N/A	752.5	ug/l	1.2 lbs/day
Arsenic*	190.63 ug/l	0.2 lbs/day	341.1	ug/l	0.6 lbs/day
Cadmium	0.56 ug/l	0.0 lbs/day	5.8	ug/l	0.0 lbs/day
Chromium III	192.54 ug/l	0.2 lbs/day	4,028.4	ug/l	6.5 lbs/day
Chromium VI*	11.02 ug/l	0.0 lbs/day	16.0	ug/l	0.0 lbs/day
Copper	21.58 ug/l	0.0 lbs/day	35.3	ug/l	0.1 lbs/day
Iron*	N/A	N/A	301.7	ug/l	0.5 lbs/day
Lead	11.08 ug/l	0.0 lbs/day	284.3	ug/l	0.5 lbs/day
Mercury*	0.01 ug/l	0.0 lbs/day	2.4	ug/l	0.0 lbs/day
Nickel	119.66 ug/l	0.1 lbs/day	1,076.3	ug/l	1.7 lbs/day
Selenium*	4.61 ug/l	0.0 lbs/day	20.1	ug/l	0.0 lbs/day
Silver	N/A ug/l	N/A lbs/day	20.4	ug/l	0.0 lbs/day
Zinc	275.20 ug/l	0.3 lbs/day	275.2	ug/l	0.4 lbs/day
Cyanide*	5.22 ug/l	0.0 lbs/day	22.1	ug/l	0.0 lbs/day

*Limits for these metals are based on the dissolved standard.

Effluent Limitations for Heat/Temperature based upon Water Quality Standards

Summer	27.7 Deg. C.	81.8 Deg. F
Fall	13.8 Deg. C.	56.8 Deg. F
Winter	9.8 Deg. C.	49.7 Deg. F
Spring	18.4 Deg. C.	65.2 Deg. F

**Utah Division of Water Quality
Salt Lake City, Utah**

**Effluent Limitations for Organics [Pesticides]
Based upon Water Quality Standards**

In-stream criteria of downstream segments for Organics [Pesticides]
will be met with an effluent limit as follows:

	4 Day Average		1 Hour Average		
	Concentration	Load	Concentration		Load
Aldrin			1.5E+00	ug/l	3.77E-03 lbs/day
Chlordane	4.30E-03 ug/l	6.97E-03 lbs/day	1.2E+00	ug/l	3.02E-03 lbs/day
DDT, DDE	1.00E-03 ug/l	1.62E-03 lbs/day	5.5E-01	ug/l	1.38E-03 lbs/day
Dieldrin	1.90E-03 ug/l	3.08E-03 lbs/day	1.3E+00	ug/l	3.14E-03 lbs/day
Endosulfan	5.60E-02 ug/l	9.08E-02 lbs/day	1.1E-01	ug/l	2.76E-04 lbs/day
Endrin	2.30E-03 ug/l	3.73E-03 lbs/day	9.0E-02	ug/l	2.26E-04 lbs/day
Guthion	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	2.51E-05 lbs/day
Heptachlor	3.80E-03 ug/l	6.16E-03 lbs/day	2.6E-01	ug/l	6.53E-04 lbs/day
Lindane	8.00E-02 ug/l	1.30E-01 lbs/day	1.0E+00	ug/l	2.51E-03 lbs/day
Methoxychlor	0.00E+00 ug/l	0.00E+00 lbs/day	3.0E-02	ug/l	7.54E-05 lbs/day
Mirex	0.00E+00 ug/l	0.00E+00 lbs/day	1.0E-02	ug/l	2.51E-05 lbs/day
Parathion	0.00E+00 ug/l	0.00E+00 lbs/day	4.0E-02	ug/l	1.01E-04 lbs/day
PCB's	1.40E-02 ug/l	2.27E-02 lbs/day	2.0E+00	ug/l	5.03E-03 lbs/day
Pentachlorophenol	1.30E+01 ug/l	2.11E+01 lbs/day	2.0E+01	ug/l	5.03E-02 lbs/day
Toxephene	2.00E-04 ug/l	3.24E-04 lbs/day	7.3E-01	ug/l	1.83E-03 lbs/day

**Utah Division of Water Quality
Salt Lake City, Utah**

**Effluent Limitations for Protection of Human Health [Toxics Rule]
Based upon Water Quality Standards (Most stringent of 1C or 3A & 3B as appropriate.)**

In-stream criteria of downstream segments for Protection of Human Health [Toxics] will be met with an effluent limit as follows:

Toxic Organics	Concentration	Maximum Concentration Load
Acenaphthene	2.71E+03 ug/l	4.39E+00 lbs/day
Acrolein	7.83E+02 ug/l	1.27E+00 lbs/day
Acrylonitrile	6.62E-01 ug/l	1.07E-03 lbs/day
Benzene	7.12E+01 ug/l	1.15E-01 lbs/day
Benzidine	ug/l	lbs/day
Carbon tetrachloride	4.41E+00 ug/l	7.16E-03 lbs/day
Chlorobenzene	2.11E+04 ug/l	3.42E+01 lbs/day
1,2,4-Trichlorobenzene		
Hexachlorobenzene	7.73E-04 ug/l	1.25E-06 lbs/day
1,2-Dichloroethane	9.93E+01 ug/l	1.61E-01 lbs/day
1,1,1-Trichloroethane		
Hexachloroethane	8.93E+00 ug/l	1.45E-02 lbs/day
1,1-Dichloroethane		
1,1,2-Trichloroethane	4.21E+01 ug/l	6.83E-02 lbs/day
1,1,2,2-Tetrachloroethane	1.10E+01 ug/l	1.79E-02 lbs/day
Chloroethane		
Bis(2-chloroethyl) ether	1.40E+00 ug/l	2.28E-03 lbs/day
2-Chloroethyl vinyl ether		
2-Chloronaphthalene	4.31E+03 ug/l	6.99E+00 lbs/day
2,4,6-Trichlorophenol	6.52E+00 ug/l	1.06E-02 lbs/day
p-Chloro-m-cresol		
Chloroform (HM)	4.72E+02 ug/l	7.64E-01 lbs/day
2-Chlorophenol	4.01E+02 ug/l	6.51E-01 lbs/day
1,2-Dichlorobenzene	1.71E+04 ug/l	2.76E+01 lbs/day
1,3-Dichlorobenzene	2.61E+03 ug/l	4.23E+00 lbs/day
1,4-Dichlorobenzene	2.61E+03 ug/l	4.23E+00 lbs/day
3,3'-Dichlorobenzidine	7.73E-02 ug/l	1.25E-04 lbs/day
1,1-Dichloroethylene	3.21E+00 ug/l	5.20E-03 lbs/day
1,2-trans-Dichloroethylene1		
2,4-Dichlorophenol	7.93E+02 ug/l	1.28E+00 lbs/day
1,2-Dichloropropane	3.91E+01 ug/l	6.34E-02 lbs/day
1,3-Dichloropropylene	1.71E+03 ug/l	2.76E+00 lbs/day
2,4-Dimethylphenol	2.31E+03 ug/l	3.74E+00 lbs/day
2,4-Dinitrotoluene	9.13E+00 ug/l	1.48E-02 lbs/day
2,6-Dinitrotoluene		
1,2-Diphenylhydrazine	5.42E-01 ug/l	8.78E-04 lbs/day
Ethylbenzene	2.91E+04 ug/l	4.72E+01 lbs/day
Fluoranthene	3.71E+02 ug/l	6.02E-01 lbs/day
4-Chlorophenyl phenyl ether		
4-Bromophenyl phenyl ether		
Bis(2-chloroisopropyl) ether	1.71E+05 ug/l	2.76E+02 lbs/day
Bis(2-chloroethoxy) methane		
Methylene chloride (HM)	1.61E+03 ug/l	2.60E+00 lbs/day
Methyl chloride (HM)		
Methyl bromide (HM)		
Bromoform (HM)	3.61E+02 ug/l	5.85E-01 lbs/day
Dichlorobromomethane(HM)	2.21E+01 ug/l	3.58E-02 lbs/day
Chlorodibromomethane (HM)	3.41E+01 ug/l	5.53E-02 lbs/day
Hexachlorocyclopentadiene	1.71E+04 ug/l	2.76E+01 lbs/day
Isophorone	6.02E+02 ug/l	9.76E-01 lbs/day
Naphthalene		
Nitrobenzene	1.91E+03 ug/l	3.09E+00 lbs/day
2-Nitrophenol		
4-Nitrophenol		
2,4-Dinitrophenol	1.40E+04 ug/l	2.28E+01 lbs/day
4,6-Dinitro-o-cresol	7.68E+02 ug/l	1.24E+00 lbs/day
N-Nitrosodimethylamine	8.13E+00 ug/l	1.32E-02 lbs/day
N-Nitrosodiphenylamine	1.61E+01 ug/l	2.60E-02 lbs/day
N-Nitrosodi-n-propylamine	1.40E+00 ug/l	2.28E-03 lbs/day
Pentachlorophenol	8.23E+00 ug/l	1.33E-02 lbs/day

**Utah Division of Water Quality
Salt Lake City, Utah**

Phenol	4.62E+06 ug/l	7.48E+03 lbs/day
Bis(2-ethylhexyl)phthalate	5.92E+00 ug/l	9.60E-03 lbs/day
Butyl benzyl phthalate	5.22E+03 ug/l	8.46E+00 lbs/day
Di-n-butyl phthalate	1.20E+04 ug/l	1.95E+01 lbs/day
Di-n-octyl phthalate		
Diethyl phthalate	1.20E+05 ug/l	1.95E+02 lbs/day
Dimethyl phthalate	2.91E+06 ug/l	4.72E+03 lbs/day
Benzo(a)anthracene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Benzo(a)pyrene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Benzo(b)fluoranthene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Benzo(k)fluoranthene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Chrysene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Acenaphthylene (PAH)		
Anthracene (PAH)		
Dibenzo(a,h)anthracene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Indeno(1,2,3-cd)pyrene (PAH)	3.11E-02 ug/l	5.04E-05 lbs/day
Pyrene (PAH)	1.10E+04 ug/l	1.79E+01 lbs/day
Tetrachloroethylene	8.93E+00 ug/l	1.45E-02 lbs/day
Toluene	2.01E+05 ug/l	3.25E+02 lbs/day
Trichloroethylene	8.13E+01 ug/l	1.32E-01 lbs/day
Vinyl chloride	5.27E+02 ug/l	8.54E-01 lbs/day
Pesticides		
Aldrin	1.40E-04 ug/l	2.28E-07 lbs/day
Dieldrin	1.40E-04 ug/l	2.28E-07 lbs/day
Chlordane	5.92E-04 ug/l	9.60E-07 lbs/day
4,4'-DDT	5.92E-04 ug/l	9.60E-07 lbs/day
4,4'-DDE	5.92E-04 ug/l	9.60E-07 lbs/day
4,4'-DDD	8.43E-04 ug/l	1.37E-06 lbs/day
alpha-Endosulfan	2.01E+00 ug/l	3.25E-03 lbs/day
beta-Endosulfan	2.01E+00 ug/l	3.25E-03 lbs/day
Endosulfan sulfate	2.01E+00 ug/l	3.25E-03 lbs/day
Endrin	8.13E-01 ug/l	1.32E-03 lbs/day
Endrin aldehyde	8.13E-01 ug/l	1.32E-03 lbs/day
Heptachlor	2.11E-04 ug/l	3.42E-07 lbs/day
Heptachlor epoxide		
PCB's		
PCB 1242 (Arochlor 1242)	4.51E-05 ug/l	7.32E-08 lbs/day
PCB-1254 (Arochlor 1254)	4.51E-05 ug/l	7.32E-08 lbs/day
PCB-1221 (Arochlor 1221)	4.51E-05 ug/l	7.32E-08 lbs/day
PCB-1232 (Arochlor 1232)	4.51E-05 ug/l	7.32E-08 lbs/day
PCB-1248 (Arochlor 1248)	4.51E-05 ug/l	7.32E-08 lbs/day
PCB-1260 (Arochlor 1260)	4.51E-05 ug/l	7.32E-08 lbs/day
PCB-1016 (Arochlor 1016)	4.51E-05 ug/l	7.32E-08 lbs/day
Pesticide		
Toxaphene	7.52E-04 ug/l	1.22E-06 lbs/day

**Utah Division of Water Quality
Salt Lake City, Utah**

Metals

Antimony	ug/l	lbs/day
Arsenic	ug/l	lbs/day
Asbestos	ug/l	lbs/day
Beryllium		
Cadmium		
Chromium (III)		
Chromium (VI)		
Copper	ug/l	lbs/day
Cyanide	ug/l	lbs/day
Lead		
Mercury	ug/l	lbs/day
Nickel	ug/l	lbs/day
Selenium		
Silver		
Thallium	ug/l	lbs/day
Zinc		

Dioxin

Dioxin (2,3,7,8-TCDD)	1.40E-08 ug/l	2.28E-11 lbs/day
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**Metals Effluent Limitations for Protection of All Beneficial Uses
Based upon Water Quality Standards and Toxics Rule**

	Class 4 Acute Agricultural ug/l	Class 3 Acute Aquatic Wildlife ug/l	Acute Toxics Drinking Water Source ug/l	Acute Toxics Wildlife ug/l	1C Acute Health Criteria ug/l	Acute Most Stringent ug/l	Class 3 Chronic Aquatic Wildlife ug/l
Aluminum		752.5				752.5	N/A
Antimony				4314.3		4314.3	
Arsenic	100.3	341.1				100.3	190.6
Barium							
Beryllium						0.0	
Cadmium	10.0	5.8				5.8	0.6
Chromium (III)		4028.4				4028.4	192.5
Chromium (VI)	100.3	16.0				16.04	11.02
Copper	200.7	35.3				35.3	21.6
Cyanide		22.1	220731.5			22.1	5.2
Iron		301.7				301.7	
Lead	100.3	284.3				100.3	11.1
Mercury		2.41		0.15		0.15	0.012
Nickel		1076.3		4615.3		1076.3	119.7
Selenium	50.2	20.1				20.1	4.6
Silver		20.4				20.4	
Thallium				6.3		6.3	
Zinc		275.2				275.2	275.2
Boron	752.5					752.5	
Sulfate	2006.7					2006.7	

**Utah Division of Water Quality
Salt Lake City, Utah**

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	
Aluminum	752.5	N/A	
Antimony	4314.30		
Arsenic	100.3	190.6	Acute Controls
Asbestos			
Barium			
Beryllium			
Cadmium	5.8	0.6	
Chromium (III)	4028.4	193	
Chromium (VI)	16.0	11.0	
Copper	35.3	21.6	
Cyanide	22.1	5.2	
Iron	301.7		
Lead	100.3	11.1	
Mercury	0.150	0.012	
Nickel	1076.3	120	
Selenium	20.1	4.6	
Silver	20.4	N/A	
Thallium	6.3		
Zinc	275.2	275.2	
Boron	752.49		
Sulfate	2006.7		N/A at this Waterbody

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.

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 required. The proposed permit is an increase in flow or concentration.

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 downstream segments, will not occur for the evaluated parameters of concern as discussed above if the effluent limitations indicated above are met.

WASTELOAD ANALYSIS [WLA]
Appendix C: Total Residual Chlorine

Date: 5/10/2023

Discharging Facility: Vobev, LLC.
 UPDES No: UT-0026247
 Permit Flow [MGD]: 0.19 Annual Max. Daily
 0.19 Annual Max. Monthly

Comment:

CHRONIC

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day)		Travel Time (min)	Decay Coefficient	Effluent Limit
								@ 20 deg C	@ T deg C			
Discharge (cfs)	Summer	0.001		0.3	0.3							
	Fall	0.001		0.3	0.3							
	Winter	0.001		0.3	0.3							
	Spring	0.001		0.3	0.3							
TRC (mg/L)	Summer	0.000	0.011			0.011	23.7	20	23.7	300	0.01	1.526
	Fall	0.000	0.011			0.011	9.6	20	12.4	300	0.08	0.147
	Winter	0.000	0.011			0.011	5.7	20	10.4	300	0.12	0.096
	Spring	0.000	0.011			0.011	14.3	20	15.4	300	0.04	0.273

ACUTE

	Season	Receiving Water	Standard	Total Effluent	Mixing Zone Boundary	Effluent Limit Without Decay	Temperature (°C)	Decay Rate (/day)		Travel Time (min)	Decay Coefficient	Effluent Limit
								@ 20 °C	@ T °C			
Discharge (cfs)	Summer	0.0005		0.3	0.3							
	Fall	0.0005		0.3	0.3							
	Winter	0.0005		0.3	0.3							
	Spring	0.0005		0.3	0.3							
TRC (mg/L)	Summer	0.000	0.019			0.019	23.7	20	23.7	300	0.01	2.632
	Fall	0.000	0.019			0.019	9.6	20	12.4	300	0.08	0.253
	Winter	0.000	0.019			0.019	5.7	20	10.4	300	0.12	0.165
	Spring	0.000	0.019			0.019	14.3	20	15.4	300	0.04	0.471

	Q=VxA	Q	0.3 ft3/s
assumed	diameter	Area	10 inch
	Area	pr ²	78.5 inch sq
			0.55 ft sq
	Velocity	Q/A	0.5454545 ft/sec
roughly estimated google earth	distance to fresh H2O body		10000 ft
	time		18333.333 sec
rounded it to 300	time in min		305.55556 ~300