

**DOCKETED**

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**APPENDIX 5.1A**

**Emission Calculations for Operation Phase**

**Appendix 5.1A - Table 1**  
**Emissions Calculations for Criteria Pollutants and Greenhouse Gases from One Diesel Emergency Generator**  
**Operation Phase**  
**Hydrostor - Gem Site**

Criteria and Regulated Pollutants	CAS	Engine Size (bkW) <sup>a</sup>	Engine Size (bhp)	Emission Factors <sup>b</sup>		Annual Hours of Operation <sup>c</sup>	Hourly Emissions (lb/hr)	Annual Emissions (tons/yr) One Diesel Generator	Annual Emissions (tons/yr) Two Diesel Generators	
				Value	Unit					
PM <sub>10</sub>	85101	5580	7483	0.020	g/bhp-hr	200	0.330	0.033	0.066	
PM <sub>2.5</sub> <sup>d</sup>	88101	5580	7483	0.020	g/bhp-hr	200	0.330	0.033	0.066	
NO <sub>x</sub>	42603	5580	7483	0.500	g/bhp-hr	200	8.248	0.825	1.650	
CO	42101	5580	7483	2.600	g/bhp-hr	200	42.892	4.289	8.578	
SO <sub>2</sub> <sup>e</sup>	42401	5580	7483	0.00001	lb/hp-hr	200	0.091	0.009	0.018	
VOC	43104	5580	7483	0.770	g/bkW-hr	200	9.472	0.947	1.894	
<b>Greenhouse Gases (GHGs)</b>										
Greenhouse Gases (GHGs)	Fuel Consumption (g/bkW-hr) <sup>a</sup>	Fuel Density (lb/gal) <sup>a</sup>	Heating Value for Diesel (MMBtu/gal) <sup>f</sup>	Emission Factor (Kg/MMBtu) <sup>g</sup>	Global Warming Potential (GWP)	Emission Rate (lb/hr)	Annual Operating Hours	Emission Rate (lb/hr CO <sub>2</sub> e)	Annual Emissions (TPY CO <sub>2</sub> e) One Diesel Generator	Annual Emissions (TPY CO <sub>2</sub> e) Two Diesel Generators
Carbon dioxide (CO <sub>2</sub> )	197.3	7.001	0.137	73.96	1	7,744.301	200	7,744	774	1,548.86
Methane (CH <sub>4</sub> )	197.3	7.001	0.137	0.003	25	0.314	200	7.85	0.79	1.57
Nitrous oxide (N <sub>2</sub> O)	197.3	7.001	0.137	0.0006	298	0.063	200	18.72	1.87	3.74
<b>Total</b>								7,770.88	777.09	1,554

<sup>a</sup> Based on manufacturer specifications (CAT 2012).

<sup>b</sup> VOC emissions factors are based on emission data from manufacturer specifications (not-to-exceed). CO, NO<sub>x</sub> and PM emission factors are based on BACT Guideline for IC Engine-Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump (≥ 1000 BHP Output), Bay Area Air Quality Management District (December 2020). SO<sub>2</sub> emission factor is based on AP 42, Chapter 3.4 - Large Stationary Diesel Engines, Table 3.4-1.

<sup>c</sup> Emergency engines are limited to 200 hours of operation according to Kern County APCD.

<sup>d</sup> PM<sub>2.5</sub> assumed equal to PM<sub>10</sub>

<sup>e</sup> SO<sub>2</sub> emission factor were calculated based on emission factor from AP-42, Section 3.4, Table 3.4-1 and maximum of 15 ppm sulfur content (0.0015%)

<sup>f</sup> Heating value for diesel fuel is based on typical parameters of various fuels, AP-42 - Appendix A.

<sup>g</sup> Emission factors from 40 CFR 98 Table C-1 and C-2.

**APPENDIX 5.1B**

**Emission Calculations for Construction Phase**

## Emission Inventory for Construction (On-Site) for Annual Dispersion Modeling

**EMISSIONS SUMMARY - CRITERIA POLLUTANTS  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate			
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Non-Stationary Sources</b>																
<b>Unpaved Roads</b>																
UP1	Cavern Works	Workforce (Site Clearing) - Cavern Works	0.1	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP2	Cavern Works	Equipment mobilization - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP3	Cavern Works	Equipment demobilization - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP4	Cavern Works	Fuel delivery - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP5	Cavern Works	Fencing delivery - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP6	Cavern Works	Concrete trucks - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP7	Cavern Works	Gravel delivery - Cavern Works	0.8	0.1	0.1	0.0	-	-	-	-	-	-	-	-		
UP8	Cavern Works	Trailer delivery - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	0.1	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.1	0.2	0.0	0.0	-	-	-	-	-	-	-	-		
UP11	Cavern Works	Workforce (Mining) - Cavern Works	0.2	1.0	0.0	0.1	-	-	-	-	-	-	-	-		
UP12	Cavern Works	Surface equipment (mobilization) - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP13	Cavern Works	Subsurface equipment (mobilization) - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP14	Cavern Works	Ground support - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP15	Cavern Works	Explosives - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP16	Cavern Works	Transportation of waste rock - Cavern Works	1.2	4.9	0.1	0.5	-	-	-	-	-	-	-	-		
UP17	Surface Works	Workforce - Surface Works	0.5	1.3	0.0	0.1	-	-	-	-	-	-	-	-		
UP18	Surface Works	Site clearing (overburden) - Surface Works	0.3	0.5	0.0	0.0	-	-	-	-	-	-	-	-		
UP19	Surface Works	Civil foundation excavation Surface Works	0.2	0.2	0.0	0.0	-	-	-	-	-	-	-	-		
UP20	Surface Works	Cement Trucks Surface Works	0.4	0.1	0.0	0.0	-	-	-	-	-	-	-	-		
UP21	Surface Works	Equipment and material delivery Surface Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.1	0.3	0.0	0.0	-	-	-	-	-	-	-	-		
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	0.5	2.0	0.0	0.2	-	-	-	-	-	-	-	-		
<b>Total Unpaved</b>			<b>4.51</b>	<b>10.74</b>	<b>0.45</b>	<b>1.07</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>																
UP1	Cavern Works	Workforce (Site Clearing) - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.024	0.002	0.000	0.000		
UP2	Cavern Works	Equipment mobilization - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP3	Cavern Works	Equipment demobilization - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP4	Cavern Works	Fuel delivery - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP5	Cavern Works	Fencing delivery - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP6	Cavern Works	Concrete trucks - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
UP7	Cavern Works	Gravel delivery - Cavern Works	0.0004	0.000	0.000	0.000	0.021	0.002	0.002	0.000	0.009	0.001	0.000	0.000		
UP8	Cavern Works	Trailer delivery - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.037	0.001	0.001	0.000		
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.001	0.001	0.000	0.000		
UP11	Cavern Works	Workforce (Mining) - Cavern Works	0.0001	0.000	0.000	0.000	0.005	0.002	0.002	0.001	0.112	0.041	0.002	0.001		
UP12	Cavern Works	Surface equipment (mobilization) - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP13	Cavern Works	Subsurface equipment (mobilization) - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP14	Cavern Works	Ground support - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP15	Cavern Works	Explosives - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP16	Cavern Works	Transportation of waste rock - Cavern Works	0.0005	0.002	0.000	0.001	0.012	0.053	0.001	0.001	0.005	0.023	0.000	0.000		
UP17	Surface Works	Workforce - Surface Works	0.0002	0.000	0.000	0.000	0.009	0.002	0.005	0.001	0.225	0.054	0.004	0.001		
UP18	Surface Works	Site clearing (overburden) - Surface Works	0.0002	0.000	0.000	0.000	0.007	0.005	0.001	0.000	0.003	0.002	0.000	0.000		
UP19	Surface Works	Civil foundation excavation Surface Works	0.0001	0.000	0.000	0.000	0.004	0.002	0.000	0.000	0.002	0.001	0.000	0.000		
UP20	Surface Works	Cement Trucks Surface Works	0.0002	0.000	0.000	0.000	0.008	0.001	0.001	0.000	0.003	0.001	0.000	0.000		
UP21	Surface Works	Equipment and material delivery Surface Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.000	0.000		
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	0.0002	0.001	0.000	0.000	0.006	0.024	0.000	0.001	0.002	0.010	0.000	0.000		
<b>Total Traffic Exhaust</b>			<b>0.002</b>	<b>0.005</b>	<b>0.001</b>	<b>0.002</b>	<b>0.103</b>	<b>0.099</b>	<b>0.015</b>	<b>0.005</b>	<b>0.435</b>	<b>0.139</b>	<b>0.007</b>	<b>0.002</b>		

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate	
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Exhaust Emissions from Non-Road Engines</b>														
EXH-1	Surface Works	Indirect Equipment	0.023	0.04	0.02	0.04	0.47	0.76	0.23	0.37	0.46	0.74	0.01	0.01
EXH-2	Surface Works	Foundation and Compaction	0.182	0.01	0.18	0.01	2.49	0.15	1.46	0.09	1.61	0.10	0.04	0.00
EXH-3	Surface Works	Turbine Hall	0.019	0.01	0.02	0.01	0.17	0.06	0.12	0.05	0.13	0.06	0.00	0.00
EXH-4	Surface Works	Spheres	0.016	0.02	0.02	0.02	0.16	0.23	0.10	0.14	0.11	0.14	0.00	0.00
EXH-5	Surface Works	Primary Equipment	0.030	0.01	0.03	0.01	0.27	0.07	0.18	0.04	0.21	0.05	0.00	0.00
EXH-6	Surface Works	Structural	0.021	0.01	0.02	0.01	0.26	0.10	0.15	0.06	0.14	0.07	0.00	0.00
EXH-7	Surface Works	Piping	0.039	0.03	0.04	0.03	0.28	0.17	0.21	0.13	0.27	0.18	0.01	0.00
EXH-8	Surface Works	Mechanical	0.016	0.01	0.02	0.01	0.16	0.09	0.10	0.06	0.11	0.06	0.00	0.00
EXH-9	Cavern Works	Primary Equipment	0.020	0.00	0.02	0.00	0.31	0.02	0.15	0.01	0.15	0.01	0.01	0.00
EXH-10	Cavern Works	Mining Surface Equipment	0.019	0.03	0.02	0.03	0.28	0.41	0.14	0.20	0.13	0.19	0.00	0.01
EXH-11	Cavern Works	Mining Subsurface Equipment	0.044	0.04	0.04	0.04	0.46	0.48	0.20	0.22	0.49	0.38	0.01	0.01
<b>Total Non-Road Exhaust</b>			<b>0.43</b>	<b>0.20</b>	<b>0.43</b>	<b>0.20</b>	<b>5.30</b>	<b>2.54</b>	<b>3.04</b>	<b>1.38</b>	<b>3.81</b>	<b>1.98</b>	<b>0.09</b>	<b>0.05</b>
<b>Stationary Sources</b>														
<b>Material Handling</b>														
TF1	Cavern Works	Clearing and Stripping -Truck unloading	0.657	0.08	0.10	0.01	-	-	-	-	-	-	-	-
TF2	Cavern Works	Shaft cuttings for disposal - Truck loading	0.003	0.01	0.00	0.00	-	-	-	-	-	-	-	-
TF3	Cavern Works	Mining Activities -Truck loading	0.067	0.17	0.01	0.03	-	-	-	-	-	-	-	-
TF4	Surface Works	Site clearing - Truck loading	0.060	0.06	0.01	0.01	-	-	-	-	-	-	-	-
TF5	Surface Works	Excavations Activities - Truck loading	0.028	0.02	0.00	0.00	-	-	-	-	-	-	-	-
<b>Transfer Areas Total</b>			<b>0.81</b>	<b>0.33</b>	<b>0.12</b>	<b>0.05</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Bulldozing</b>														
BD 1	Surface Works	Foundation and Compaction - Surface Works	0.222	0.40	0.11	0.20	-	-	-	-	-	-	-	-
BD 2	Cavern Works	Mining Surface	0.333	1.46	0.16	0.72	-	-	-	-	-	-	-	-
<b>Bulldozing Total</b>			<b>0.56</b>	<b>1.86</b>	<b>0.27</b>	<b>0.92</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Grading</b>														
GD1	Surface Works	Foundation and Compaction	0.192	0.35	0.01	0.03	-	-	-	-	-	-	-	-
<b>Grading Total</b>			<b>0.19</b>	<b>0.35</b>	<b>0.01</b>	<b>0.03</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Wind Erosion of Exposed Surface Areas</b>														
WE1	Total Area of the Site	Clearing & Stripping	0.459	2.010	0.229	1.005	-	-	-	-	-	-	-	-
<b>Wind Erosion Areas Total</b>			<b>0.459</b>	<b>2.010</b>	<b>0.229</b>	<b>1.005</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
<b>Wind Erosion of Stock Piles</b>														
WS1	Cavern Works	Shaft Cutting	0.05	0.24	0.01	0.04	-	-	-	-	-	-	-	-
WS2	Cavern Works	Waste Rock - Mining	0.40	1.75	0.06	0.26	-	-	-	-	-	-	-	-
WS3	Surface Works	Site Clearing	0.40	1.76	0.06	0.26	-	-	-	-	-	-	-	-
WS4	Surface Works	Excavations	0.24	1.07	0.04	0.16	-	-	-	-	-	-	-	-
<b>Wind Erosion Stockpile Total</b>			<b>1.10</b>	<b>4.81</b>	<b>0.16</b>	<b>0.72</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions</b>			<b>8.06</b>	<b>20.30</b>	<b>1.69</b>	<b>3.99</b>	<b>5.40</b>	<b>2.64</b>	<b>3.05</b>	<b>1.38</b>	<b>4.24</b>	<b>2.12</b>	<b>0.10</b>	<b>0.05</b>

**EMISSIONS SUMMARY - GREENHOUSE GASES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

ID	Activity	Description	CO <sub>2</sub> Emission Rate		CH <sub>4</sub> Emission Rate		N <sub>2</sub> O Emission Rate	
			24-hour (lbs/hr)	Annual (tons/yr)	24-hour (lbs/hr)	Annual (tons/yr)	24-hour (lbs/hr)	Annual (tons/yr)
<b>Non-Stationary Sources</b>								
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>								
UP1	Cavern Works	Workforce (Site Clearing) - Cavern Works	3.34	0.27	0.00	0.00	0.00	0.00
UP2	Cavern Works	Equipment mobilization - Cavern Works	1.88	0.01	0.00	0.00	0.00	0.00
UP3	Cavern Works	Equipment demobilization - Cavern Works	1.88	0.01	0.00	0.00	0.00	0.00
UP4	Cavern Works	Fuel delivery - Cavern Works	1.08	0.09	0.00	0.00	0.00	0.00
UP5	Cavern Works	Fencing delivery - Cavern Works	0.94	0.00	0.00	0.00	0.00	0.00
UP6	Cavern Works	Concrete trucks - Cavern Works	0.39	0.03	0.00	0.00	0.00	0.00
UP7	Cavern Works	Gravel delivery - Cavern Works	10.03	0.75	0.00	0.00	0.00	0.00
UP8	Cavern Works	Trailer delivery - Cavern Works	1.88	0.01	0.00	0.00	0.00	0.00
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	5.02	0.11	0.00	0.00	0.00	0.00
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.77	1.46	0.00	0.00	0.00	0.00
UP11	Cavern Works	Workforce (Mining) - Cavern Works	15.33	5.56	0.00	0.00	0.00	0.00
UP12	Cavern Works	Surface equipment (mobilization) - Cavern Works	1.88	0.05	0.00	0.00	0.00	0.00
UP13	Cavern Works	Subsurface equipment (mobilization) - Cavern Works	1.88	0.03	0.00	0.00	0.00	0.00
UP14	Cavern Works	Ground support - Cavern Works	0.80	0.02	0.00	0.00	0.00	0.00
UP15	Cavern Works	Explosives - Cavern Works	0.80	0.02	0.00	0.00	0.00	0.00
UP16	Cavern Works	Transportation of waste rock - Cavern Works	6.69	29.18	0.00	0.00	0.00	0.00
UP17	Surface Works	Workforce - Surface Works	30.79	7.39	0.00	0.00	0.00	0.00
UP18	Surface Works	Site clearing (overburden) - Surface Works	3.89	2.79	0.00	0.00	0.00	0.00
UP19	Surface Works	Civil foundation excavation Surface Works	2.39	1.28	0.00	0.00	0.00	0.00
UP20	Surface Works	Cement Trucks Surface Works	3.37	0.60	0.00	0.00	0.00	0.00
UP21	Surface Works	Equipment and material delivery Surface Works	0.81	0.26	0.00	0.00	0.00	0.00
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.08	0.24	0.00	0.00	0.00	0.00
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.45	1.79	0.00	0.00	0.00	0.00
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	3.02	12.94	0.00	0.00	0.00	0.00
<b>Total Traffic Exhaust</b>			<b>99.41</b>	<b>64.88</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Exhaust Emissions from Non-Road Engines</b>								
EXH-1	Surface Works	Indirect Equipment	998.85	1,602.67	-	-	-	-
EXH-2	Surface Works	Foundation and Compaction	4,690.23	289.44	-	-	-	-
EXH-3	Surface Works	Turbine Hall	340.53	128.74	-	-	-	-
EXH-4	Surface Works	Spheres	309.86	447.96	-	-	-	-
EXH-5	Surface Works	Primary Equipment	526.13	129.88	-	-	-	-
EXH-6	Surface Works	Structural	497.03	191.22	-	-	-	-
EXH-7	Surface Works	Piping	555.24	342.27	-	-	-	-
EXH-8	Surface Works	Mechanical	309.86	172.10	-	-	-	-
EXH-9	Cavern Works	Primary Equipment	596.60	46.59	-	-	-	-
EXH-10	Cavern Works	Mining Surface Equipment	519.84	768.33	-	-	-	-
EXH-11	Cavern Works	Mining Subsurface Equipment	700.54	818.76	-	-	-	-
<b>Total Non-Road Exhaust</b>			<b>10,044.72</b>	<b>4,937.95</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions</b>			<b>10,144.1</b>	<b>5,002.8</b>	<b>0.004</b>	<b>0.003</b>	<b>0.001</b>	<b>0.001</b>

Greenhouse Gases (GHGs)	Global Warming Potential (GWP)	Emission Rate (lb/hr)	Emission Rate (lb/hr)	Emission Rate (lb/hr CO <sub>2</sub> e)	Annual Emissions (TPY CO <sub>2</sub> e)
Carbon dioxide (CO <sub>2</sub> )	1	10,144.133	5,002.8	10,144	5,003
Methane (CH <sub>4</sub> )	25	0.004	0.003	0.10	0.07
Nitrous oxide (N <sub>2</sub> O)	298	0.001	0.001	0.24	0.16
<b>Total</b>					<b>5,003.06</b>

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Cavern Works															
	Clearing & Stripping								Shaft Construction		Mining Activities					
	Workforce	Equipment mobilization	Equipment demobilization	Fuel delivery	Fencing delivery	Concrete trucks	Gravel delivery	Trailer delivery	Workforce	Shaft cuttings for disposal	Workforce	Surface equipment – mobilization	Subsurface equipment – mobilization	Ground support	Explosives	On road trucks - waste rock truck
<b>Material Throughput</b>																
Total Area (acres)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Material Depth (in)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	--	--	--	--	--	305,100	--	--	513,000	--	--	--	--	--	10,240,992
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	--	--	--	--	--	11,300	--	--	19,000	--	--	--	--	--	379,296
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	--	--	--	--	--	105.0	--	--	130.0	--	--	--	--	--	130
Total Material Weight (tons)	--	--	--	--	--	--	16,018	--	--	33,345	--	--	--	--	--	665,664
<b>Operating Time</b>																
Total Operating Weeks (weeks) <sup>c</sup>	16	1	1	16	1	3	3	1	4	52	52	4	4	52	52	52
Total Operating Days (days) <sup>c</sup>	80	7	7	80	7	15	15	7	20	365	365	30	30	365	365	365
Daily Operating Hours (hrs/day)	2	2	2	2	2	10	10	2	2	12	2	2	2	2	2	24
<b>Vehicle and Travel Data</b>																
Vehicle Model <sup>d</sup>	Passenger Car	Tractor Trailer	Tractor Trailer	Fuel truck (tandem)	Tractor Trailer	Cement mix truck (10 yd)	Tandem truck load (12 yd)	Tractor Trailer	Passenger car	12 cy dump truck	Passenger car	Tractor Trailer	Tractor Trailer	Flatbed tractor trailer	Flatbed tractor trailer	Dump trucks (12 yd)
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	19.0	19.0	7.1	19.0	13.5	20.0	19.0	2.3	25.5	2.3	19.0	19.0	19.0	19.0	25.5
Vehicle Capacity (tons)	0.8	20.0	20.0	19.0	20.0	20.0	18.0	20.0	0.8	19.0	0.8	20.0	20.0	20.0	20.0	19.0
Vehicle Capacity (yd <sup>3</sup> )	--	--	--	--	--	--	12.0	--	--	12.0	--	--	--	--	--	12.0
Loaded Vehicle Weight (tons)	3.0	39.0	39.0	26.1	39.0	33.5	38.0	39.0	3.0	44.5	3.0	39.0	39.0	39.0	39.0	44.5
W = Average Vehicle Weight (tons)	2.7	29.0	29.0	16.6	29.0	23.5	29.0	29.0	2.7	35.0	2.7	29.0	29.0	29.0	29.0	35.0
Number of Vehicles (duration)	960	10	10	80	2	30	942	12	390	1,583	19,957	50	35	24	24	31,608
Number of Vehicles (daily)	12	2	2	1	1	2	63	2	18	5	55	2	2	1	1	87
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	7.7	1.3	1.3	0.6	0.6	1.3	40.6	1.3	11.6	3.2	35.4	1.3	1.3	0.6	0.6	56.0
Activity Duration Vehicle Miles Travelled (VMT)	618	6	6	52	1	19	607	8	251	1,020	12,855	32	23	15	15	20,359

<sup>a</sup> Material quantities based on the document TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)  
<sup>b</sup> The density of 130 lb/ft<sup>3</sup> used for shat material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience  
<sup>c</sup> Operating weeks are based on construction schedule information obtained from Hydrostor.  
<sup>d</sup> Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)  
<sup>e</sup> Empty vehicle weights were obtained from technical specifications of each vehicle.  
<sup>f</sup> Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	17	18	19	20	21	22	23	24
	Surface Works					Surface Works & Cavern		Reservoir Fill
	Workforce	Site clearing - overburden	Civil foundation excavation	Cement Trucks	Equipment and material delivery	Potable Water	Non Potable Water	Non Potable Water
<b>Material Throughput</b>								
Total Area (acres)	--	--	--	--	--	--	--	--
Material Depth (in)	--	--	--	--	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	3,402,783	1,201,959	--	--	--	--	--
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	126,029	44,517	--	--	--	--	--
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	115	115	--	--	--	--	--
Total Material Weight (tons)	--	195,660	69,113	--	--	--	--	--
<b>Operating Time</b>								
Total Operating Weeks (weeks) <sup>c</sup>	52	16	12	4	52	52	52	52
Total Operating Days (days) <sup>c</sup>	240	120	90	30	365	365	365	365
Daily Operating Hours (hrs/day)	2	12	12	12	2	24	24	24
<b>Vehicle and Travel Data</b>								
Vehicle Model <sup>d</sup>	Passenger Car	12 cy dump truck	12 cy dump truck	12 cy cement truck	Flatbed	water truck 9000 gal	water truck 9000 gal	water truck 9000 gal
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	25.5	25.5	23.0	19.0	23.2	23.2	23.2
Vehicle Capacity (tons)	0.8	19.0	19.0	24.0	20.0	12.0	12.0	12.0
Vehicle Capacity (yd <sup>3</sup> )	--	12.0	12.0	12.0	--	-	-	-
Loaded Vehicle Weight (tons)	3.0	44.5	44.5	47.0	39.0	35.3	35.3	35.3
W = Average Vehicle Weight (tons)	2.7	35.0	35.0	35.0	29.0	29.2	29.2	29.2
Number of Vehicles (duration)	92,160	10,502	4,822	2,771	969	260	1,974	14,289
Number of Vehicles (daily)	384	88	54	93	3	1	6	40
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	71	16	10	17	1	1	4	26
Activity Duration Vehicle Miles Travelled (VMT)	17,077	1,946	893	513	180	167	1,271	9,204

<sup>a</sup>Material quantities based on the document TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>b</sup>The density of 130 lb/ft<sup>3</sup> used for silt material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience

<sup>c</sup>Operating weeks are based on construction schedule information obtained from Hydrostor.

<sup>d</sup>Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>e</sup>Empty vehicle weights were obtained from technical specifications of each vehicle.

<sup>f</sup>Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Clearing & Stripping														Shaft Construction					
	Haul Road 1		Haul Road 2		Haul Road 3		Haul Road 4		Haul Road 5		Haul Road 6		Haul Road 7		Haul Road 8		Haul Road 9		Haul Road 10	
	Workforce		Equipment mobilization		Equipment demobilization		Fuel delivery		Fencing delivery		Concrete trucks		Gravel delivery		Trailer delivery		Workforce		Shaft cuttings for disposal	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Vehicle and Travel Data <sup>b</sup></b>																				
W = Average Vehicle Weight (tons)	2.7	2.7	29.0	29.0	29.0	29.0	16.6	16.6	29.0	29.0	23.5	23.5	29.0	29.0	29.0	29.0	2.7	2.7	35.0	35.0
D = Distance traveled on unpaved roads (2-way miles)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Daily Operation Hours (hrs/day)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total No. of Operating Days for activity (days)	80	80	7	7	7	7	80	80	7	7	15	15	15	15	7	7	20	20	365	365
No. of truck trips per day (trucks/day)	12	12	2	2	2	2	1	1	1	1	2	2	63	63	2	2	18	18	5	5
Total No. of trucks for activity (trucks)	960	960	10	10	10	10	80	80	2	2	30	30	942	942	12	12	390	390	1,583	1,583
Daily Vehicle Miles Travelled (VMT)	8	8	1	1	1	1	1	1	1	1	1	1	41	41	1	1	12	12	3	3
Activity Duration Vehicle Miles Travelled (VMT)	618	618	6	6	6	6	52	52	1	1	19	19	607	607	8	8	251	251	1,020	1,020
<b>Site Characteristics</b>																				
k = Particle size multiplier (lb/VMT) <sup>e</sup>	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>c</sup>	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>																				
Dust Control Efficiency (%) <sup>f</sup>	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
<b>Emission Factors <sup>a</sup></b>																				
Emission Factor (lb/VMT) - Daily	1.04	0.104	3.1	0.3	3.1	0.3	2.4	0.2	3.1	0.3	2.8	0.3	3.1	0.3	3.1	0.3	1.0	0.1	3.3	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.099	2.92	0.29	2.92	0.29	2.27	0.23	2.92	0.29	2.66	0.27	2.92	0.29	2.92	0.29	0.99	0.10	3.18	0.32
<b>Emission Rates <sup>a</sup></b>																				
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	8.0	0.8	3.9	0.4	3.9	0.4	1.5	0.2	2.0	0.2	3.6	0.4	123.9	12.4	3.9	0.4	12.1	1.2	10.7	1.1
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.0	0.0	0.1	0.0	1.6	0.2
Controlled Daily Emissions (lb/day)	1.2	0.1	0.6	0.1	0.6	0.1	0.2	0.0	0.3	0.0	0.5	0.1	18.6	1.9	0.6	0.1	1.8	0.2	1.6	0.2
Controlled Annual Emissions (TPY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Controlled Hourly Emissions (lb/hr, daily basis)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Emission Factor (lb/hr/mi)	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	2.4	0.2	0.1	0.0	0.2	0.0	0.2	0.0

<sup>a</sup> Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -

$$E = k * (s/12)^a * (W/3)^b * (365-P)/365$$

<sup>b</sup> See Appendix 5.1B (annual) Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>f</sup> Dust control efficiency based on 85% for basic watering plus chemical dust suppressors on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Mining Activities												Surface Works								Surface Works & Cavern				Reservoir Fill			
	Haul Road 11		Haul Road 12		Haul Road 13		Haul Road 14		Haul Road 15		Haul Road 16		Haul Road 17		Haul Road 18		Haul Road 19		Haul Road 20		Haul Road 21		Haul Road 22		Haul Road 23		Haul Road 24	
	Workforce		Surface equipment – mobilization		Subsurface equipment – mobilization		Ground support		Explosives		On road trucks - waste rock truck		Workforce		Site clearing - overburden		Civil foundation excavation		Cement Trucks		Equipment and material delivery		Potable Water		Non Potable Water		Non Potable Water	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Vehicle and Travel Data<sup>b</sup></b>																												
W = Average Vehicle Weight (tons)	2.7	2.7	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.2	29.2	29.2	29.2	29.2	29.2
D = Distance traveled on unpaved roads (2-way miles)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Daily Operation Hours (hrs/day)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total No. of Operating Days for activity (days)	365	365	30	30	30	30	365	365	365	365	365	365	240	240	120	120	90	90.0	30	30	365	365	365	365.0	365	365.0	365	365.0
No. of truck trips per day (trucks/day)	55	55	2	2	2	2	1	1	1	1	87	87	384	384	88	88	54	54.0	93	93	3	3	1	1.0	6	6.0	40	40.0
Total No. of trucks for activity (trucks)	19,957	19,957	50	50	35	35	24	24	24	24	31,608	31,608	92,160	92,160	10,502	10,502	10,502	10,502	2,771	2,771	969	260	260	259.7	1,974	1,974	14,289	14,289
Daily Vehicle Miles Travelled (VMT)	35	35	1	1	1	1	1	1	1	1	56	56	71	71	16	16	10	10.0	17	17	1	1	1	0.6	4	3.9	26	25.8
Activity Duration Vehicle Miles Travelled (VMT)	12,855	12,855	32	32	23	23	15	15	15	15	20,359	20,359	17,077	17,077	1,946	1,946	893	893	513	513	180	180	167	167.3	1,271	1,271	9,204	9,204
<b>Site Characteristics</b>																												
k = Particle size multiplier (lb/VMT) <sup>c</sup>	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>e</sup>	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>																												
Dust Control Efficiency (%) <sup>e</sup>	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
<b>Emission Factors<sup>a</sup></b>																												
Emission Factor (lb/VMT) - Daily <sup>e</sup>	1.0	0.1	3.1	0.3	3.1	0.3	3.1	0.3	3.1	0.3	3.3	0.3	1.0	0.1	3.3	0.3	3.3	0.3	3.3	0.3	3.1	0.3	3.1	0.3	3.1	0.3	3.1	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.10	2.92	0.29	2.92	0.29	2.92	0.29	2.92	0.29	3.18	0.32	0.99	0.10	3.18	0.32	3.18	0.32	3.18	0.32	2.92	0.29	2.93	0.29	2.93	0.29	2.93	0.29
<b>Emission Rates<sup>a</sup></b>																												
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	36.8	3.7	3.9	0.4	3.9	0.4	2.0	0.2	2.0	0.2	186.2	18.6	74.0	7.4	54.2	5.4	33.2	3.3	57.2	5.7	1.7	0.2	2.0	0.2	11.8	1.2	78.9	7.9
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	6.39	0.64	0.05	0.00	0.03	0.00	0.02	0.00	0.02	0.00	32.34	3.23	8.49	0.85	3.09	0.31	1.42	0.14	0.82	0.08	0.26	0.03	0.25	0.02	1.86	0.19	13.48	1.35
Controlled Daily Emissions (lb/day)	5.5	0.6	0.6	0.1	0.6	0.1	0.3	0.0	0.3	0.0	27.9	2.8	11.1	1.1	8.1	0.8	5.0	0.5	8.6	0.9	0.3	0.0	0.3	0.0	1.8	0.2	11.8	1.2
Controlled Annual Emissions (TPY)	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.5	1.3	0.1	0.5	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	2.0	0.2
Controlled Hourly Emissions (lb/hr, daily basis)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.1	0.5	0.0	0.3	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.0
Emission Factor (lb/hr/mi)	0.7	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	3.6	0.4	5.0	0.5	3.7	0.4	2.2	0.2	3.9	0.4	0.1	0.0	0.0	0.0	0.2	0.0	1.5	0.2

<sup>a</sup> Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -  
 $E = k * (s/12)^a * (W/3)^b * (365-P)/365$

<sup>b</sup> See Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>f</sup> Dust control efficiency based on 70% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/day)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Hourly Emissions														
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (lbs/hr)	Total PM <sub>2.5</sub> (lbs/hr)	Total VOC (lbs/hr)	Total NO <sub>x</sub> (lbs/hr)	Total CO (lbs/hr)	Total SO <sub>2</sub> (lbs/hr)								
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																															
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617														
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859														
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859														
<b>Daily Emissions (lbs/day)<sup>b</sup></b>																															
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.64	80	2	5,300	LDGV	<6,000	Diesel	8	4.88E-02	2.05E-03	8.57E-04	1.31E-04	3.07E-04	1.21E-04	7.84E-05	1.05E-03	1.82E-05	8.31E-06	0.0005	0.0010	0.0244	0.0004								
Haul Road 2	Equipment mobilization - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000								
Haul Road 3	Equipment demobilization - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000								
Haul Road 4	Fuel delivery - Cavern Works	0.64	80	2	33,200	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000								
Haul Road 5	Fencing delivery - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000								
Haul Road 6	Concrete trucks - Cavern Works	0.64	15	10	47,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0001	0.0007	0.0003	0.0000								
Haul Road 7	Gravel delivery - Cavern Works	0.64	15	10	58,000	HDGV8a	33,001-60,000	Diesel	41	9.25E-02	2.12E-01	1.15E-03	2.41E-03	6.62E-03	2.34E-03	1.70E-03	1.66E-02	3.76E-04	1.68E-04	0.0017	0.0212	0.0093	0.0001								
Haul Road 8	Trailer delivery - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000								
Haul Road 9	Workforce (Shaft) - Cavern Works	0.64	20	2	5,300	LDGV	<6,000	Diesel	12	7.32E-02	3.08E-03	1.29E-03	1.97E-04	4.60E-04	1.81E-04	1.18E-04	1.58E-03	2.74E-05	1.25E-05	0.0008	0.0015	0.0366	0.0006								
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.64	365	12	70,000	HDDV8b	>60,000	Diesel	3	7.34E-03	1.68E-02	9.15E-05	1.91E-04	5.26E-04	1.85E-04	1.35E-04	1.32E-03	2.99E-05	1.34E-05	0.0001	0.0014	0.0006	0.0000								
Haul Road 11	Workforce (Mining) - Cavern Works	0.64	365	2	5,300	LDGV	<6,000	Diesel	35	2.24E-01	9.41E-03	3.93E-03	6.01E-04	1.41E-03	5.55E-04	3.59E-04	4.82E-03	8.36E-05	3.81E-05	0.0024	0.0047	0.1119	0.0020								
Haul Road 12	Surface equipment (mobilization) - Cavern Works	0.64	30	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000								
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	0.64	30	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000								
Haul Road 14	Ground support - Cavern Works	0.64	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000								
Haul Road 15	Explosives - Cavern Works	0.64	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000								
Haul Road 16	Transportation of waste rock - Cavern Works	0.64	365	24	70,000	HDDV8b	33,001-60,000	Diesel	56	1.28E-01	2.93E-01	1.59E-03	3.33E-03	9.15E-03	3.22E-03	2.35E-03	2.30E-02	5.20E-04	2.32E-04	0.0010	0.0122	0.0053	0.0001								
Haul Road 17	Workforce - Surface Works	0.19	240	2	5,300	LDGV	<6,000	Diesel	71	4.50E-01	1.89E-02	7.89E-03	1.21E-03	2.82E-03	1.11E-03	7.22E-04	9.68E-03	1.68E-04	7.65E-05	0.0048	0.0095	0.2248	0.0039								
Haul Road 18	Site clearing (overburden) - Surface Works	0.19	120	12	70,000	HDDV8b	>60,000	Diesel	16	3.72E-02	8.52E-02	4.63E-04	9.68E-04	2.66E-03	9.38E-04	6.84E-04	6.68E-03	1.51E-04	6.76E-05	0.0006	0.0071	0.0031	0.0000								
Haul Road 19	Civil foundation excavation Surface Works	0.19	90	12	70,000	HDDV8b	>60,000	Diesel	10	2.28E-02	5.23E-02	2.84E-04	5.94E-04	1.63E-03	5.76E-04	4.20E-04	4.10E-03	9.28E-05	4.15E-05	0.0003	0.0044	0.0019	0.0000								
Haul Road 20	Cement Trucks Surface Works	0.19	30	12	70,000	HDDV8b	>60,000	Diesel	17	3.93E-02	9.01E-02	4.90E-04	1.02E-03	2.81E-03	9.92E-04	7.23E-04	7.06E-03	1.60E-04	7.15E-05	0.0006	0.0075	0.0033	0.0000								
Haul Road 21	Equipment and material delivery Surface Works	0.19	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.27E-03	2.91E-03	1.58E-05	3.30E-05	9.08E-05	3.20E-05	2.33E-05	2.28E-04	5.16E-06	2.31E-06	0.0001	0.0015	0.0006	0.0000								
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0000	0.0001	0.0001	0.0000								
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	4	8.81E-03	2.02E-02	1.10E-04	2.29E-04	6.31E-04	2.22E-04	1.62E-04	1.58E-03	3.58E-05	1.60E-05	0.0001	0.0008	0.0004	0.0000								
Haul Road 24	Non Potable Water - Reservoir Fill	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	26	5.88E-02	1.35E-01	7.32E-04	1.53E-03	4.21E-03	1.48E-03	1.08E-03	1.06E-02	2.39E-04	1.07E-04	0.0004	0.0056	0.0024	0.0000								

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors (see Table B-2.)

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/year)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Annual Emissions														
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (tons/yr)	Total PM <sub>2.5</sub> (tons/yr)	Total VOC (tons/yr)	Total NO <sub>x</sub> (tons/yr)	Total CO (tons/yr)	Total SO <sub>2</sub> (tons/yr)								
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																															
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617														
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859														
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859														
<b>Annual Emissions (lbs/year)<sup>b</sup></b>																															
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.64	80	2	5300	LDGV	<6,000	Diesel	618	3.91	0.16	0.07	0.01	0.02	0.01	0.01	0.08	0.0000	0.0000	0.0000	0.0001	0.0020	0.0000								
Haul Road 2	Equipment mobilization - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	6	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 3	Equipment demobilization - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	6	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 4	Fuel delivery - Cavern Works	0.64	80	2	33200	HDGV8a	33,001-60,000	Diesel	52	0.12	0.27	0.00	0.00	0.01	0.00	0.00	0.01	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000								
Haul Road 5	Fencing delivery - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	1	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 6	Concrete trucks - Cavern Works	0.64	15	10	47000	HDGV8a	33,001-60,000	Diesel	19	0.04	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000								
Haul Road 7	Gravel delivery - Cavern Works	0.64	15	10	58000	HDGV8a	33,001-60,000	Diesel	607	1.38	3.17	0.02	0.04	0.10	0.03	0.03	0.08	0.0001	0.0000	0.0000	0.0016	0.0007	0.0000								
Haul Road 8	Trailer delivery - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	8	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 9	Workforce (Shaft) - Cavern Works	0.64	20	2	5300	LDGV	<6,000	Diesel	251	1.59	0.07	0.03	0.00	0.01	0.00	0.00	0.03	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000								
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.64	365	12	70000	HDDV8b	>60,000	Diesel	1,020	2.33	5.33	0.03	0.06	0.17	0.06	0.04	0.14	0.0001	0.0001	0.0001	0.0027	0.0012	0.0000								
Haul Road 11	Workforce (Mining) - Cavern Works	0.64	365	2	5300	LDGV	<6,000	Diesel	12,855	81.21	3.41	1.43	0.22	0.51	0.20	0.13	1.75	0.0004	0.0002	0.0009	0.0017	0.0406	0.0007								
Haul Road 12	Surface equipment (mobilization) - Cavern Wc	0.64	30	2	58000	HDGV8a	33,001-60,000	Diesel	32	0.07	0.17	0.00	0.00	0.01	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000								
Haul Road 13	Subsurface equipment (mobilization) - Cavern	0.64	30	2	58000	HDGV8a	33,001-60,000	Diesel	23	0.05	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000								
Haul Road 14	Ground support - Cavern Works	0.64	365	2	58000	HDGV8a	33,001-60,000	Diesel	15	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 15	Explosives - Cavern Works	0.64	365	2	58000	HDGV8a	33,001-60,000	Diesel	15	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 16	Transportation of waste rock - Cavern Works	0.64	365	24	70000	HDDV8b	33,001-60,000	Diesel	20,359	46.43	106.41	0.58	1.21	3.32	1.17	0.85	2.77	0.0023	0.0010	0.0014	0.0532	0.0232	0.0003								
Haul Road 17	Workforce - Surface Works	0.19	240	2	5300	LDGV	<6,000	Diesel	17,077	107.88	4.54	1.89	0.29	0.68	0.27	0.17	2.32	0.0005	0.0002	0.0012	0.0023	0.0539	0.0009								
Haul Road 18	Site clearing (overburden) - Surface Works	0.19	120	12	70000	HDDV8b	>60,000	Diesel	1,946	4.44	10.17	0.06	0.12	0.32	0.11	0.08	0.26	0.0002	0.0001	0.0001	0.0051	0.0022	0.0000								
Haul Road 19	Civil foundation excavation Surface Works	0.19	90	12	70000	HDDV8b	>60,000	Diesel	893	2.04	4.67	0.03	0.05	0.15	0.05	0.04	0.12	0.0001	0.0000	0.0001	0.0023	0.0010	0.0000								
Haul Road 20	Cement Trucks Surface Works	0.19	30	12	70000	HDDV8b	>60,000	Diesel	513	1.17	2.68	0.01	0.03	0.08	0.03	0.02	0.07	0.0001	0.0000	0.0000	0.0013	0.0006	0.0000								
Haul Road 21	Equipment and material delivery Surface Worl	0.19	365	2	58000	HDGV8a	33,001-60,000	Diesel	180	0.41	0.94	0.01	0.01	0.03	0.01	0.01	0.02	0.0000	0.0000	0.0000	0.0005	0.0002	0.0000								
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	167	0.38	0.87	0.00	0.01	0.03	0.01	0.01	0.02	0.0000	0.0000	0.0000	0.0004	0.0002	0.0000								
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	1,271	2.90	6.64	0.04	0.08	0.21	0.07	0.05	0.17	0.0001	0.0001	0.0001	0.0033	0.0014	0.0000								
Haul Road 24	Non Potable Water - Reservoir Fill	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	9,204	20.99	48.10	0.26	0.55	1.50	0.53	0.39	1.25	0.0010	0.0005	0.0006	0.0241	0.0105	0.0001								

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

**Table 4**  
**Estimation of Emissions Factors for Non-Road Equipment Used in the Project**  
**Construction Phase**  
**Gem Site - Hydrostor**

Equipment Description	Number of Equipment	Engine Power (hp) <sup>g</sup>	Engine Tier Rating	Unadjusted Emission Factor (EFs) <sup>a</sup>					Transient Adjustment Emission Factor (TAF) <sup>b</sup>					Deterioration Emission Factor (DF) <sup>c</sup>				S Adjustment <sup>d</sup> (g/hp-hr)	Adjusted Emission Factor (EFadj) <sup>e</sup>				Emission Factor <sup>f</sup>	
				HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>		HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>
				(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(lb/hp-h)											(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)
<b>Surface Works</b>																								
<u>Indirect</u>																								
60 kW Diesel Gensets	12	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
<u>Foundation and Compaction</u>																								
Wheel Loader	2	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Crawler Loader	12	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Grader	7	160	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Crawler dozer	2	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Scraper	9	270	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Backhoe	16	120	4	0.1314	0.0870	0.2760	0.0092	0.367	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.257	0.337	0.032	625.645	0.0058
Roller	11	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.020	595.821	0.0055
Pile driver hammer	4	250	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<u>Turbine Hall</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	5	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Spheres</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Primary Equipment</u>																								
Cranes	3	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	8	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Structural</u>																								
Cranes	4	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Piping</u>																								
Welding machine	12	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<u>Mechanical</u>																								
Welding machines	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
Crane	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<b>Cavern Works</b>																								
Drill rigs (electrical)	3	675	4	0.1314	0.1330	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.153	0.278	0.014	530.613	0.0049
30 ton cranes	3	173	4	0.1314	0.0870	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.100	0.278	0.014	530.613	0.0049
6" water pumps	3	58	4	0.1314	0.2370	0.2760	0.0184	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.027	589.939	0.0054
Long stick track hoe	1	187	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Off road dump truck, 30 t	1	370	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
<u>Mining Surface Equipment</u>																								
Off road dump truck, 30t	2	370	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Front end loader	1	250	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
All terrain forklift	1	110	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
<u>Mining Subsurface Equipment</u>																								
Bolter (semi-electrical)	3	55	4	0.1314	0.2370	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.040	595.821	0.0055
Jumbo (semi-electrical)	2	90	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
Scissor lift	1	138	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Welder	1	19	4	0.4380	2.1610	4.4399	0.2800	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	1.030	6.392	5.415	0.977	693.350	0.0064
Buggy	1	47	4	0.1314	0.1530	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.003	1.101	1.009	1.473	0.000	0.138	0.258	0.290	0.040	595.832	0.0055
Loaders/haul/dump	5	201	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Boom lift	1	147	4	0.1314	0.8700	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	1.532	0.289	0.020	535.902	0.0049
Skid steer	1	61	4	0.1314	0.2370	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.040	595.821	0.0055

<sup>a</sup> Zero-Hour, steady-state emission factors for nonroad CI engines from EPA-420-B-16-022, Table A4

<sup>b</sup> Transient Adjustment Factors by Equipment Type for Nonroad CI Equipment, Table A5.

<sup>c</sup> Deterioration Factors for Nonroad Diesel Engines, Table A6.

<sup>d</sup> Adjustment to PM emission factor to account for variations in fuel sulfur content is made using the following equation -

soxcnv = 0.02247 grams PM sulfur/grams fuel sulfur consumed  
soxbas = 0.33 percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 1 and 2)  
          0.0015 percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 3 and 4)  
soxdsl = 0.0015 percent (15 ppm is the maximum ultra low sulfur diesel - ULSD)

<sup>e</sup> For all pollutants except PM, adjusted Emission Factor = UAF x TAF x DF.

For PM, adjusted Emission Factor = UAF x TAF x DF -  $S_{PM\ adj}$ .

<sup>f</sup> Emission Factor for SO<sub>2</sub> = [BSFC x 453.6 x (1 - soxcnv) - HC] x 0.01 x soxdsl x (64/32).

**Table 5**  
**Estimation of Emissions Rates for Non-Road Equipment used in the Project**  
**Construction Phase**  
**Gem Site - Hydrostor**

Equipment Description	NUMBER OF EQUIPMENT	ENGINE POWER (hp)	Assumed Load (%)	Availability (%)	HOURS OF OPERATION <sup>d</sup>	Emission Factors <sup>a</sup>						Hourly Emission Rates (Average Hourly) <sup>b</sup>						Annual Emission Rates (Average Annual) <sup>c</sup>																																																											
						HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>																																																						
						(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	TPY	TPY	TPY	TPY	TPY	TPY																																																						
<b>Surface Works</b>																																																																													
<b>Indirect Equipment</b>																																																																													
60 kW Diesel Gensets	12	100	80%	80%	2,912	0.135	0.273	0.278	0.014	589.939	0.005	0.104	0.210	0.214	0.010	453.073	0.004	0.33	0.67	0.69	0.03	1453.92	0.01																																																						
						<b>EXH-1 Total (kg/h and tonne/year)</b>																																																																							
						0.228						0.462						0.471						0.023						998.854						0.009						0.37						0.74						0.76						0.04						1602.67						0.01					
<b>Foundation and Compactor</b>																																																																													
Wheel Loader	2	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.014	0.015	0.028	0.002	51.447	0.000	0.00	0.00	0.00	0.00	0.00	6.35	0.00																																																					
Crawler Loader	12	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.082	0.088	0.167	0.011	308.679	0.003	0.01	0.01	0.02	0.00	0.00	38.10	0.00																																																					
Grader	7	160	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.063	0.069	0.130	0.009	240.084	0.002	0.01	0.01	0.02	0.00	0.00	29.63	0.00																																																					
Crawler dozer	2	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.014	0.015	0.028	0.002	51.447	0.000	0.00	0.00	0.00	0.00	0.00	6.35	0.00																																																					
Scraper	9	270	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.138	0.128	0.281	0.019	520.896	0.005	0.02	0.02	0.03	0.00	0.00	64.29	0.00																																																					
Backhoe	16	120	50%	80%	112	0.309	0.257	0.337	0.032	625.645	0.006	0.237	0.198	0.259	0.025	480.495	0.004	0.03	0.02	0.03	0.00	0.00	59.30	0.00																																																					
Roller	11	100	50%	80%	112	0.142	0.417	0.289	0.020	595.821	0.005	0.062	0.184	0.127	0.009	262.161	0.002	0.01	0.02	0.02	0.00	0.00	32.36	0.00																																																					
Pile driver hammer	4	250	50%	80%	112	0.135	0.086	0.278	0.014	530.613	0.005	0.054	0.035	0.111	0.005	212.245	0.002	0.01	0.00	0.01	0.00	0.00	26.20	0.00																																																					
						<b>EXH-2 Total (kg/h and tonne/year)</b>																																																																							
						1.463						1.610						2.492						0.182						4690.228						0.043						0.08						0.09						0.14						0.01						262.58						0.00					
<b>Turbine Hall</b>																																																																													
Cranes	2	200	50%	80%	560	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.01	0.01	0.03	0.00	0.00	52.39	0.00																																																					
Welding machine	5	50	50%	80%	840	0.309	0.453	0.337	0.064	695.650	0.006	0.031	0.045	0.034	0.006	69.565	0.001	0.03	0.04	0.03	0.01	0.01	64.39	0.00																																																					
						<b>EXH-3 Total (kg/h and tonne/year)</b>																																																																							
						0.052						0.059						0.078						0.009						154.463						0.001						0.04						0.05						0.06						0.01						116.79						0.00					
						0.116						0.130						0.172						0.019						340.532						0.003						0.05						0.06						0.06						0.01						128.74						0.00					
<b>Spheres</b>																																																																													
Cranes	2	200	50%	80%	2,912	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.07	0.04	0.14	0.01	0.01	272.44	0.00																																																					
Welding machine	4	50	50%	80%	2,184	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.06	0.09	0.06	0.01	0.01	133.94	0.00																																																					
						<b>EXH-4 Total (kg/h and tonne/year)</b>																																																																							
						0.046						0.050						0.071						0.007						140.550						0.001						0.13						0.13						0.21						0.02						406.38						0.00					
						0.102						0.110						0.158						0.016						309.859						0.003						0.14						0.14						0.23						0.02						447.96						0.00					
<b>Primary Equipment</b>																																																																													
Cranes	3	200	50%	80%	448	0.135	0.086	0.278	0.014	530.613	0.005	0.032	0.021	0.067	0.003	127.347	0.001	0.02	0.01	0.03	0.00	0.00	62.87	0.00																																																					
Welding machine	8	50	50%	80%	448	0.309	0.453	0.337	0.064	695.650	0.006	0.049	0.072	0.054	0.010	111.304	0.001	0.02	0.04	0.03	0.01	0.01	54.95	0.00																																																					
						<b>EXH-5 Total (kg/h and tonne/year)</b>																																																																							
						0.082						0.093						0.121						0.014						238.651						0.002						0.04						0.05						0.06						0.01						117.82						0.00					
						0.180						0.205						0.266						0.030						526.135						0.005						0.04						0.05						0.07						0.01						129.88						0.00					
<b>Structural</b>																																																																													
Cranes	4	200	50%	80%	560	0.135	0.086	0.278	0.014	530.613	0.005	0.043	0.028	0.089	0.004	169.796	0.002	0.03	0.02	0.05	0.00	0.00	104.78	0.00																																																					
Welding machine	4	50	50%	80%	1,120	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.03	0.04	0.03	0.01	0.01	68.69	0.00																																																					
						<b>EXH-6 Total (kg/h and tonne/year)</b>																																																																							
						0.068						0.064						0.116						0.009						225.448						0.002						0.06						0.06						0.09						0.01						173.47						0.00					
						0.150						0.141						0.256						0.021						497.027						0.005						0.06						0.07						0.10						0.01						191.22						0.00					
<b>Piping</b>																																																																													
Welding machine	12	50	50%	80%	1,232	0.309	0.453	0.337	0.064	695.650	0.006	0.074	0.109	0.081	0.015	166.956	0.002	0.10	0.15	0.11	0.02	0.02	226.67	0.00																																																					
Cranes	2	200	50%	80%	896	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.02	0.01	0.04	0.00	0.00	83.83	0.00																																																					
						<b>EXH-7 Total (kg/h and tonne/year)</b>																																																																							
						0.096						0.122						0.125						0.018						251.854						0.002						0.12						0.16						0.15						0.02						310.50						0.00					
						0.211						0.270						0.276						0.039						555.243						0.005						0.13						0.18						0.17						0.03						342.27						0.00					
<b>Mechanical</b>																																																																													
Welding machines	4	50	50%	80%	1,008	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.03	0.04	0.03	0.01	0.01	61.82	0.00																																																					
Crane	2	200	50%	80%	1,008	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.02	0.02	0.05	0.00	0.00	94.31	0.00																																																					
						<b>EXH-8 Total (kg/h and tonne/year)</b>																																																																							
						0.046						0.050						0.071						0.007						140.550						0.001						0.05						0.06						0.08						0.01						156.13						0.00					
						0.102						0.110						0.158						0.016						309.859						0.003						0.06						0.06						0.09						0.01						172.10						0.00					
<b>Cavern Works</b>																																																																													
<b>Primary Equipment</b>																																																																													
Drill rigs (electrical)	3	675	0%	0%	308	0.135	0.153	0.278	0.014	530.613	0.005	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																																					
30 ton cranes	3	173	50%	80%	112	0.135	0.100	0.278	0.014	530.613	0.005	0.028	0.021	0.058	0.003	110.155	0.001	0.00	0.00	0.01	0.00	0.00	13.60	0.00																																																					
6" water pumps	3	58	50%	80%	308	0.135	0.273	0.278	0.027	589.939	0.005	0.009	0.019	0.019	0.002	41.060	0.000	0.00	0.01	0.01	0.00	0.00	13.94	0.00																																																					
Long stick track hoe	1	187	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.011	0.010	0.022	0.001	40.085	0.000	0.00	0.00	0.00	0.00	0.00	4.95	0.00																																																					
Off road dump truck, 30 t	1	370	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.021	0.020	0.043	0.003	79.313	0.001	0.00	0.00	0.01	0.00	0.00	9.79	0.00																																																					
						<b>EXH-9 Total (kg/h and tonne/year)</b>																																																																							
						0.069						0.069						0.142						0.009						270.614						0.002						0.01						0.01						0.02						0.00						42.27						0.00					
						0.152						0.153						0.312						0.020						596.601						0.005						0.01						0.01						0.02						0.00						46.59						0.00					
<b>Mining Surface Equipment</b>																																																																													
Off road dump truck, 30t	2	370	50%	80%	2,464	0.142	0.132	0.289	0.020	535.902	0.005	0.042	0.039	0.086	0.006	158.627	0.001	0.11	0.11	0.23	0.02	0.02	430.72	0.00																																																					
Front end loader	1	250	50%	80%	3,696	0.142	0.132	0.289	0.020	535.902	0.005	0.014	0.013	0.029	0.002	53.590	0.000	0.06	0.05	0.12	0.01	0.01	218.27	0.00																																																					
All terrain forklift	1	110	50%	80%	1,848	0.142	0.153	0.289	0.020	535.902	0.005	0.006	0.007	0.013	0.001	23.580	0.000	0.01	0.01	0.03	0.00	0.00	48.02	0.00																																																					
						<b>EXH-10 Total (kg/h and tonne/year)</b>																																																																							
						0.062						0.059						0.127						0.009						235.797						0.002						0.18						0.17						0.38						0.03																	

**TABLE 6  
ESTIMATION OF PM10 AND PM2.5 EMISSION FACTORS AND RATES FOR BATCH/CONTINUOUS DROP TRANSFER OPERATIONS  
Construction Phase  
Gem Site - Hydrostor**

ID	Material Handling Area	Material Type	Operational Data		Material Throughput <sup>a</sup>				Number of Transfers	Moisture Content (M) <sup>b</sup> (%)	Emission Control Data		Daily Uncontrolled Emission Factor <sup>c</sup>		Daily Controlled Emission Factor <sup>c</sup>		Estimated Emission Rate (ER)			
			(hr/day)	(# days)	Total	Total	Daily	Hourly			Method	Efficiency (%)	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>		PM <sub>2.5</sub>	
					(CY)	(tons)	(tons/day)	(tons/hr)					(lb/ton)	(lb/ton)	(lb/ton)	(lb/ton)	(lb/hr)	(tons/year)	(lb/hr)	(tons/year)
<b>Caverns Works</b>																				
TA1	Clearing and Stripping -Truck unloading	Gravel	10	15	11,300	16,018	1,068	106.8	1	2	None	0	0.0148	0.0022	0.0148	0.0022	0.66	0.08	0.10	0.01
TA2	Shaft cuttings for disposal - Truck loading	Topsoil/Overburden	12	365	19,000	33,345	91	7.6	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.00	0.01	0.00	0.00
TA3	Mining Activities -Truck loading	Waste Rock	24	365	379,296	665,664	1,824	76.0	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.07	0.17	0.01	0.03
<b>Surface Works</b>																				
TA4	Site clearing - Truck loading	Topsoil	12	120	126,029	195,660	1,631	135.9	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.06	0.06	0.01	0.01
TA5	Excavations Activities - Truck loading	Overburden	12	90	44,517	69,113	768	64.0	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.03	0.02	0.00	0.00

<sup>a</sup> See Appendix 5.1B (annual) Table 1 for material throughput information.

<sup>b</sup> Moisture content data based on the Golder specialist's experience in soils.

<sup>c</sup> Based on Emission Factor of USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

**Uncontrolled EF (UEF) Equation :**

$$UEF \text{ (lb/ton)} = k \times (0.0032) \times (U / 5)^{1.3} / [(M / 2)^{1.4}]$$

where: U = Mean wind speed (miles/hr) \*

k = Particle size multiplier

**Controlled EF (CEF) Equation :**

$$CEF \text{ (lb/ton)} = UEF \text{ (lb/ton)} \times [100\% - \text{Control efficiency (\%)}]$$

36.33	11.87	0.35	0.053
Daily	Annual	(PM10)	(PM2.5)

\* Calculated from the Mojave Airport 2020 met data

Emission factor: USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

**Table 7  
Fugitive PM Emissions from Bulldozers  
Construction Phase  
Gem Site - Hydrostor**

Parameters	Bulldozing/Scraping Activities	
	Foundation and Compaction - Surface Works	Mining Surface
<b>ID</b>	<b>B1</b>	<b>B2</b>
<b>Operational Data</b>		
Daily Operation Hours (hrs/day)	4	12
Total No. of Operating Days for activity (days)	150	365
No. of active bulldozers/loaders/excavators/scrapers	2	1
<b>Site Characteristics <sup>b</sup></b>		
M = Moisture content (%)	3.4	3.4
s = Silt content of site specific unpaved roads (%)	7.5	7.5
<b>Control Efficiency</b>		
Dust Control Method <sup>c</sup>	Watering	Watering
Dust Control Efficiency (%)	70	70
<b>Calculated PM Emission Factors (EF) <sup>a</sup></b>		
Uncontrolled TSP EF (lb/hr)	13.03	13.03
Controlled TSP EF (lb/hr)	3.91	3.91
Uncontrolled PM <sub>15</sub> EF (lb/hr)	3.70	3.70
Controlled PM <sub>15</sub> EF (lb/hr)	1.11	1.11
Uncontrolled PM <sub>10</sub> EF (lb/hr)	2.78	2.78
Controlled PM <sub>10</sub> EF (lb/hr)	0.83	0.83
Uncontrolled PM <sub>2.5</sub> EF (lb/hr)	1.37	1.37
Controlled PM <sub>2.5</sub> EF (lb/hr)	0.41	0.41
<b>Estimated Emissions Rates (ER) <sup>d</sup></b>		
PM <sub>10</sub> ER lb/hr (daily basis)	0.22	0.33
PM <sub>10</sub> ER tons (year)	0.40	1.460
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.11	0.16
PM <sub>2.5</sub> ER tons (year)	0.197	0.719

<sup>a</sup> Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation :  $UEF (lb/hr) = 5.7 \times (s)^{1.2} / (M)^{1.3}$   
 Controlled TSP EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>15</sub> EF (UEF) Equation :  $UEF (lb/hr) = 1.0 \times (s)^{1.5} / (M)^{1.4}$   
 Controlled PM<sub>15</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>10</sub> EF (UEF) Equation :  $UEF (kg/hr) = 0.75 \times \text{UEF of PM}_{15}$   
 Controlled PM<sub>10</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>2.5</sub> EF (UEF) Equation :  $UEF (kg/hr) = 0.105 \times \text{UEF of TSP}$   
 Controlled PM<sub>2.5</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$

<sup>b</sup> Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

<sup>c</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March 2012).

<sup>d</sup> ER = EF x No. of active bulldozers.



**Table 9  
Fugitive PM Emissions from Wind Erosion of Exposed Surface Areas  
Construction Phase  
Gem Site - Hydrostor**

Parameters	Activity Areas
	Clearing & Stripping
<b>ID</b>	<b>WE1</b>
<b>Operational Data</b>	
Hours of Exposure (hrs/day)	24
Hours of Exposure (hrs/yr)	3360
Unvegetated Surface Area (acres) <sup>b</sup>	35.3
<b>Site Characteristics<sup>c</sup></b>	
Daily hours of precipitation ≥ 0.25 mm (p)	0
Annual days of precipitation ≥ 0.25 mm (p)	16
Daily % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	67.7
Annual % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	39.9
<b>Control Efficiency</b>	
Dust Control Method <sup>d</sup>	Watering as needed
Dust Control Efficiency (%) <sup>d</sup>	70
<b>Particle Size Multipliers (k)<sup>e</sup></b>	
For TSP	1.0
For PM <sub>10</sub>	0.50
For PM <sub>2.5</sub>	0.25
<b>Calculated PM Emission Factors (EF)<sup>a</sup></b>	
Uncontrolled TSP EF (ton/acre/yr)	0.38
Uncontrolled PM <sub>10</sub> EF (ton/acre/yr)	0.19
Uncontrolled PM <sub>2.5</sub> EF (ton/acre/yr)	0.095
Controlled TSP EF (ton/acre/yr)	0.11
Controlled PM <sub>10</sub> EF (ton/acre/yr)	0.06
Controlled PM <sub>2.5</sub> EF (ton/acre/yr)	0.029
<b>Estimated Emissions Rates<sup>a</sup></b>	
TSP ER lb/hr (daily basis)	0.92
TSP ER tons (year)	4.02
PM <sub>10</sub> ER lb/hr (daily basis)	0.46
PM <sub>10</sub> ER tons (year)	2.01
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.23
PM <sub>2.5</sub> ER tons (year)	1.01

<sup>a</sup> Emission factor equation from Table 11.9-4 (wind erosion of exposed areas) of US EPA AP-42 Section 11.9 for Western Surface Coal Mines:

Uncontrolled TSP EF (UEF) Equation :  $UEF \text{ (ton/acre/yr)} = k \times 0.38$   
 Controlled TSP EF (CEF) Equation :  $CEF \text{ (ton/acre/yr)} = UEF \text{ (ton/acre/yr)} \times [100 - \text{Control efficiency (\%)}]$

<sup>b</sup> Area of unvegetated surface based on the total area of the future plant. It was considered the half of the total area of the site where clearing and stripping activities will be happening in 12 months

<sup>c</sup> Based on hourly surface meteorological data from the Mojave Airport for 2020.

<sup>d</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March 2012).

<sup>e</sup> Particle size based on AP-42 Section 13.2.5 recommendation.

**Table 10**  
**Fugitive PM Emissions from Wind Erosion of Stock Piles**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Cavern Works		Surface Works	
	Shaft Cutting	Waste Rock - Mining	Site Clearing	Excavations
<b>Activity ID</b>	<b>WS1</b>	<b>WS2</b>	<b>WS3</b>	<b>WS4</b>
<b>Operational Data</b>				
Daily Operation Hours (hrs/day)	24	24	24	24
No. of Annual Operating Days (days/yr)	365	365	120	90
Material Type	Topsoil/Overburden	Waste Rock	Topsoil	Overburden
Pile Description (shape)	Conical	Conical	Conical	Conical
Height of Pile (m) <sup>a</sup>	3.4	9	9	7
Total Material Piled (tons)	33,345	665,664	195,660	69,113
Daily Material Piled (tons/day)	91	1,824	1,631	768
Daily Material Piled (m <sup>3</sup> /day) <sup>b</sup>	40	795	803	378
Cone-shaped pile base area (m <sup>2</sup> )	36	261	263	159
Cone-shaped pile base radius (m)	3.4	9.1	9.2	7.1
Estimated angle of repose (degrees)	45.0	45.0	45.0	45.0
Cone-shaped pile exposed surface area (m <sup>2</sup> )	50	369	372	225
Rectangular Pile Length (m)	--	--	--	--
Rectangular Pile Width (m)	--	--	--	--
Rectangular pile exposed surface area (m <sup>2</sup> )	--	--	--	--
No. of piles	1	1	1	1
<b>Emissions Factor</b>				
Annual Erosion Potential, P (g/m <sup>2</sup> /yr) <sup>c</sup>	17167.8	17167.8	17167.8	17167.8
Annual % of time hourly wind speed ≥ 5.4 m/s or 12 mph <sup>d</sup>	39.9	39.9	39.9	39.9
Annual hours with wind speed ≥ 5.4 m/s or 12 mph <sup>e</sup>	3455	3455.0	3455.0	3455.0
<b>Control Efficiency</b>				
Dust Control Method <sup>e</sup>	Watering	Watering	Watering	Watering
Dust Control Efficiency (%) <sup>f</sup>	50	50	50	50
<b>Particle Size Multipliers (k)<sup>g</sup></b>				
For TSP	1.0	1.0	1.0	1.0
For PM <sub>10</sub>	0.50	0.50	0.50	0.50
For PM <sub>2.5</sub>	0.075	0.075	0.075	0.075
<b>Estimated Emissions Rates (ER)<sup>g</sup></b>				
Annual TSP ER ton/yr	0.48	3.50	3.52	2.13
Annual PM <sub>10</sub> ER ton/yr	0.24	1.75	1.76	1.07
Annual PM <sub>2.5</sub> ER ton/yr	0.04	0.26	0.26	0.16
TSP ER lb/hr (annual basis)	0.11	0.80	0.80	0.49
PM <sub>10</sub> ER lb/hr (annual basis)	0.05	0.40	0.40	0.24
PM <sub>2.5</sub> ER lb/hr (annua basis)	0.01	0.06	0.06	0.04

<sup>a</sup> Height estimated to result in a 45 degree angle of repose based on the daily throughput.

<sup>b</sup> The densities are provided in Table 1 for each material

<sup>c</sup> Annual wind erosion potential estimated based on Equation 3 of AP-42 Section 13.2.5 (Industrial Wind Erosion). Threshold wind speed assumed to be 0.50 m/s.

<sup>d</sup> Based on hourly surface meteorological data from Mojave Airport for 2020.

<sup>e</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust (March 2012).

<sup>f</sup> Control Efficiency based for water sprays in Stockpiles, Table 4 of Emission Estimation Technique Manual - National Pollutant Inventory, Australian Government, January 2012.

<sup>g</sup> Annual emissions estimated based on the exposed surface area and the wind erosion potential. Hourly emissions estimated from annual rates based.

**TABLE 11**  
**GREENHOUSE GASES EMISSION ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase**  
**Gem Site - Hydrostor**

Road ID	Description	Vehicle	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Fuel Consumption mpg (miles/gallon)	Fuel Type	Default High Heat Value (MMBtu/gallon) <sup>a</sup>	Total Miles Travelled (VMT/day)	Total Miles Travelled (VMT/year)
							Distillate Fuel Oil No 2	0.138		
Haul Road 1	Workforce (Site Clearing) - Cavern Works	Passenger Car	0.64	80	2	26	ULSD	0.138	8	618
Haul Road 2	Equipment mobilization - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	6
Haul Road 3	Equipment demobilization - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	6
Haul Road 4	Fuel delivery - Cavern Works	Fuel truck (tandem)	0.64	80	2	7	ULSD	0.138	1	52
Haul Road 5	Fencing delivery - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	1
Haul Road 6	Concrete trucks - Cavern Works	Cement mix truck (10 yd)	0.64	15	10	8	ULSD	0.138	1	19
Haul Road 7	Gravel delivery - Cavern Works	Tandem truck load (12 yd)	0.64	15	10	9	ULSD	0.138	41	607
Haul Road 8	Trailer delivery - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	8
Haul Road 9	Workforce (Shaft) - Cavern Works	Passenger car	0.64	20	2	26	ULSD	0.138	12	251
Haul Road 10	Shaft cuttings for disposal - Cavern Works	12 cy dump truck	0.64	365	12	8	ULSD	0.138	3	1,020
Haul Road 11	Workforce (Mining) - Cavern Works	Passenger car	0.64	365	2	26	ULSD	0.138	35	12,855
Haul Road 12	Surface equipment (mobilization) - Cavern Works	Tractor Trailer	0.64	30	2	8	ULSD	0.138	1	32
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	Tractor Trailer	0.64	30	2	8	ULSD	0.138	1	23
Haul Road 14	Ground support - Cavern Works	Flatbed tractor trailer	0.64	365	2	9	ULSD	0.138	1	15
Haul Road 15	Explosives - Cavern Works	Flatbed tractor trailer	0.64	365	2	9	ULSD	0.138	1	15
Haul Road 16	Transportation of waste rock - Cavern Works	Dump trucks (12 yd)	0.64	365	24	8	ULSD	0.138	56	20,359
Haul Road 17	Workforce - Surface Works	Passenger Car	0.19	240	2	26	ULSD	0.138	71	17,077
Haul Road 18	Site clearing (overburden) - Surface Works	12 cy dump truck	0.19	120	12	8	ULSD	0.138	16	1,946
Haul Road 19	Civil foundation excavation Surface Works	12 cy dump truck	0.19	90	12	8	ULSD	0.138	10	893
Haul Road 20	Cement Trucks Surface Works	12 cy cement truck	0.19	30	12	10	ULSD	0.138	17	513
Haul Road 21	Equipment and material delivery Surface Works	Flatbed	0.19	365	2	8	ULSD	0.138	1	180
Haul Road 22	Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	1	167
Haul Road 23	Non Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	4	1,271
Haul Road 24	Non Potable Water - Reservoir Fill	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	26	9,204

<sup>a</sup> Default High Heat Value for Distillate Fuel Oil No 2 and default CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emission factors, Table C1 and C2 to Subpart C of Part 98.  
<sup>b</sup> Mileage-weighted average emission factors (g/mile) based on the following formula: HHV (MMBtu/gallon) x EF (Kg/MMBtu) x (1/mpg) x (1000 g/kg)  
<sup>c</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

**TABLE 11  
GREENHOUSE GASES EMISSION ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK  
TRAFFIC  
Construction Phase  
Gem Site - Hydrostor**

Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile) <sup>b</sup>			Daily Emissions <sup>c</sup>			Hourly Emissions <sup>c</sup>			Annual Emissions <sup>c</sup>		
CO2	CH4	N2O	Total CO <sub>2</sub> (lbs/day)	Total CH <sub>4</sub> (lbs/day)	Total N <sub>2</sub> O (lbs/day)	Total CO <sub>2</sub> (lbs/hr)	Total CH <sub>4</sub> (lbs/hr)	Total N <sub>2</sub> O (lbs/hr)	Total CO <sub>2</sub> (tons/yr)	Total CH <sub>4</sub> (tons/yr)	Total N <sub>2</sub> O (tons/yr)
<b>Emission Factor (kg/MMBtu)<sup>a</sup></b>											
73.9600	0.0030	0.0006									
392.6	0.016	0.003	6.6892	0.0003	0.0001	3.3446	0.0001	0.0000	0.2676	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0094	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0094	0.0000	0.0000
1,523.4	0.062	0.012	2.1632	0.0001	0.0000	1.0816	0.0000	0.0000	0.0865	0.0000	0.0000
1,327.2	0.054	0.011	1.8847	0.0001	0.0000	0.9423	0.0000	0.0000	0.0019	0.0000	0.0000
1,360.9	0.055	0.011	3.8649	0.0002	0.0000	0.3865	0.0000	0.0000	0.0290	0.0000	0.0000
1,121.6	0.045	0.009	100.3378	0.0041	0.0008	10.0338	0.0004	0.0001	0.7499	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0113	0.0000	0.0000
392.6	0.016	0.003	10.0338	0.0004	0.0001	5.0169	0.0002	0.0000	0.1087	0.0000	0.0000
1,300.2	0.053	0.011	9.2314	0.0004	0.0001	0.7693	0.0000	0.0000	1.4616	0.0001	0.0000
392.6	0.016	0.003	30.6588	0.0012	0.0002	15.3294	0.0006	0.0001	5.5624	0.0002	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0471	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0330	0.0000	0.0000
1,121.6	0.045	0.009	1.5927	0.0001	0.0000	0.7963	0.0000	0.0000	0.0191	0.0000	0.0000
1,121.6	0.045	0.009	1.5927	0.0001	0.0000	0.7963	0.0000	0.0000	0.0191	0.0000	0.0000
1,300.2	0.053	0.011	160.6256	0.0065	0.0013	6.6927	0.0003	0.0001	29.1785	0.0012	0.0002
392.6	0.016	0.003	61.5771	0.0025	0.0005	30.7886	0.0012	0.0002	7.3893	0.0003	0.0001
1,300.2	0.053	0.011	46.7385	0.0019	0.0004	3.8949	0.0002	0.0000	2.7890	0.0001	0.0000
1,300.2	0.053	0.011	28.6804	0.0012	0.0002	2.3900	0.0001	0.0000	1.2805	0.0001	0.0000
1,063.2	0.043	0.009	40.3900	0.0016	0.0003	3.3658	0.0001	0.0000	0.6017	0.0000	0.0000
1,327.2	0.054	0.011	1.6265	0.0001	0.0000	0.8133	0.0000	0.0000	0.2627	0.0000	0.0000
1,275.8	0.052	0.010	1.8117	0.0001	0.0000	0.0755	0.0000	0.0000	0.2352	0.0000	0.0000
1,275.8	0.052	0.010	10.8699	0.0004	0.0001	0.4529	0.0000	0.0000	1.7879	0.0001	0.0000
1,275.8	0.052	0.010	72.4662	0.0029	0.0006	3.0194	0.0001	0.0000	12.9432	0.0005	0.0001

Emission Inventory for Construction  
(On-Site, Month 18) for Short-Term  
Dispersion Modeling

**EMISSIONS SUMMARY - CRITERIA POLLUTANTS  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate	
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Non-Stationary Sources</b>														
<b>Unpaved Roads</b>														
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	0.1	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.1	0.2	0.0	0.0	-	-	-	-	-	-	-	-
UP17	Surface Works	Workforce - Surface Works	0.5	1.3	0.0	0.1	-	-	-	-	-	-	-	-
UP20	Surface Works	Cement Trucks Surface Works	0.4	0.1	0.0	0.0	-	-	-	-	-	-	-	-
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.1	0.3	0.0	0.0	-	-	-	-	-	-	-	-
<b>Total Unpaved</b>			1.05	2.00	0.10	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>														
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.037	0.001	0.001	0.000
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.001	0.001	0.000	0.000
UP17	Surface Works	Workforce - Surface Works	0.0002	0.000	0.000	0.000	0.009	0.002	0.005	0.001	0.225	0.054	0.004	0.001
UP20	Surface Works	Cement Trucks Surface Works	0.0002	0.000	0.000	0.000	0.008	0.001	0.001	0.000	0.003	0.001	0.000	0.000
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.001	0.004	0.000	0.000	0.000	0.002	0.000	0.000
<b>Total Traffic Exhaust</b>			0.00	0.00	0.000	0.000	0.02	0.01	0.01	0.00	0.27	0.06	0.00	0.00
<b>Exhaust Emissions from Non-Road Engines</b>														
EXH-1	Surface Works	Indirect Equipment	0.023	0.04	0.02	0.04	0.47	0.76	0.23	0.37	0.46	0.74	0.01	0.01
EXH-2	Surface Works	Foundation and Compaction	0.182	0.01	0.18	0.01	2.49	0.15	1.46	0.09	1.61	0.10	0.04	0.00
EXH-3	Surface Works	Turbine Hall	0.019	0.01	0.02	0.01	0.17	0.06	0.12	0.05	0.13	0.06	0.00	0.00
EXH-4	Surface Works	Spheres	0.016	0.02	0.02	0.02	0.16	0.23	0.10	0.14	0.11	0.14	0.00	0.00
EXH-9	Cavern Works	Primary Equipment	0.020	0.00	0.02	0.00	0.31	0.02	0.15	0.01	0.15	0.01	0.01	0.00
<b>Total Non-Road Exhaust</b>			0.26	0.08	0.26	0.08	3.60	1.23	2.06	0.66	2.47	1.05	0.06	0.02
<b>Stationary Sources</b>														
<b>Material Handling</b>														
TF2	Cavern Works	Shaft cuttings for disposal - Truck loading	0.003	0.01	0.00	0.00	-	-	-	-	-	-	-	-
<b>Transfer Areas Total</b>			0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Bulldozing</b>														
BD 1	Surface Works	Foundation and Compaction - Surface Works	0.222	0.40	0.11	0.20	-	-	-	-	-	-	-	-
<b>Bulldozing Total</b>			0.22	0.40	0.11	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Grading</b>														
GD1	Surface Works	Foundation and Compaction	0.192	0.35	0.01	0.03	-	-	-	-	-	-	-	-
<b>Grading Total</b>			0.19	0.35	0.01	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Wind Erosion of Exposed Surface Areas</b>														
WE1	Total Area of the Site	Clearing & Stripping	0.459	2.010	0.229	1.005	-	-	-	-	-	-	-	-
<b>Wind Erosion Areas Total</b>			0.459	2.010	0.229	1.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Wind Erosion of Stock Piles</b>														
WS1	Cavern Works	Shaft Cutting	0.05	0.24	0.01	0.04	-	-	-	-	-	-	-	-
<b>Wind Erosion Stockpile Total</b>			0.05	0.24	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Emissions</b>			2.2	5.1	0.7	1.5	3.6	1.2	2.07	0.66	2.7	1.1	0.1	0.0

**EMISSIONS SUMMARY - GREENHOUSE GASES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

ID	Activity	Description	CO <sub>2</sub> Emission Rate		CH <sub>4</sub> Emission Rate		N <sub>2</sub> O Emission Rate	
			24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Non-Stationary Sources</b>								
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>								
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	5.02	0.11	0.00	0.00	0.00	0.00
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.77	1.46	0.00	0.00	0.00	0.00
UP17	Surface Works	Workforce - Surface Works	30.79	7.39	0.00	0.00	0.00	0.00
UP20	Surface Works	Cement Trucks Surface Works	3.37	0.60	0.00	0.00	0.00	0.00
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.08	0.24	0.00	0.00	0.00	0.00
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.45	1.94	0.00	0.00	0.00	0.00
<b>Total Traffic Exhaust</b>			<b>40.47</b>	<b>11.74</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Exhaust Emissions from Non-Road Engines</b>								
EXH-1	Surface Works	Indirect Equipment	998.85	1,602.67	-	-	-	-
EXH-2	Surface Works	Foundation and Compaction	4,690.23	289.44	-	-	-	-
EXH-3	Surface Works	Turbine Hall	340.53	128.74	-	-	-	-
EXH-4	Surface Works	Spheres	309.86	447.96	-	-	-	-
EXH-9	Cavern Works	Primary Equipment	596.60	46.59	-	-	-	-
<b>Total Non-Road Exhaust</b>			<b>6,936.07</b>	<b>2,515.41</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions</b>			<b>6,976.5</b>	<b>2,527.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Parameters	Shaft Construction		Surface Works		Surface Works & Cavern	
	Workforce	Shaft cuttings for disposal	Workforce	Cement Trucks	Potable Water	Non Potable Water
<b>Material Throughput</b>						
Total Area (acres)	--	--	--	--	--	--
Material Depth (in)	--	--	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	513,000	--	--	--	--
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	19,000	--	--	--	--
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	130.0	--	--	--	--
Total Material Weight (tons)	--	33,345	--	--	--	--
<b>Operating Time</b>						
Total Operating Weeks (weeks) <sup>c</sup>	4	52	52	4	52	52
Total Operating Days (days) <sup>c</sup>	20	365	240	30	365	365
Daily Operating Hours (hrs/day)	2	12	2	12	24	24
<b>Vehicle and Travel Data</b>						
Vehicle Model <sup>d</sup>	Passenger car	12 cy dump truck	Passenger Car	12 cy cement truck	water truck 9000 gal	water truck 9000 gal
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	25.5	2.3	23.0	23.2	23.2
Vehicle Capacity (tons)	0.8	19.0	0.8	24.0	12.0	12.0
Vehicle Capacity (yd <sup>3</sup> )	--	12.0	--	12.0	-	-
Loaded Vehicle Weight (tons)	3.0	44.5	3.0	47.0	35.3	35.3
W = Average Vehicle Weight (tons)	2.7	35.0	2.7	35.0	29.2	29.2
Number of Vehicles (duration)	390	1,583	92,160	2,771	266	2,143
Number of Vehicles (daily)	18	5	384	93	1	6
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.6	0.6	0.2	0.2	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	11.6	3.2	71	17	1	4
Activity Duration Vehicle Miles Travelled (VMT)	251	1,020	17,077	513	171	1,381

<sup>a</sup> Material quantities based on the document TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>b</sup> The density of 130 lb/ft<sup>3</sup> used for shat material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience.

<sup>c</sup> Operating weeks are based on construction schedule information obtained from Hydrostor.

<sup>d</sup> Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>e</sup> Empty vehicle weights were obtained from technical specifications of each vehicle.

<sup>f</sup> Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel.

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Parameters	Shaft Construction			
	Haul Road 9		Haul Road 10	
	Workforce		Shaft cuttings for disposal	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Vehicle and Travel Data <sup>b</sup></b>				
W = Average Vehicle Weight (tons)	2.7	2.7	35.0	35.0
D = Distance traveled on unpaved roads (2-way miles)	0.6	0.6	0.6	0.6
Daily Operation Hours (hrs/day)	2	2	12	12
Total No. of Operating Days for activity (days)	20	20	365	365
No. of truck trips per day (trucks/day)	18	18	5	5
Total No. of trucks for activity (trucks)	390	390	1,583	1,583
Daily Vehicle Miles Travelled (VMT)	12	12	3	3
Activity Duration Vehicle Miles Travelled (VMT)	251	251	1,020	1,020
<b>Site Characteristics</b>				
k = Particle size multiplier (lb/VMT) <sup>c</sup>	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>e</sup>	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>				
Dust Control Efficiency (%) <sup>e</sup>	85	85	85	85
<b>Emission Factors <sup>a</sup></b>				
Emission Factor (lb/VMT) - Daily <sup>e</sup>	1.0	0.1	3.3	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.10	3.18	0.32
<b>Emission Rates <sup>a</sup></b>				
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	12.1	1.2	10.7	1.1
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	0.1	0.0	1.6	0.2
Controlled Daily Emissions (lb/day)	1.8	0.2	1.6	0.2
Controlled Annual Emissions (TPY)	0.0	0.0	0.2	0.0
Controlled Hourly Emissions (lb/hr, daily basis)	0.1	0.0	0.1	0.0
Emission Factor (lb/hr/mi)	0.2	0.0	0.2	0.0

<sup>b</sup> See Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>e</sup> Dust control efficiency based on 70% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Parameters	Surface Works				Surface Works & Cavern			
	Haul Road 17		Haul Road 20		Haul Road 22		Haul Road 23	
	Workforce		Cement Trucks		Potable Water		Non Potable Water	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Vehicle and Travel Data <sup>b</sup></b>								
W = Average Vehicle Weight (tons)	2.7	2.7	35.0	35.0	29.2	29.2	29.2	29.2
D = Distance traveled on unpaved roads (2-way miles)	0.2	0.2	0.2	0.2	0.6	0.6	0.6	0.6
Daily Operation Hours (hrs/day)	2	2	12	12	24	24.0	24	24.0
Total No. of Operating Days for activity (days)	240	240	30	30	365	365.0	365	365.0
No. of truck trips per day (trucks/day)	384	384	93	93	1	1.0	6	6.0
Total No. of trucks for activity (trucks)	92,160	92,160	2,771	2,771	266	265.6	2,143	2,143
Daily Vehicle Miles Travelled (VMT)	71	71	17	17	1	0.6	4	3.9
Activity Duration Vehicle Miles Travelled (VMT)	17,077	17,077	513	513	171	171.0	1,381	1,381
<b>Site Characteristics</b>								
k = Particle size multiplier (lb/VMT) <sup>c</sup>	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>e</sup>	16	16	16	16	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>								
Dust Control Efficiency (%) <sup>e</sup>	85	85	85	85	85	85	85	85
<b>Emission Factors <sup>a</sup></b>								
Emission Factor (lb/VMT) - Daily <sup>e</sup>	1.0	0.1	3.3	0.3	3.1	0.3	3.1	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.10	3.18	0.32	2.93	0.29	2.93	0.29
<b>Emission Rates <sup>a</sup></b>								
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	74.0	7.4	57.2	5.7	2.0	0.2	11.8	1.2
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	8.49	0.85	0.82	0.08	0.25	0.03	2.02	0.20
Controlled Daily Emissions (lb/day)	11.1	1.1	8.6	0.9	0.3	0.0	1.8	0.2
Controlled Annual Emissions (TPY)	1.3	0.1	0.1	0.0	0.0	0.0	0.3	0.0
Controlled Hourly Emissions (lb/hr, daily basis)	0.5	0.0	0.4	0.0	0.0	0.0	0.1	0.0
Emission Factor (lb/hr/mi)	5.0	0.5	3.9	0.4	0.0	0.0	0.2	0.0

<sup>b</sup> See Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>e</sup> Dust control efficiency based on 70% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/day)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Hourly Emissions						
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (lbs/hr)	Total PM <sub>2.5</sub> (lbs/hr)	Total VOC (lbs/hr)	Total NO <sub>x</sub> (lbs/hr)	Total CO (lbs/hr)	Total SO <sub>2</sub> (lbs/hr)
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																							
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617						
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859						
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859						
<b>Daily Emissions (lbs/day)<sup>b</sup></b>																							
Haul Road 9	Workforce (Shaft) - Cavern Works	0.64	20	2	5,300	LDGV	<6,000	Diesel	12	7.32E-02	3.08E-03	1.29E-03	1.97E-04	4.60E-04	1.81E-04	1.18E-04	1.58E-03	2.74E-05	1.25E-05	0.0008	0.0015	0.0366	0.0006
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.64	365	12	70,000	HDDV8b	>60,000	Diesel	3	7.34E-03	1.68E-02	9.15E-05	1.91E-04	5.26E-04	1.85E-04	1.35E-04	1.32E-03	2.99E-05	1.34E-05	0.0001	0.0014	0.0006	0.0000
Haul Road 17	Workforce - Surface Works	0.19	240	2	5,300	LDGV	<6,000	Diesel	71	4.50E-01	1.89E-02	7.89E-03	1.21E-03	2.82E-03	1.11E-03	7.22E-04	9.68E-03	1.68E-04	7.65E-05	0.0048	0.0095	0.2248	0.0039
Haul Road 20	Cement Trucks Surface Works	0.19	30	12	70,000	HDDV8b	>60,000	Diesel	17	3.93E-02	9.01E-02	4.90E-04	1.02E-03	2.81E-03	9.92E-04	7.23E-04	7.06E-03	1.60E-04	7.15E-05	0.0006	0.0075	0.0033	0.0000
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0000	0.0001	0.0001	0.0000
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	4	8.81E-03	2.02E-02	1.10E-04	2.29E-04	6.31E-04	2.22E-04	1.62E-04	1.58E-03	3.58E-05	1.60E-05	0.0001	0.0008	0.0004	0.0000

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/year)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Annual Emissions										
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (tons/yr)	Total PM <sub>2.5</sub> (tons/yr)	Total VOC (tons/yr)	Total NO <sub>x</sub> (tons/yr)	Total CO (tons/yr)	Total SO <sub>2</sub> (tons/yr)				
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																											
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617										
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859										
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859										
<b>Annual Emissions (lbs/year)<sup>b</sup></b>																											
Haul Road 9	Workforce (Shaft) - Cavern Works	0.64	20	2	5300	LDGV	<6,000	Diesel	251	1.59	0.07	0.03	0.00	0.01	0.00	0.00	0.03	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000				
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.64	365	12	70000	HDDV8b	>60,000	Diesel	1,020	2.33	5.33	0.03	0.06	0.17	0.06	0.04	0.14	0.0001	0.0001	0.0001	0.0027	0.0012	0.0000				
Haul Road 17	Workforce - Surface Works	0.19	240	2	5300	LDGV	<6,000	Diesel	17,077	107.88	4.54	1.89	0.29	0.68	0.27	0.17	2.32	0.0005	0.0002	0.0012	0.0023	0.0539	0.0009				
Haul Road 20	Cement Trucks Surface Works	0.19	30	12	70000	HDDV8b	>60,000	Diesel	513	1.17	2.68	0.01	0.03	0.08	0.03	0.02	0.07	0.0001	0.0000	0.0000	0.0013	0.0006	0.0000				
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	171	0.39	0.89	0.00	0.01	0.03	0.01	0.01	0.02	0.0000	0.0000	0.0000	0.0004	0.0002	0.0000				
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	1,381	3.15	7.22	0.04	0.08	0.23	0.08	0.06	0.19	0.0002	0.0001	0.0001	0.0036	0.0016	0.0000				

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

**Table 4**  
**Estimation of Emissions Factors for Non-Road Equipment Used in the Project**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Equipment Description	Number of Equipment	Engine Power (hp) <sup>g</sup>	Engine Tier Rating	Unadjusted Emission Factor (EFs) <sup>a</sup>					Transient Adjustment Emission Factor (TAF) <sup>b</sup>					Deterioration Emission Factor (DF) <sup>c</sup>				S Adjustment <sup>d</sup> (g/hp-hr)	Adjusted Emission Factor (EFadj) <sup>e</sup>				Emission Factor <sup>f</sup>	
				HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>		HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>
				(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(lb/hp-h)											(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)
<b>Surface Works</b>																								
<u>Indirect</u>																								
60 kW Diesel Gensets	12	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
<u>Foundation and Compaction</u>																								
Wheel Loader	2	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Crawler Loader	12	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Grader	7	160	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Crawler dozer	2	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Scraper	9	270	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Backhoe	16	120	4	0.1314	0.0870	0.2760	0.0092	0.367	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.257	0.337	0.032	625.645	0.0058
Roller	11	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.020	595.821	0.0055
Pile driver hammer	4	250	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<u>Turbine Hall</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	5	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Spheres</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<b>Cavern Works</b>																								
Drill rigs (electrical)	3	675	4	0.1314	0.1330	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.153	0.278	0.014	530.613	0.0049
30 ton cranes	3	173	4	0.1314	0.0870	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.100	0.278	0.014	530.613	0.0049
6" water pumps	3	58	4	0.1314	0.2370	0.2760	0.0184	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.027	589.939	0.0054
Long stick track hoe	1	187	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Off road dump truck, 30 t	1	370	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049

<sup>a</sup> Zero-Hour, steady-state emission factors for nonroad CI engines from EPA-420-B-16-022, Table A4

<sup>b</sup> Transient Adjustment Factors by Equipment Type for Nonroad CI Equipment, Table A5.

<sup>c</sup> Deterioration Factors for Nonroad Diesel Engines, Table A6.

<sup>d</sup> Adjustment to PM emission factor to account for variations in fuel sulfur content is made using the following equation -

$$\begin{aligned}
 \text{soxcnv} &= 0.02247 \text{ grams PM sulfur/grams fuel sulfur consumed} \\
 \text{soxbas} &= 0.33 \text{ percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 1 and 2)} \\
 &= 0.0015 \text{ percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 3 and 4)} \\
 \text{soxdsl} &= 0.0015 \text{ percent (15 ppm is the maximum ultra low sulfur diesel - ULSD)}
 \end{aligned}$$

<sup>e</sup> For all pollutants except PM, adjusted Emission Factor = UAF x TAF x DF.

For PM, adjusted Emission Factor = UAF x TAF x DF - S<sub>PM adj</sub>.

<sup>f</sup> Emission Factor for SO<sub>2</sub> = [BSFC x 453.6 x (1 - soxcnv) - HC] x 0.01 x soxdsl x (64/32).

**Table 5**  
**Estimation of Emissions Rates for Non-Road Equipment used in the Project**  
**Construction Phase - Month 1E**  
**Gem Site - Hydrostor**

Equipment Description	NUMBER OF EQUIPMENT	ENGINE POWER (hp)	Assumed Load (%)	Availability (%)	HOURS OF OPERATION <sup>d</sup>	Emission Factors <sup>a</sup>						Hourly Emission Rates (Average Hourly) <sup>b</sup>						Annual Emission Rates (Average Annual) <sup>f</sup>					
						HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO2	SO2	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO2	SO2	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO2	SO2
						(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)
<b>Surface Works</b>																							
<b>Indirect Equipment</b>																							
60 kW Diesel Gensets	12	100	80%	80%	2,912	0.135	0.273	0.278	0.014	589.939	0.005	0.104	0.210	0.214	0.010	453.073	0.004	0.33	0.67	0.69	0.03	1453.92	0.01
						<b>EXH-1 Total (kg/h and tonne/year)</b>																	
												<b>EXH-1 Total (lb/h and ton/year)</b>											
<b>Foundation and Compaction</b>																							
Wheel Loader	2	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.014	0.015	0.028	0.002	51.447	0.000	0.00	0.00	0.00	0.00	6.35	0.00
Crawler Loader	12	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.082	0.088	0.167	0.011	308.679	0.003	0.01	0.01	0.02	0.00	38.10	0.00
Grader	7	160	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.063	0.069	0.130	0.009	240.084	0.002	0.01	0.01	0.02	0.00	29.63	0.00
Crawler dozer	2	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.014	0.015	0.028	0.002	51.447	0.000	0.00	0.00	0.00	0.00	6.35	0.00
Scraper	9	270	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.138	0.128	0.281	0.019	520.896	0.005	0.02	0.02	0.03	0.00	64.29	0.00
Backhoe	16	120	50%	80%	112	0.309	0.257	0.337	0.032	625.645	0.006	0.237	0.198	0.259	0.025	480.495	0.004	0.03	0.02	0.03	0.00	59.30	0.00
Roller	11	100	50%	80%	112	0.142	0.417	0.289	0.020	595.821	0.005	0.062	0.184	0.127	0.009	262.161	0.002	0.01	0.02	0.02	0.00	32.36	0.00
Pile driver hammer	4	250	50%	80%	112	0.135	0.086	0.278	0.014	530.613	0.005	0.054	0.035	0.111	0.005	212.245	0.002	0.01	0.00	0.01	0.00	26.20	0.00
						<b>EXH-2 Total (kg/h and tonne/year)</b>																	
												<b>EXH-2 Total (lb/h and ton/year)</b>											
<b>Turbine Hall</b>																							
Cranes	2	200	50%	80%	560	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.01	0.01	0.03	0.00	52.39	0.00
Welding machine	5	50	50%	80%	840	0.309	0.453	0.337	0.064	695.650	0.006	0.031	0.045	0.034	0.006	69.565	0.001	0.03	0.04	0.03	0.01	64.39	0.00
						<b>EXH-3 Total (kg/h and tonne/year)</b>																	
												<b>EXH-3 Total (lb/h and ton/year)</b>											
<b>Spheres</b>																							
Cranes	2	200	50%	80%	2,912	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.07	0.04	0.14	0.01	272.44	0.00
Welding machine	4	50	50%	80%	2,184	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.06	0.09	0.06	0.01	133.94	0.00
						<b>EXH-4 Total (kg/h and tonne/year)</b>																	
												<b>EXH-4 Total (lb/h and ton/year)</b>											
<b>Cavern Works</b>																							
<b>Primary Equipment</b>																							
Drill rigs (electrical)	3	675	0%	0%	308	0.135	0.153	0.278	0.014	530.613	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00
30 ton cranes	3	173	50%	80%	112	0.135	0.100	0.278	0.014	530.613	0.005	0.028	0.021	0.058	0.003	110.155	0.001	0.00	0.00	0.01	0.00	13.60	0.00
6" water pumps	3	58	50%	80%	308	0.135	0.273	0.278	0.027	589.939	0.005	0.009	0.019	0.019	0.002	41.060	0.000	0.00	0.01	0.01	0.00	13.94	0.00
Long stick track hoe	1	187	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.011	0.010	0.022	0.001	40.085	0.000	0.00	0.00	0.00	0.00	4.95	0.00
Off road dump truck, 30 t	1	370	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.021	0.020	0.043	0.003	79.313	0.001	0.00	0.00	0.01	0.00	9.79	0.00
						<b>EXH-9 Total (kg/h and tonne/year)</b>																	
												<b>EXH-9 Total (lb/h and ton/year)</b>											

<sup>a</sup> See Table 4 for the derivation of the emission factors.

<sup>b</sup> Emission rate = Engine HP-rating x Emission Factor (g/hp-hr) x No. of Vehicles x (kg/1,000 g)

<sup>c</sup> Emission rate = Engine HP-rating x Emission Factor (g/hp-hr) x No. of Vehicles x (kg/1,000 g) x Annual Operating Hours x (tonne/1,000 kg)

<sup>d</sup> Annual Operating Hours based of the construction schedule and the hours of operation of each equipment.

**TABLE 6**  
**ESTIMATION OF PM10 AND PM2.5 EMISSION FACTORS AND RATES FOR BATCH/CONTINUOUS DROP TRANSFER OPERATIONS**  
 Construction Phase - Month 18  
 Gem Site - Hydrostor

ID	Material Handling Area	Material Type	Operational Data		Material Throughput <sup>a</sup>				Number of Transfers	Moisture Content (M) <sup>b</sup> (%)	Emission Control Data		Daily Uncontrolled Emission Factor <sup>c</sup>		Daily Controlled Emission Factor <sup>c</sup>		Estimated Emission Rate (ER)			
					Total (CY)	Total (tons)	Daily (tons/day)	Hourly (tons/hr)			Method	Efficiency (%)	PM <sub>10</sub> (lb/ton)	PM <sub>2.5</sub> (lb/ton)	PM <sub>10</sub> (lb/ton)	PM <sub>2.5</sub> (lb/ton)	PM <sub>10</sub>		PM <sub>2.5</sub>	
			(hr/day)	(# days)													(lb/hr)	(tons/year)	(lb/hr)	(tons/year)
<b>Caverns Works</b>																				
TA2	Shaft cuttings for disposal - Truck loading	Topsoil/Overburden	12	365	19,000	33,345	91	7.6	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.00	0.01	0.00	0.00

Emission factor: USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

<sup>a</sup> See Table 1 for material throughput information.

<sup>b</sup> Moisture content data based on the Golder specialist's experience in soils.

<sup>c</sup> Based on Emission Factor of USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

**Uncontrolled EF (UEF) Equation :**

$$UEF \text{ (lb/ton)} = k \times (0.0032) \times (U / 5)^{1.3} / [(M / 2)^{1.4}]$$

**Controlled EF (CEF) Equation :**

$$CEF \text{ (lb/ton)} = UEF \text{ (lb/ton)} \times [100\% - \text{Control efficiency (\%)}]$$

where: U = Mean wind speed (miles/hr) \*

36.33	11.87
Daily	Annual

k = Particle size multiplier

0.35	0.053
(PM10)	(PM2.5)

\* Calculated from the Mojave Airport 2020 met data

**Table 7  
Fugitive PM Emissions from Bulldozers  
Construction Phase - Month 18  
Gem Site - Hydrostor**

Parameters	Bulldozing/Scraping Activities
	Foundation and Compaction - Surface Works
<b>ID</b>	<b>B1</b>
<b>Operational Data</b>	
Daily Operation Hours (hrs/day)	4
Total No. of Operating Days for activity (days)	150
No. of active bulldozers/loaders/excavators/scrapers	2
<b>Site Characteristics <sup>b</sup></b>	
M = Moisture content (%)	3.4
s = Silt content of site specific unpaved roads (%)	7.5
<b>Control Efficiency</b>	
Dust Control Method <sup>c</sup>	Watering
Dust Control Efficiency (%)	70
<b>Calculated PM Emission Factors (EF) <sup>a</sup></b>	
Uncontrolled TSP EF (lb/hr)	13.03
Controlled TSP EF (lb/hr)	3.91
Uncontrolled PM <sub>15</sub> EF (lb/hr)	3.70
Controlled PM <sub>15</sub> EF (lb/hr)	1.11
Uncontrolled PM <sub>10</sub> EF (lb/hr)	2.78
Controlled PM <sub>10</sub> EF (lb/hr)	0.83
Uncontrolled PM <sub>2.5</sub> EF (lb/hr)	1.37
Controlled PM <sub>2.5</sub> EF (lb/hr)	0.41
<b>Estimated Emissions Rates (ER) <sup>d</sup></b>	
PM <sub>10</sub> ER lb/hr (daily basis)	0.22
PM <sub>10</sub> ER tons (year)	0.40
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.11
PM <sub>2.5</sub> ER tons (year)	0.197

<sup>a</sup> Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation :  $UEF (lb/hr) = 5.7 \times (s)^{1.2} / (M)^{1.3}$   
 Controlled TSP EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>15</sub> EF (UEF) Equation :  $UEF (lb/hr) = 1.0 \times (s)^{1.5} / (M)^{1.4}$   
 Controlled PM<sub>15</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>10</sub> EF (UEF) Equation :  $UEF (kg/hr) = 0.75 \times UEF \text{ of } PM_{15}$   
 Controlled PM<sub>10</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>2.5</sub> EF (UEF) Equation :  $UEF (kg/hr) = 0.105 \times UEF \text{ of } TSP$   
 Controlled PM<sub>2.5</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$

<sup>b</sup> Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42

<sup>c</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March 2012).

<sup>d</sup> ER = EF x No. of active bulldozers.



**Table 9**  
**Fugitive PM Emissions from Wind Erosion of Exposed Surface Areas**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Parameters	Activity Areas
	Clearing & Stripping
<b>ID</b>	<b>WE1</b>
<b>Operational Data</b>	
Hours of Exposure (hrs/day)	24
Hours of Exposure (hrs/yr)	3360
Unvegetated Surface Area (acres) <sup>b</sup>	35.3
<b>Site Characteristics<sup>c</sup></b>	
Daily hours of precipitation ≥ 0.25 mm (p)	0
Annual days of precipitation ≥ 0.25 mm (p)	16
Daily % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	67.7
Annual % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	39.9
<b>Control Efficiency</b>	
Dust Control Method <sup>d</sup>	Watering as needed
Dust Control Efficiency (%) <sup>d</sup>	70
<b>Particle Size Multipliers (k)<sup>e</sup></b>	
For TSP	1.0
For PM <sub>10</sub>	0.50
For PM <sub>2.5</sub>	0.25
<b>Calculated PM Emission Factors (EF)<sup>a</sup></b>	
Uncontrolled TSP EF (ton/acre/yr)	0.38
Uncontrolled PM <sub>10</sub> EF (ton/acre/yr)	0.19
Uncontrolled PM <sub>2.5</sub> EF (ton/acre/yr)	0.095
Controlled TSP EF (ton/acre/yr)	0.11
Controlled PM <sub>10</sub> EF (ton/acre/yr)	0.06
Controlled PM <sub>2.5</sub> EF (ton/acre/yr)	0.029
<b>Estimated Emissions Rates<sup>a</sup></b>	
TSP ER lb/hr (daily basis)	0.92
TSP ER tons (year)	4.02
PM <sub>10</sub> ER lb/hr (daily basis)	0.46
PM <sub>10</sub> ER tons (year)	2.01
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.23
PM <sub>2.5</sub> ER tons (year)	1.01

<sup>a</sup> Emission factor equation from Table 11.9-4 (wind erosion of exposed areas) of US EPA AP-42 Section 11.9 for Western Surface Coal Mines:

Uncontrolled TSP EF (UEF) Equation :  $UEF \text{ (ton/acre/yr)} = k \times 0.38$   
 Controlled TSP EF (CEF) Equation :  $CEF \text{ (ton/acre/yr)} = UEF \text{ (ton/acre/yr)} \times [100 - \text{Control efficiency (\%)}]$

<sup>b</sup> Area of unvegetated surface based on the total area of the future plant. It was considered the half of the total area of the site where clearing and stripping activities will be happening in 12 months

<sup>c</sup> Based on hourly surface meteorological data from the Mojave Airport for 2020.

<sup>d</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March, 2012).

<sup>e</sup> Particle size based on AP-42 Section 13.2.5 recommendation.

**Table 10**  
**Fugitive PM Emissions from Wind Erosion of Stock Piles**  
**Construction Phase - Month 18**  
**Gem Site - Hydrostor**

Parameters	Cavern Works
	Shaft Cutting
<b>Activity ID</b>	<b>WS1</b>
<b>Operational Data</b>	
Daily Operation Hours (hrs/day)	24
No. of Annual Operating Days (days/yr)	365
Material Type	Topsoil/Overburden
Pile Description (shape)	Conical
Height of Pile (m) <sup>a</sup>	3.4
Total Material Piled (tons)	33,345
Daily Material Piled (tons/day)	91
Daily Material Piled (m <sup>3</sup> /day) <sup>b</sup>	40
Cone-shaped pile base area (m <sup>2</sup> )	36
Cone-shaped pile base radius (m)	3.4
Estimated angle of repose (degrees)	45.0
Cone-shaped pile exposed surface area (m <sup>2</sup> )	50
Rectangular Pile Length (m)	--
Rectangular Pile Width (m)	--
Rectangular pile exposed surface area (m <sup>2</sup> )	--
No. of piles	1
<b>Emissions Factor</b>	
Annual Erosion Potential, P (g/m <sup>2</sup> /yr) <sup>c</sup>	17167.8
Annual % of time hourly wind speed ≥ 5.4 m/s or 12 mph <sup>d</sup>	39.9
Annual hours with wind speed ≥ 5.4 m/s or 12 mph <sup>c</sup>	3455
<b>Control Efficiency</b>	
Dust Control Method <sup>e</sup>	Watering
Dust Control Efficiency (%) <sup>f</sup>	50
<b>Particle Size Multipliers (k)<sup>g</sup></b>	
For TSP	1.0
For PM <sub>10</sub>	0.50
For PM <sub>2.5</sub>	0.075
<b>Estimated Emissions Rates (ER)<sup>g</sup></b>	
Annual TSP ER ton/yr	0.48
Annual PM <sub>10</sub> ER ton/yr	0.24
Annual PM <sub>2.5</sub> ER ton/yr	0.04
TSP ER lb/hr (annual basis)	0.11
PM <sub>10</sub> ER lb/hr (annual basis)	0.05
PM <sub>2.5</sub> ER lb/hr (annua basis)	0.01

<sup>a</sup> Height estimated to result in a 45 degree angle of repose based on the daily throughput.

<sup>b</sup> The densities are provided in Table 1 for each material

<sup>c</sup> Annual wind erosion potential estimated based on Equation 3 of AP-42 Section 13.2.5 (Industrial Wind Erosion). Threshold wind speed assumed to be 0.50 m/s.

<sup>d</sup> Based on hourly surface meteorological data from Mojave Airport for 2020.

<sup>e</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, stockpiles of soil or other fine loose materials shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust (March, 2012).

<sup>f</sup> Control Efficiency based for water sprays in Stockpiles, Table 4 of Emission Estimation Technique Manual - National Pollutant Inventory, Australian Government, January 2012.

<sup>g</sup> Annual emissions estimated based on the exposed surface area and the wind erosion potential. Hourly emissions estimated from annual rates based.

**TABLE 11  
GREENHOUSE GASES EMISSION ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC  
Construction Phase - Month 18  
Gem Site - Hydrostor**

Road ID	Description	Vehicle	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Fuel Consumption mpg (miles/gallon)	Fuel Type	Default High Heat Value (MMBtu/gallon) <sup>a</sup>	Total Miles Travelled (VMT/day)	Total Miles Travelled (VMT/year)	Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile) <sup>b</sup>			Daily Emissions <sup>c</sup>			Hourly Emissions <sup>c</sup>			Annual Emissions <sup>c</sup>		
											CO2	CH4	N2O	Total CO <sub>2</sub> (lbs/day)	Total CH <sub>4</sub> (lbs/day)	Total N <sub>2</sub> O (lbs/day)	Total CO <sub>2</sub> (lbs/hr)	Total CH <sub>4</sub> (lbs/hr)	Total N <sub>2</sub> O (lbs/hr)	Total CO <sub>2</sub> (tons/yr)	Total CH <sub>4</sub> (tons/yr)	Total N <sub>2</sub> O (tons/yr)
							Distillate Fuel Oil No 2	0.138	<u>Emission Factor (kg/MMBtu) <sup>a</sup></u>			73.9600	0.0030	0.0006								
Haul Road 9	Workforce (Shaft) - Cavern Works	Passenger car	0.64	20	2	26	ULSD	0.138	12	251	392.6	0.016	0.003	10.0338	0.0004	0.0001	5.0169	0.0002	0.0000	0.1087	0.0000	0.0000
Haul Road 10	Shaft cuttings for disposal - Cavern Works	12 cy dump truck	0.64	365	12	8	ULSD	0.138	3	1,020	1,300.2	0.053	0.011	9.2314	0.0004	0.0001	0.7693	0.0000	0.0000	1.4616	0.0001	0.0000
Haul Road 17	Workforce - Surface Works	Passenger Car	0.19	240	2	26	ULSD	0.138	71	17,077	392.6	0.016	0.003	61.5771	0.0025	0.0005	30.7886	0.0012	0.0002	7.3893	0.0003	0.0001
Haul Road 20	Cement Trucks Surface Works	12 cy cement truck	0.19	30	12	10	ULSD	0.138	17	513	1,063.2	0.043	0.009	40.3900	0.0016	0.0003	3.3658	0.0001	0.0000	0.6017	0.0000	0.0000
Haul Road 22	Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	1	171	1,275.8	0.052	0.010	1.8117	0.0001	0.0000	0.0755	0.0000	0.0000	0.2405	0.0000	0.0000
Haul Road 23	Non Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	4	1,381	1,275.8	0.052	0.010	10.8699	0.0004	0.0001	0.4529	0.0000	0.0000	1.9416	0.0001	0.0000

<sup>a</sup> Default High Heat Value for Distillate Fuel Oil No 2 and default CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emission factors, Table C1 and C2 to Subpart C of Part 98.

<sup>b</sup> Mileage-weighted average emission factors (g/mile) based on the following formula: HHV (MMBtu/gallon) x EF (Kg/MMBtu) x (1/mpg) x (1000 g/kg)

<sup>c</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

Emission Inventory for Construction  
(On-Site, Month 26) for Short Term  
Dispersion Modeling

**EMISSIONS SUMMARY - CRITERIA POLLUTANTS**  
**CONSTRUCTION PHASE - MONTH 26**  
**Gem Site - Hydrostor**

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate			
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Non-Stationary Sources</b>																
<b>Unpaved Roads</b>																
UP11	Cavern Works	Workforce (Mining) - Cavern Works	0.2	0.9	0.0	0.1	-	-	-	-	-	-	-	-		
UP14	Cavern Works	Ground support - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP15	Cavern Works	Explosives - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP16	Cavern Works	Transportation of waste rock - Cavern Works	1.2	4.9	0.1	0.5	-	-	-	-	-	-	-	-		
UP17	Surface Works	Workforce - Surface Works	0.5	1.3	0.0	0.1	-	-	-	-	-	-	-	-		
UP21	Surface Works	Equipment and material delivery Surface Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-		
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.1	0.3	0.0	0.0	-	-	-	-	-	-	-	-		
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	0.5	2.0	0.0	0.2	-	-	-	-	-	-	-	-		
<b>Total Unpaved</b>			<b>2.47</b>	<b>9.39</b>	<b>0.25</b>	<b>0.94</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>																
UP11	Cavern Works	Workforce (Mining) - Cavern Works	0.0001	0.000	0.000	0.000	0.005	0.002	0.002	0.001	0.112	0.037	0.002	0.001		
UP14	Cavern Works	Ground support - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP15	Cavern Works	Explosives - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP16	Cavern Works	Transportation of waste rock - Cavern Works	0.0005	0.002	0.000	0.001	0.012	0.053	0.001	0.001	0.005	0.023	0.000	0.000		
UP17	Surface Works	Workforce - Surface Works	0.0002	0.000	0.000	0.000	0.009	0.002	0.005	0.001	0.225	0.054	0.004	0.001		
UP21	Surface Works	Equipment and material delivery Surface Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000		
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.000	0.000		
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	0.0002	0.001	0.000	0.000	0.006	0.024	0.000	0.001	0.002	0.010	0.000	0.000		
<b>Total Traffic Exhaust</b>			<b>0.00</b>	<b>0.00</b>	<b>0.000</b>	<b>0.002</b>	<b>0.04</b>	<b>0.09</b>	<b>0.01</b>	<b>0.00</b>	<b>0.35</b>	<b>0.13</b>	<b>0.01</b>	<b>0.00</b>		

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate			
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Exhaust Emissions from Non-Road Engines</b>																
EXH-1	Surface Works	Indirect Equipment	0.023	0.04	0.02	0.04	0.47	0.76	0.23	0.37	0.46	0.74	0.01	0.01		
EXH-4	Surface Works	Spheres	0.016	0.02	0.02	0.02	0.16	0.23	0.10	0.14	0.11	0.14	0.00	0.00		
EXH-7	Surface Works	Piping	0.039	0.03	0.04	0.03	0.28	0.17	0.21	0.13	0.27	0.18	0.01	0.00		
EXH-8	Surface Works	Mechanical	0.016	0.01	0.02	0.01	0.16	0.09	0.10	0.06	0.11	0.06	0.00	0.00		
EXH-10	Cavern Works	Mining Surface Equipment	0.019	0.03	0.02	0.03	0.28	0.41	0.14	0.20	0.13	0.19	0.00	0.01		
EXH-11	Cavern Works	Mining Subsurface Equipment	0.044	0.04	0.04	0.04	0.46	0.48	0.20	0.22	0.49	0.38	0.01	0.01		
<b>Total Non-Road Exhaust</b>			<b>0.16</b>	<b>0.16</b>	<b>0.16</b>	<b>0.16</b>	<b>1.80</b>	<b>2.14</b>	<b>0.98</b>	<b>1.12</b>	<b>1.57</b>	<b>1.70</b>	<b>0.03</b>	<b>0.04</b>		
<b>Stationary Sources</b>																
<b>Material Handling</b>																
TF3	Cavern Works	Mining Activities -Truck loading	0.067	0.17	0.01	0.03	-	-	-	-	-	-	-	-		
<b>Transfer Areas Total</b>			<b>0.07</b>	<b>0.17</b>	<b>0.01</b>	<b>0.03</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		
<b>Bulldozing</b>																
BD 2	Cavern Works	Mining Surface	0.208	0.91	0.10	0.45	-	-	-	-	-	-	-	-		
<b>Bulldozing Total</b>			<b>0.21</b>	<b>0.91</b>	<b>0.10</b>	<b>0.45</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		
<b>Wind Erosion of Exposed Surface Areas</b>																
WE1	Total Area of the Site	Clearing & Stripping	0.108	0.475	0.054	0.238	-	-	-	-	-	-	-	-		
<b>Wind Erosion Areas Total</b>			<b>0.108</b>	<b>0.475</b>	<b>0.054</b>	<b>0.238</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>		
<b>Wind Erosion of Stock Piles</b>																
WS2	Cavern Works	Waste Rock - Mining	0.40	1.75	0.06	0.26	-	-	-	-	-	-	-	-		
<b>Wind Erosion Stockpile Total</b>			<b>0.40</b>	<b>1.75</b>	<b>0.06</b>	<b>0.26</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		
<b>Total Emissions</b>			<b>3.4</b>	<b>12.9</b>	<b>0.6</b>	<b>2.1</b>	<b>1.8</b>	<b>2.2</b>	<b>1.0</b>	<b>1.1</b>	<b>1.9</b>	<b>1.8</b>	<b>0.0</b>	<b>0.0</b>		

**EMISSIONS SUMMARY - GREENHOUSE GASES**  
**CONSTRUCTION PHASE - MONTH 26**  
**Gem Site - Hydrostor**

ID	Activity	Description	CO <sub>2</sub> Emission Rate		CH <sub>4</sub> Emission Rate		N <sub>2</sub> O Emission Rate	
			24-hour (lbs/hr)	Annual (tons/yr)	24-hour (lbs/hr)	Annual (tons/yr)	24-hour (lbs/hr)	Annual (tons/yr)
<b>Non-Stationary Sources</b>								
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>								
UP11	Cavern Works	Workforce (Mining) - Cavern Works	15.33	5.10	0.00	0.00	0.00	0.00
UP14	Cavern Works	Ground support - Cavern Works	0.80	0.02	0.00	0.00	0.00	0.00
UP15	Cavern Works	Explosives - Cavern Works	0.80	0.02	0.00	0.00	0.00	0.00
UP16	Cavern Works	Transportation of waste rock - Cavern Works	6.69	29.18	0.00	0.00	0.00	0.00
UP17	Surface Works	Workforce - Surface Works	30.79	7.39	0.00	0.00	0.00	0.00
UP21	Surface Works	Equipment and material delivery Surface Works	0.81	0.26	0.00	0.00	0.00	0.00
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.08	0.24	0.00	0.00	0.00	0.00
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.45	1.79	0.00	0.00	0.00	0.00
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	3.02	12.94	0.00	0.00	0.00	0.00
<b>Total Traffic Exhaust</b>			<b>58.76</b>	<b>56.93</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Exhaust Emissions from Non-Road Engines</b>								
EXH-1	Surface Works	Indirect Equipment	998.85	1,602.67	-	-	-	-
EXH-4	Surface Works	Spheres	309.86	447.96	-	-	-	-
EXH-7	Surface Works	Piping	555.24	342.27	-	-	-	-
EXH-8	Surface Works	Mechanical	309.86	172.10	-	-	-	-
EXH-10	Cavern Works	Mining Surface Equipment	519.84	768.33	-	-	-	-
EXH-11	Cavern Works	Mining Subsurface Equipment	700.54	818.76	-	-	-	-
<b>Total Non-Road Exhaust</b>			<b>3,394.20</b>	<b>4,152.08</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions</b>			<b>3,453.0</b>	<b>4,209.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Parameters	11	14	15	16
	Mining Activities			
	Workforce	Ground support	Explosives	On road trucks - waste rock truck
<b>Material Throughput</b>				
Total Area (acres)	--	--	--	--
Material Depth (in)	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	--	--	10,240,992
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	--	--	379,296
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	--	--	130
Total Material Weight (tons)	--	--	--	665,664
<b>Operating Time</b>				
Total Operating Weeks (weeks) <sup>c</sup>	48	52	52	52
Total Operating Days (days) <sup>c</sup>	336	365	365	365
Daily Operating Hours (hrs/day)	2	2	2	24
<b>Vehicle and Travel Data</b>				
Vehicle Model <sup>d</sup>	Passenger car	Flatbed tractor trailer	Flatbed tractor trailer	Dump trucks (12 yd)
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	19.0	19.0	25.5
Vehicle Capacity (tons)	0.8	20.0	20.0	19.0
Vehicle Capacity (yd <sup>3</sup> )	--	#REF!	#REF!	12.0
Loaded Vehicle Weight (tons)	3.0	39.0	39.0	44.5
W = Average Vehicle Weight (tons)	2.7	29.0	29.0	35.0
Number of Vehicles (duration)	18,294	22	22	31,608
Number of Vehicles (daily)	55	1	1	87
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.64	0.6	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	35.4	0.6	0.6	56.0
Activity Duration Vehicle Miles Travelled (VMT)	11,783	14	14	20,359

<sup>a</sup> Material quantities based on the document TWD 21-5375-00-5000-001-Table 2-Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>b</sup> The density of 130 lb/ft<sup>3</sup> used for shat material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience.

<sup>c</sup> Operating weeks are based on construction schedule information obtained from Hydrostor.

<sup>d</sup> Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>e</sup> Empty vehicle weights were obtained from technical specifications of each vehicle.

<sup>f</sup> Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel.

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Parameters	17	21	22	23	24
	Surface Works		Surface Works & Cavern		Reservoir Fill
	Workforce	Equipment and material delivery	Potable Water	Non Potable Water	Non Potable Water
<b>Material Throughput</b>					
Total Area (acres)	--	--	--	--	--
Material Depth (in)	--	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	--	--	--	--
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	--	--	--	--
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	--	--	--	--
Total Material Weight (tons)	--	--	--	--	--
<b>Operating Time</b>					
Total Operating Weeks (weeks) <sup>c</sup>	52	52	52	52	52
Total Operating Days (days) <sup>c</sup>	240	365	365	365	365
Daily Operating Hours (hrs/day)	2	2	24	24	24
<b>Vehicle and Travel Data</b>					
Vehicle Model <sup>d</sup>	Passenger Car	Flatbed	water truck 9000 gal	water truck 9000 gal	water truck 9000 gal
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	19.0	23.2	23.2	23.2
Vehicle Capacity (tons)	0.8	20.0	12.0	12.0	12.0
Vehicle Capacity (yd <sup>3</sup> )	--	#REF!	-	-	-
Loaded Vehicle Weight (tons)	3.0	39.0	35.3	35.3	35.3
W = Average Vehicle Weight (tons)	2.7	29.0	29.2	29.2	29.2
Number of Vehicles (duration)	92,160	969	260	1,974	14,289
Number of Vehicles (daily)	384	3	1	6	40
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.2	0.2	0.6	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	71	1	1	4	26
Activity Duration Vehicle Miles Travelled (VMT)	17,077	180	167	1,271	9,204

<sup>a</sup> Material quantities based on the document TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>b</sup> The density of 130 lb/ft<sup>3</sup> used for shat material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience.

<sup>c</sup> Operating weeks are based on construction schedule information obtained from Hydrostor.

<sup>d</sup> Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>e</sup> Empty vehicle weights were obtained from technical specifications of each vehicle.

<sup>f</sup> Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel.

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Parameters	Mining Activities								Surface Works				Surface Works & Cavern				Reservoir Fill	
	Haul Road 11		Haul Road 14		Haul Road 15		Haul Road 16		Haul Road 17		Haul Road 21		Haul Road 22		Haul Road 23		Haul Road 24	
	Workforce		Ground support		Explosives		On road trucks - waste rock truck		Workforce		Equipment and material delivery		Potable Water		Non Potable Water		Non Potable Water	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Vehicle and Travel Data<sup>b</sup></b>																		
W = Average Vehicle Weight (tons)	2.7	2.7	29.0	29.0	29.0	29.0	35.0	35.0	2.7	2.7	29.0	29.0	29.2	29.2	29.2	29.2	29.2	29.2
D = Distance traveled on unpaved roads (2-way miles)	0.64	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2	0.2	0.6	0.6	0.6	0.6	0.6	0.6
Daily Operation Hours (hrs/day)	2	2	2	2	2	2	24	24	2	2	2	2	24	24.0	24	24.0	24	24.0
Total No. of Operating Days for activity (days)	336	336	365	365	365	365	365	365	240	240	365	365	365	365.0	365	365.0	365	365.0
No. of truck trips per day (trucks/day)	55	55	1	1	1	1	87	87	384	384	3	3	1	1.0	6	6.0	40	40.0
Total No. of trucks for activity (trucks)	18,294	18,294	22	22	22	22	31,608	31,608	92,160	92,160	969	260	260	259.7	1,974	1,974	14,289	14,289
Daily Vehicle Miles Travelled (VMT)	35	35	1	1	1	1	56	56	71	71	1	1	1	0.6	4	3.9	26	25.8
Activity Duration Vehicle Miles Travelled (VMT)	11,783	11,783	14	14	14	14	20,359	20,359	17,077	17,077	180	180	167	167.3	1,271	1,271	9,204	9,204
<b>Site Characteristics</b>																		
k = Particle size multiplier (lb/VMT) <sup>c</sup>	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>e</sup>	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>																		
Dust Control Efficiency (%) <sup>e</sup>	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
<b>Emission Factors<sup>a</sup></b>																		
Emission Factor (lb/VMT) - Daily <sup>e</sup>	1.0	0.1	3.1	0.3	3.1	0.3	3.3	0.3	1.0	0.1	3.1	0.3	3.1	0.3	3.1	0.3	3.1	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.10	2.92	0.29	2.92	0.29	3.18	0.32	0.99	0.10	2.92	0.29	2.93	0.29	2.93	0.29	2.93	0.29
<b>Emission Rates<sup>a</sup></b>																		
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	36.8	3.7	2.0	0.2	2.0	0.2	186.2	18.6	74.0	7.4	1.7	0.2	2.0	0.2	11.8	1.2	78.9	7.9
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	5.86	0.59	0.02	0.00	0.02	0.00	32.34	3.23	8.49	0.85	0.26	0.03	0.25	0.02	1.86	0.19	13.48	1.35
Controlled Daily Emissions (lb/day)	5.5	0.6	0.3	0.0	0.3	0.0	27.9	2.8	11.1	1.1	0.3	0.0	0.3	0.0	1.8	0.2	11.8	1.2
Controlled Annual Emissions (TPY)	0.9	0.1	0.0	0.0	0.0	0.0	4.9	0.5	1.3	0.1	0.0	0.0	0.0	0.0	0.3	0.0	2.0	0.2
Controlled Hourly Emissions (lb/hr, daily basis)	0.2	0.0	0.0	0.0	0.0	0.0	1.2	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.0
Emission Factor (lb/hr/mi)	0.7	0.1	0.0	0.0	0.0	0.0	3.6	0.4	5.0	0.5	0.1	0.0	0.0	0.0	0.2	0.0	1.5	0.2

<sup>a</sup> Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -  
 $E = k * (s/12)^a * (W/3)^b * (365-P)/365$

<sup>b</sup> See Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>f</sup> Dust control efficiency based on 70% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/day)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Hourly Emissions							
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (lbs/hr)	Total PM <sub>2.5</sub> (lbs/hr)	Total VOC (lbs/hr)	Total NO <sub>x</sub> (lbs/hr)	Total CO (lbs/hr)	Total SO <sub>2</sub> (lbs/hr)	
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																								
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617							
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859							
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859							
<b>Daily Emissions (lbs/day)<sup>b</sup></b>																								
Haul Road 11	Workforce (Mining) - Cavern Works	0.64	336	2	5,300	LDGV	<6,000	Diesel	35	2.24E-01	9.41E-03	3.93E-03	6.01E-04	1.41E-03	5.55E-04	3.59E-04	4.82E-03	8.36E-05	3.81E-05	0.0024	0.0047	0.1119	0.0020	
Haul Road 14	Ground support - Cavern Works	0.64	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000	
Haul Road 15	Explosives - Cavern Works	0.64	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000	
Haul Road 16	Transportation of waste rock - Cavern Works	0.64	365	24	70,000	HDDV8b	33,001-60,000	Diesel	56	1.28E-01	2.93E-01	1.59E-03	3.33E-03	9.15E-03	3.22E-03	2.35E-03	2.30E-02	5.20E-04	2.32E-04	0.0010	0.0122	0.0053	0.0001	
Haul Road 17	Workforce - Surface Works	0.19	240	2	5,300	LDGV	<6,000	Diesel	71	4.50E-01	1.89E-02	7.89E-03	1.21E-03	2.82E-03	1.11E-03	7.22E-04	9.68E-03	1.68E-04	7.65E-05	0.0048	0.0095	0.2248	0.0039	
Haul Road 21	Equipment and material delivery Surface Works	0.19	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.27E-03	2.91E-03	1.58E-05	3.30E-05	9.08E-05	3.20E-05	2.33E-05	2.28E-04	5.16E-06	2.31E-06	0.0001	0.0015	0.0006	0.0000	
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0000	0.0001	0.0001	0.0000	
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	4	8.81E-03	2.02E-02	1.10E-04	2.29E-04	6.31E-04	2.22E-04	1.62E-04	1.58E-03	3.58E-05	1.60E-05	0.0001	0.0008	0.0004	0.0000	
Haul Road 24	Non Potable Water - Reservoir Fill	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	26	5.88E-02	1.35E-01	7.32E-04	1.53E-03	4.21E-03	1.48E-03	1.08E-03	1.06E-02	2.39E-04	1.07E-04	0.0004	0.0056	0.0024	0.0000	

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.



**Table 4**  
**Estimation of Emissions Factors for Non-Road Equipment Used in the Project**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Equipment Description	Number of Equipment	Engine Power (hp) <sup>g</sup>	Engine Tier Rating	Unadjusted Emission Factor (EFs) <sup>a</sup>					Transient Adjustment Emission Factor (TAF) <sup>b</sup>					Deterioration Emission Factor (DF) <sup>c</sup>				S Adjustment <sup>d</sup> (g/hp-hr)	Adjusted Emission Factor (EFadj) <sup>e</sup>				Emission Factor <sup>f</sup>	
				HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>		HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>
				(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(lb/hp-h)											(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)
<b>Surface Works</b>																								
<u>Indirect</u>																								
60 kW Diesel Gensets	12	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
<u>Spheres</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Piping</u>																								
Welding machine	12	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<u>Mechanical</u>																								
Welding machines	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
Crane	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<b>Cavern Works</b>																								
<u>Mining Surface Equipment</u>																								
Off road dump truck, 30t	2	370	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Front end loader	1	250	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
All terrain forklift	1	110	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
<u>Mining Subsurface Equipment</u>																								
Bolter (semi-electrical)	3	55	4	0.1314	0.2370	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.040	595.821	0.0055
Jumbo (semi-electrical)	2	90	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
Scissor lift	1	138	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Welder	1	19	4	0.4380	2.1610	4.4399	0.2800	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	1.030	6.392	5.415	0.977	693.350	0.0064
Buggy	1	47	4	0.1314	0.1530	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.003	1.101	1.009	1.473	0.000	0.138	0.258	0.290	0.040	595.832	0.0055
Loaders/haul/dump	5	201	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Boom lift	1	147	4	0.1314	0.8700	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	1.532	0.289	0.020	535.902	0.0049
Skid steer	1	61	4	0.1314	0.2370	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.040	595.821	0.0055

<sup>a</sup> Zero-Hour, steady-state emission factors for nonroad CI engines from EPA-420-B-16-022, Table A4

<sup>b</sup> Transient Adjustment Factors by Equipment Type for Nonroad CI Equipment, Table A5.

<sup>c</sup> Deterioration Factors for Nonroad Diesel Engines, Table A6.

<sup>d</sup> Adjustment to PM emission factor to account for variations in fuel sulfur content is made using the following equation -

$$\begin{aligned}
 \text{soxcnv} &= 0.02247 \text{ grams PM sulfur/grams fuel sulfur consumed} \\
 \text{soxbas} &= 0.33 \text{ percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 1 and 2)} \\
 &= 0.0015 \text{ percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 3 and 4)} \\
 \text{soxdsl} &= 0.0015 \text{ percent (15 ppm is the maximum ultra low sulfur diesel - ULSD)}
 \end{aligned}$$

<sup>e</sup> For all pollutants except PM, adjusted Emission Factor = UAF x TAF x DF.

For PM, adjusted Emission Factor = UAF x TAF x DF - S<sub>PM adj</sub>.

<sup>f</sup> Emission Factor for SO<sub>2</sub> = [BSFC x 453.6 x (1 - soxcnv) - HC] x 0.01 x soxdsl x (64/32).

**Table 5**  
**Estimation of Emissions Rates for Non-Road Equipment used in the Project**  
**Construction Phase - Month 2f**  
**Gem Site - Hydrostor**

Equipment Description	NUMBER OF EQUIPMENT	ENGINE POWER (hp)	Assumed Load (%)	Availability (%)	HOURS OF OPERATION <sup>d</sup>	Emission Factors <sup>a</sup>						Hourly Emission Rates (Average Hourly) <sup>b</sup>						Annual Emission Rates (Average Annual) <sup>f</sup>					
						HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO2	SO2	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO2	SO2	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO2	SO2
						(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)
<b>Surface Works</b>																							
<b>Indirect Equipment</b>																							
60 kW Diesel Gensets	12	100	80%	80%	2,912	0.135	0.273	0.278	0.014	589.939	0.005	0.104	0.210	0.214	0.010	453.073	0.004	0.33	0.67	0.69	0.03	1453.92	0.01
						<b>EXH-1 Total (kg/h and tonne/year)</b>																	
												0.228						0.462					
<b>Spheres</b>																							
Cranes	2	200	50%	80%	2,912	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.07	0.04	0.14	0.01	272.44	0.00
Welding machine	4	50	50%	80%	2,184	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.06	0.09	0.06	0.01	133.94	0.00
						<b>EXH-4 Total (kg/h and tonne/year)</b>																	
												0.102						0.110					
<b>Piping</b>																							
Welding machine	12	50	50%	80%	1,232	0.309	0.453	0.337	0.064	695.650	0.006	0.074	0.109	0.081	0.015	166.956	0.002	0.10	0.15	0.11	0.02	226.67	0.00
Cranes	2	200	50%	80%	896	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.02	0.01	0.04	0.00	83.83	0.00
						<b>EXH-7 Total (kg/h and tonne/year)</b>																	
												0.096						0.122					
<b>Mechanical</b>																							
Welding machines	4	50	50%	80%	1,008	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.03	0.04	0.03	0.01	61.82	0.00
Crane	2	200	50%	80%	1,008	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.02	0.02	0.05	0.00	94.31	0.00
						<b>EXH-8 Total (kg/h and tonne/year)</b>																	
												0.046						0.050					
<b>Cavern Works</b>																							
<b>Mining Surface Equipment</b>																							
Off road dump truck, 30t	2	370	50%	80%	2,464	0.142	0.132	0.289	0.020	535.902	0.005	0.042	0.039	0.086	0.006	158.627	0.001	0.11	0.11	0.23	0.02	430.72	0.00
Front end loader	1	250	50%	80%	3,696	0.142	0.132	0.289	0.020	535.902	0.005	0.014	0.013	0.029	0.002	53.590	0.000	0.06	0.05	0.12	0.01	218.27	0.00
All terrain forklift	1	110	50%	80%	1,848	0.142	0.153	0.289	0.020	535.902	0.005	0.006	0.007	0.013	0.001	23.580	0.000	0.01	0.01	0.03	0.00	48.02	0.00
						<b>EXH-10 Total (kg/h and tonne/year)</b>																	
												0.062						0.059					
<b>Mining Subsurface Equipment</b>																							
Bolter (semi-electrical)	3	55	50%	10%	3,696	0.142	0.417	0.289	0.040	595.821	0.005	0.001	0.003	0.002	0.000	4.916	0.000	0.00	0.01	0.01	0.00	20.02	0.00
Jumbo (semi-electrical)	2	90	50%	10%	3,696	0.135	0.273	0.278	0.014	589.939	0.005	0.001	0.002	0.003	0.000	5.309	0.000	0.00	0.01	0.01	0.00	21.63	0.00
Scissor lift	1	138	50%	80%	1,232	0.142	0.153	0.289	0.020	535.902	0.005	0.008	0.008	0.016	0.001	29.582	0.000	0.01	0.01	0.02	0.00	40.16	0.00
Welder	1	19	50%	80%	924	1.030	6.392	5.415	0.977	693.350	0.006	0.008	0.049	0.041	0.007	5.269	0.000	0.01	0.05	0.04	0.01	5.37	0.00
Buggy	1	47	50%	80%	1,232	0.138	0.258	0.290	0.040	595.832	0.005	0.003	0.005	0.005	0.001	11.202	0.000	0.00	0.01	0.01	0.00	15.21	0.00
Loaders/haul/dump	5	201	50%	80%	2,464	0.142	0.132	0.289	0.020	535.902	0.005	0.057	0.053	0.116	0.008	215.432	0.002	0.15	0.14	0.32	0.02	584.97	0.01
Boom lift	1	147	50%	80%	924	0.142	1.532	0.289	0.020	535.902	0.005	0.008	0.090	0.017	0.001	31.511	0.000	0.01	0.09	0.02	0.00	32.09	0.00
Skid steer	1	61	50%	80%	1,456	0.142	0.417	0.289	0.040	595.821	0.005	0.003	0.010	0.007	0.001	14.538	0.000	0.01	0.02	0.01	0.00	23.33	0.00
						<b>EXH-11 Total (kg/h and tonne/year)</b>																	
												0.089						0.221					
												0.197						0.488					

<sup>a</sup> See Table 4 for the derivation of the emission factors.

<sup>b</sup> Emission rate = Engine HP-rating x Emission Factor (g/hp-hr) x No. of Vehicles x (kg/1,000 g)

<sup>c</sup> Emission rate = Engine HP-rating x Emission Factor (g/hp-hr) x No. of Vehicles x (kg/1,000 g) x Annual Operating Hours x (tonne/1,000 kg)

<sup>d</sup> Annual Operating Hours based of the construction schedule and the hours of operation of each equipment.

**TABLE 6**  
**ESTIMATION OF PM10 AND PM2.5 EMISSION FACTORS AND RATES FOR BATCH/CONTINUOUS DROP TRANSFER OPERATIONS**  
 Construction Phase - Month 26  
 Gem Site - Hydrostor

ID	Material Handling Area	Material Type	Operational Data		Material Throughput <sup>a</sup>				Number of Transfers	Moisture Content (M) <sup>b</sup>	Emission Control Data		Daily Uncontrolled Emission Factor <sup>c</sup>		Daily Controlled Emission Factor <sup>c</sup>		Estimated Emission Rate (ER)			
					Method	Efficiency (%)	PM <sub>10</sub>	PM <sub>2.5</sub>			PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>		PM <sub>2.5</sub>					
			(hr/day)	(# days)			Total (CY)	Total (tons)			Daily (tons/day)	Hourly (tons/hr)	(lb/ton)	(lb/ton)	(lb/ton)	(lb/ton)	(lb/hr)	(tons/year)	(lb/hr)	(tons/year)
<b>Caverns Works</b> TA3	Mining Activities -Truck loading	Waste Rock	24	365	379,296	665,664	1,824	76.0	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.07	0.17	0.01	0.03

Emission factor: USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

<sup>a</sup> See Table 1 for material throughput information.

<sup>b</sup> Moisture content data based on the Golder specialist's experience in soils.

<sup>c</sup> Based on Emission Factor of USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

**Uncontrolled EF (UEF) Equation :**

$$UEF \text{ (lb/ton)} = k \times (0.0032) \times (U / 5)^{1.3} [(M / 2)^{1.4}]$$

**Controlled EF (CEF) Equation :**

$$CEF \text{ (lb/ton)} = UEF \text{ (lb/ton)} \times [100\% - \text{Control efficiency (\%)}]$$

where: U = Mean wind speed (miles/hr) \*      k = Particle size multiplier

36.33	11.87	0.35	0.053
Daily	Annual	(PM10)	(PM2.5)

\* Calculated from the Mojave Airport 2020 met data

**Table 7  
Fugitive PM Emissions from Bulldozers  
Construction Phase - Month 26  
Gem Site - Hydrostor**

Parameters	Bulldozing/Scraping Activities
	Mining Surface
<b>ID</b>	<b>B3</b>
<b>Operational Data</b>	
Daily Operation Hours (hrs/day)	12
Total No. of Operating Days for activity (days)	365
No. of active bulldozers/loaders/excavators/scrapers	1
<b>Site Characteristics<sup>b</sup></b>	
M = Moisture content (%)	3.4
s = Silt content of site specific unpaved roads (%)	7.5
<b>Control Efficiency</b>	
Dust Control Method <sup>c</sup>	Watering
Dust Control Efficiency (%)	70
<b>Calculated PM Emission Factors (EF)<sup>a</sup></b>	
Uncontrolled TSP EF (lb/hr)	13.03
Controlled TSP EF (lb/hr)	3.91
Uncontrolled PM <sub>15</sub> EF (lb/hr)	3.70
Controlled PM <sub>15</sub> EF (lb/hr)	1.11
Uncontrolled PM <sub>10</sub> EF (lb/hr)	2.78
Controlled PM <sub>10</sub> EF (lb/hr)	0.83
Uncontrolled PM <sub>2.5</sub> EF (lb/hr)	1.37
Controlled PM <sub>2.5</sub> EF (lb/hr)	0.41
<b>Estimated Emissions Rates (ER)<sup>d</sup></b>	
PM <sub>10</sub> ER lb/hr (daily basis)	0.21
PM <sub>10</sub> ER tons (year)	0.912
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.10
PM <sub>2.5</sub> ER tons (year)	0.450

**Notes:**

<sup>a</sup> Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

- Uncontrolled TSP EF (UEF) Equation :
- Controlled TSP EF (CEF) Equation :
- Uncontrolled PM<sub>15</sub> EF (UEF) Equation :
- Controlled PM<sub>15</sub> EF (CEF) Equation :
- Uncontrolled PM<sub>10</sub> EF (UEF) Equation :
- Controlled PM<sub>10</sub> EF (CEF) Equation :
- Uncontrolled PM<sub>2.5</sub> EF (UEF) Equation :
- Controlled PM<sub>2.5</sub> EF (CEF) Equation :

<sup>b</sup> Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42

<sup>c</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to

<sup>d</sup> ER = EF x No. of active bulldozers.

**Table 8**  
**Fugitive PM Emissions from Wind Erosion of Exposed Surface Areas**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Parameters	Activity Areas
	Clearing & Stripping
<b>ID</b>	<b>WE1</b>
<b>Operational Data</b>	
Hours of Exposure (hrs/day)	24
Hours of Exposure (hrs/yr)	3360
Unvegetated Surface Area (acres) <sup>b</sup>	10.0
<b>Site Characteristics<sup>c</sup></b>	
Daily hours of precipitation ≥ 0.25 mm (p)	0
Annual days of precipitation ≥ 0.25 mm (p)	16
Daily % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	67.7
Annual % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	39.9
<b>Control Efficiency</b>	
Dust Control Method <sup>d</sup>	Watering as needed
Dust Control Efficiency (%) <sup>d</sup>	75
<b>Particle Size Multipliers (k)<sup>e</sup></b>	
For TSP	1.0
For PM <sub>10</sub>	0.50
For PM <sub>2.5</sub>	0.25
<b>Calculated PM Emission Factors (EF)<sup>a</sup></b>	
Uncontrolled TSP EF (ton/acre/yr)	0.38
Uncontrolled PM <sub>10</sub> EF (ton/acre/yr)	0.19
Uncontrolled PM <sub>2.5</sub> EF (ton/acre/yr)	0.095
Controlled TSP EF (ton/acre/yr)	0.10
Controlled PM <sub>10</sub> EF (ton/acre/yr)	0.05
Controlled PM <sub>2.5</sub> EF (ton/acre/yr)	0.024
<b>Estimated Emissions Rates<sup>a</sup></b>	
TSP ER lb/hr (daily basis)	0.22
TSP ER tons (year)	0.95
PM <sub>10</sub> ER lb/hr (daily basis)	0.11
PM <sub>10</sub> ER tons (year)	0.48
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.05
PM <sub>2.5</sub> ER tons (year)	0.24

**Notes:**

<sup>a</sup> Emission factor equation from Table 11.9-4 (wind erosion of exposed areas) of US EPA AP-42 Section 11.9 for Western Surface Coal Mines:

$$\text{Uncontrolled TSP EF (UEF) Equation : } \text{UEF (ton/acre/yr)} = k \times 0.38$$

$$\text{Controlled TSP EF (CEF) Equation : } \text{CEF (ton/acre/yr)} = \text{UEF (ton/acre/yr)} \times [100 - \text{Control efficiency (\%)}]$$

<sup>b</sup> Area of unvegetated surface based on the total area of the future plant. It was considered the half of the total area of the site where clearing and stripping activities will be happening in 12 months

<sup>c</sup> Based on hourly surface meteorological data from the Mojave Airport for 2020.

<sup>d</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March, 2012).

<sup>e</sup> Particle size based on AP-42 Section 13.2.5 recommendation.

**Table 9**  
**Fugitive PM Emissions from Wind Erosion of Stock Piles**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Parameters	Cavern Works
	Waste Rock - Mining
<b>Activity ID</b>	<b>WS2</b>
<b>Operational Data</b>	
Daily Operation Hours (hrs/day)	24
No. of Annual Operating Days (days/yr)	365
Material Type	Waste Rock
Pile Description (shape)	Conical
Height of Pile (m) <sup>a</sup>	9
Total Material Piled (tons)	665,664
Daily Material Piled (tons/day)	1,824
Daily Material Piled (m <sup>3</sup> /day) <sup>b</sup>	795
Cone-shaped pile base area (m <sup>2</sup> )	261
Cone-shaped pile base radius (m)	9.1
Estimated angle of repose (degrees)	45.0
Cone-shaped pile exposed surface area (m <sup>2</sup> )	369
Rectangular Pile Length (m)	--
Rectangular Pile Width (m)	--
Rectangular pile exposed surface area (m <sup>2</sup> )	--
No. of piles	1
<b>Emissions Factor</b>	
Annual Erosion Potential, P (g/m <sup>2</sup> /yr) <sup>c</sup>	17167.8
Annual % of time hourly wind speed ≥ 5.4 m/s or 12 mph <sup>d</sup>	39.9
Annual hours with wind speed ≥ 5.4 m/s or 12 mph <sup>e</sup>	3455.0
<b>Control Efficiency</b>	
Dust Control Method <sup>g</sup>	Watering
Dust Control Efficiency (%) <sup>f</sup>	50
<b>Particle Size Multipliers (k) <sup>g</sup></b>	
For TSP	1.0
For PM <sub>10</sub>	0.50
For PM <sub>2.5</sub>	0.075
<b>Estimated Emissions Rates (ER) <sup>g</sup></b>	
Annual TSP ER ton/yr	3.50
Annual PM <sub>10</sub> ER ton/yr	1.75
Annual PM <sub>2.5</sub> ER ton/yr	0.26
TSP ER lb/hr (annual basis)	0.80
PM <sub>10</sub> ER lb/hr (annual basis)	0.40
PM <sub>2.5</sub> ER lb/hr (annual basis)	0.06

**Notes:**

<sup>a</sup> Height estimated to result in a 45 degree angle of repose based on the daily throughput.

<sup>b</sup> The densities are provided in Table 1 for each material

<sup>c</sup> Annual wind erosion potential estimated based on Equation 3 of AP-42 Section 13.2.5 (Industrial Wind Erosion). Threshold wind speed assumed to be 0.50 m/s.

<sup>d</sup> Based on hourly surface meteorological data from Mojave Airport for 2020.

<sup>e</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust (March, 2012).

<sup>f</sup> Control Efficiency based for water sprays in Stockpiles, Table 4 of Emission Estimation Technique Manual - National Pollutant Inventory, Australian Government, January 2

<sup>g</sup> Annual emissions estimated based on the exposed surface area and the wind erosion potential. Hourly emissions estimated from annual rates based.

**TABLE 10**  
**GREENHOUSE GASES EMISSION ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase - Month 26**  
**Gem Site - Hydrostor**

Road ID	Description	Vehicle	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Fuel Consumption mpg (miles/gallon)	Fuel Type	Default High Heat Value (MMBtu/gallon) <sup>a</sup>	Total Miles Travelled (VMT/day)	Total Miles Travelled (VMT/year)	Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile) <sup>b</sup>			Daily Emissions <sup>c</sup>			Hourly Emissions <sup>c</sup>			Annual Emissions <sup>c</sup>			
											CO2	CH4	N2O	Total CO2 (lbs/day)	Total CH4 (lbs/day)	Total N2O (lbs/day)	Total CO2 (lbs/hr)	Total CH4 (lbs/hr)	Total N2O (lbs/hr)	Total CO2 (tons/yr)	Total CH4 (tons/yr)	Total N2O (tons/yr)	
							Distillate Fuel Oil No 2	0.138	<u>Emission Factor (kg/MMBtu) <sup>a</sup></u>			73.9600	0.0030	0.0006									
Haul Road 11	Workforce (Mining) - Cavern Works	Passenger car	0.64	336	2	26	ULSD	0.138	35	11,783	392.6	0.016	0.003	30.6588	0.0012	0.0002	15.3294	0.0006	0.0001	5.0988	0.0002	0.0000	
Haul Road 14	Ground support - Cavern Works	Flatbed tractor trailer	0.64	365	2	9	ULSD	0.138	1	14	1,121.6	0.045	0.009	1.5927	0.0001	0.0000	0.7963	0.0000	0.0000	0.0175	0.0000	0.0000	
Haul Road 15	Explosives - Cavern Works	Flatbed tractor trailer	0.64	365	2	9	ULSD	0.138	1	14	1,121.6	0.045	0.009	1.5927	0.0001	0.0000	0.7963	0.0000	0.0000	0.0175	0.0000	0.0000	
Haul Road 16	Transportation of waste rock - Cavern Works	Dump trucks (12 yd)	0.64	365	24	8	ULSD	0.138	56	20,359	1,300.2	0.053	0.011	160.6256	0.0065	0.0013	6.6927	0.0003	0.0001	29.1785	0.0012	0.0002	
Haul Road 17	Workforce - Surface Works	Passenger Car	0.19	240	2	26	ULSD	0.138	71	17,077	392.6	0.016	0.003	61.5771	0.0025	0.0005	30.7886	0.0012	0.0002	7.3893	0.0003	0.0001	
Haul Road 21	Equipment and material delivery Surface Works	Flatbed	0.19	365	2	8	ULSD	0.138	1	180	1,327.2	0.054	0.011	1.6265	0.0001	0.0000	0.8133	0.0000	0.0000	0.2627	0.0000	0.0000	
Haul Road 22	Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	1	167	1,275.8	0.052	0.010	1.8117	0.0001	0.0000	0.0755	0.0000	0.0000	0.2352	0.0000	0.0000	
Haul Road 23	Non Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	4	1,271	1,275.8	0.052	0.010	10.8699	0.0004	0.0001	0.4529	0.0000	0.0000	1.7879	0.0001	0.0000	
Haul Road 24	Non Potable Water - Reservoir Fill	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	26	9,204	1,275.8	0.052	0.010	72.4662	0.0029	0.0006	3.0194	0.0001	0.0000	12.9432	0.0005	0.0001	

<sup>a</sup> Default High Heat Value for Distillate Fuel Oil No 2 and default CO2, CH4 and N2O emission factors, Table C1 and C2 to Subpart C of Part 98.

<sup>b</sup> Mileage-weighted average emission factors (g/mile) based on the following formula: HHV (MMBtu/gallon) x EF (Kg/MMBtu) x (1/MPG) x (1000 g/kg)

<sup>c</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

## Construction Inventory Off-Site

**EMISSIONS SUMMARY - CRITERIA POLLUTANTS  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate	
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Non-Stationary Sources</b>														
<b>Unpaved Roads</b>														
UP1	Cavern Works	Workforce (Site Clearing) - Cavern Works	0.1	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP2	Cavern Works	Equipment mobilization - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP3	Cavern Works	Equipment demobilization - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP4	Cavern Works	Fuel delivery - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP5	Cavern Works	Fencing delivery - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP6	Cavern Works	Concrete trucks - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP7	Cavern Works	Gravel delivery - Cavern Works	0.8	0.1	0.1	0.0	-	-	-	-	-	-	-	-
UP8	Cavern Works	Trailer delivery - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	0.1	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.1	0.2	0.0	0.0	-	-	-	-	-	-	-	-
UP11	Cavern Works	Workforce (Mining) - Cavern Works	0.2	1.0	0.0	0.1	-	-	-	-	-	-	-	-
UP12	Cavern Works	Surface equipment (mobilization) - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP13	Cavern Works	Subsurface equipment (mobilization) - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP14	Cavern Works	Ground support - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP15	Cavern Works	Explosives - Cavern Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP16	Cavern Works	Transportation of waste rock - Cavern Works	1.2	4.9	0.1	0.5	-	-	-	-	-	-	-	-
UP17	Surface Works	Workforce - Surface Works	0.5	1.3	0.0	0.1	-	-	-	-	-	-	-	-
UP18	Surface Works	Site clearing (overburden) - Surface Works	0.3	0.5	0.0	0.0	-	-	-	-	-	-	-	-
UP19	Surface Works	Civil foundation excavation Surface Works	0.2	0.2	0.0	0.0	-	-	-	-	-	-	-	-
UP20	Surface Works	Cement Trucks Surface Works	0.4	0.1	0.0	0.0	-	-	-	-	-	-	-	-
UP21	Surface Works	Equipment and material delivery Surface Works	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0	0.0	0.0	0.0	-	-	-	-	-	-	-	-
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.1	0.3	0.0	0.0	-	-	-	-	-	-	-	-
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	0.5	2.0	0.0	0.2	-	-	-	-	-	-	-	-
<b>Total Unpaved</b>			<b>4.51</b>	<b>10.74</b>	<b>0.45</b>	<b>1.07</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>														
UP1	Cavern Works	Workforce (Site Clearing) - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.024	0.002	0.000	0.000
UP2	Cavern Works	Equipment mobilization - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP3	Cavern Works	Equipment demobilization - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP4	Cavern Works	Fuel delivery - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP5	Cavern Works	Fencing delivery - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP6	Cavern Works	Concrete trucks - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UP7	Cavern Works	Gravel delivery - Cavern Works	0.0004	0.000	0.000	0.000	0.021	0.002	0.002	0.000	0.009	0.001	0.000	0.000
UP8	Cavern Works	Trailer delivery - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.037	0.001	0.001	0.000
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.0000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.001	0.001	0.000	0.000
UP11	Cavern Works	Workforce (Mining) - Cavern Works	0.0001	0.000	0.000	0.000	0.005	0.002	0.002	0.001	0.112	0.041	0.002	0.001
UP12	Cavern Works	Surface equipment (mobilization) - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP13	Cavern Works	Subsurface equipment (mobilization) - Cavern Works	0.0000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP14	Cavern Works	Ground support - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP15	Cavern Works	Explosives - Cavern Works	0.0000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP16	Cavern Works	Transportation of waste rock - Cavern Works	0.0005	0.002	0.000	0.001	0.012	0.053	0.001	0.001	0.005	0.023	0.000	0.000
UP17	Surface Works	Workforce - Surface Works	0.0002	0.000	0.000	0.000	0.009	0.002	0.005	0.001	0.225	0.054	0.004	0.001
UP18	Surface Works	Site clearing (overburden) - Surface Works	0.0002	0.000	0.000	0.000	0.007	0.005	0.001	0.000	0.003	0.002	0.000	0.000
UP19	Surface Works	Civil foundation excavation Surface Works	0.0001	0.000	0.000	0.000	0.004	0.002	0.000	0.000	0.002	0.001	0.000	0.000
UP20	Surface Works	Cement Trucks Surface Works	0.0002	0.000	0.000	0.000	0.008	0.001	0.001	0.000	0.003	0.001	0.000	0.000
UP21	Surface Works	Equipment and material delivery Surface Works	0.0000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.0000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.000	0.000
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	0.0002	0.001	0.000	0.000	0.006	0.024	0.000	0.001	0.002	0.010	0.000	0.000
<b>Total Traffic Exhaust</b>			<b>0.002</b>	<b>0.005</b>	<b>0.001</b>	<b>0.002</b>	<b>0.103</b>	<b>0.099</b>	<b>0.015</b>	<b>0.005</b>	<b>0.435</b>	<b>0.139</b>	<b>0.007</b>	<b>0.002</b>

ID	Activity	Description	PM <sub>10</sub> Emission Rate		PM <sub>2.5</sub> Emission Rate		NO <sub>x</sub> Emission Rate		VOC Emission Rate		CO Emission Rate		SO <sub>2</sub> Emission Rate	
			24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual	24-hour	Annual
			(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)	(lbs/hr)	(tons/yr)
<b>Exhaust Emissions from Non-Road Engines</b>														
EXH-1	Surface Works	Indirect Equipment	0.023	0.04	0.02	0.04	0.47	0.76	0.23	0.37	0.46	0.74	0.01	0.01
EXH-2	Surface Works	Foundation and Compaction	0.182	0.01	0.18	0.01	2.49	0.15	1.46	0.09	1.61	0.10	0.04	0.00
EXH-3	Surface Works	Turbine Hall	0.019	0.01	0.02	0.01	0.17	0.06	0.12	0.05	0.13	0.06	0.00	0.00
EXH-4	Surface Works	Spheres	0.016	0.02	0.02	0.02	0.16	0.23	0.10	0.14	0.11	0.14	0.00	0.00
EXH-5	Surface Works	Primary Equipment	0.030	0.01	0.03	0.01	0.27	0.07	0.18	0.04	0.21	0.05	0.00	0.00
EXH-6	Surface Works	Structural	0.021	0.01	0.02	0.01	0.26	0.10	0.15	0.06	0.14	0.07	0.00	0.00
EXH-7	Surface Works	Piping	0.039	0.03	0.04	0.03	0.28	0.17	0.21	0.13	0.27	0.18	0.01	0.00
EXH-8	Surface Works	Mechanical	0.016	0.01	0.02	0.01	0.16	0.09	0.10	0.06	0.11	0.06	0.00	0.00
EXH-9	Cavern Works	Primary Equipment	0.020	0.00	0.02	0.00	0.31	0.02	0.15	0.01	0.15	0.01	0.01	0.00
EXH-10	Cavern Works	Mining Surface Equipment	0.019	0.03	0.02	0.03	0.28	0.41	0.14	0.20	0.13	0.19	0.00	0.01
EXH-11	Cavern Works	Mining Subsurface Equipment	0.044	0.04	0.04	0.04	0.46	0.48	0.20	0.22	0.49	0.38	0.01	0.01
<b>Total Non-Road Exhaust</b>			<b>0.43</b>	<b>0.20</b>	<b>0.43</b>	<b>0.20</b>	<b>5.30</b>	<b>2.54</b>	<b>3.04</b>	<b>1.38</b>	<b>3.81</b>	<b>1.98</b>	<b>0.09</b>	<b>0.05</b>
<b>Stationary Sources</b>														
<b>Material Handling</b>														
TF1	Cavern Works	Clearing and Stripping -Truck unloading	0.657	0.08	0.10	0.01	-	-	-	-	-	-	-	-
TF2	Cavern Works	Shaft cuttings for disposal - Truck loading	0.003	0.01	0.00	0.00	-	-	-	-	-	-	-	-
TF3	Cavern Works	Mining Activities -Truck loading	0.067	0.17	0.01	0.03	-	-	-	-	-	-	-	-
TF4	Surface Works	Site clearing - Truck loading	0.060	0.06	0.01	0.01	-	-	-	-	-	-	-	-
TF5	Surface Works	Excavations Activities - Truck loading	0.028	0.02	0.00	0.00	-	-	-	-	-	-	-	-
<b>Transfer Areas Total</b>			<b>0.81</b>	<b>0.33</b>	<b>0.12</b>	<b>0.05</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Bulldozing</b>														
BD 1	Surface Works	Foundation and Compaction - Surface Works	0.222	0.40	0.11	0.20	-	-	-	-	-	-	-	-
BD 2	Cavern Works	Mining Surface	0.333	1.46	0.16	0.72	-	-	-	-	-	-	-	-
<b>Bulldozing Total</b>			<b>0.56</b>	<b>1.86</b>	<b>0.27</b>	<b>0.92</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Grading</b>														
GD1	Surface Works	Foundation and Compaction	0.192	0.35	0.01	0.03	-	-	-	-	-	-	-	-
<b>Grading Total</b>			<b>0.19</b>	<b>0.35</b>	<b>0.01</b>	<b>0.03</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Wind Erosion of Exposed Surface Areas</b>														
WE1	Total Area of the Site	Clearing & Stripping	0.459	2.010	0.229	1.005	-	-	-	-	-	-	-	-
<b>Wind Erosion Areas Total</b>			<b>0.459</b>	<b>2.010</b>	<b>0.229</b>	<b>1.005</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
<b>Wind Erosion of Stock Piles</b>														
WS1	Cavern Works	Shaft Cutting	0.05	0.24	0.01	0.04	-	-	-	-	-	-	-	-
WS2	Cavern Works	Waste Rock - Mining	0.40	1.75	0.06	0.26	-	-	-	-	-	-	-	-
WS3	Surface Works	Site Clearing	0.40	1.76	0.06	0.26	-	-	-	-	-	-	-	-
WS4	Surface Works	Excavations	0.24	1.07	0.04	0.16	-	-	-	-	-	-	-	-
<b>Wind Erosion Stockpile Total</b>			<b>1.10</b>	<b>4.81</b>	<b>0.16</b>	<b>0.72</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions</b>			<b>8.06</b>	<b>20.30</b>	<b>1.69</b>	<b>3.99</b>	<b>5.40</b>	<b>2.64</b>	<b>3.05</b>	<b>1.38</b>	<b>4.24</b>	<b>2.12</b>	<b>0.10</b>	<b>0.05</b>

**EMISSIONS SUMMARY - GREENHOUSE GASES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

ID	Activity	Description	CO <sub>2</sub> Emission Rate		CH <sub>4</sub> Emission Rate		N <sub>2</sub> O Emission Rate	
			24-hour (lbs/hr)	Annual (tons/yr)	24-hour (lbs/hr)	Annual (tons/yr)	24-hour (lbs/hr)	Annual (tons/yr)
<b>Non-Stationary Sources</b>								
<b>Exhaust Emissions from Haul Truck Traffic on Unpaved Roads</b>								
UP1	Cavern Works	Workforce (Site Clearing) - Cavern Works	3.34	0.27	0.00	0.00	0.00	0.00
UP2	Cavern Works	Equipment mobilization - Cavern Works	1.88	0.01	0.00	0.00	0.00	0.00
UP3	Cavern Works	Equipment demobilization - Cavern Works	1.88	0.01	0.00	0.00	0.00	0.00
UP4	Cavern Works	Fuel delivery - Cavern Works	1.08	0.09	0.00	0.00	0.00	0.00
UP5	Cavern Works	Fencing delivery - Cavern Works	0.94	0.00	0.00	0.00	0.00	0.00
UP6	Cavern Works	Concrete trucks - Cavern Works	0.39	0.03	0.00	0.00	0.00	0.00
UP7	Cavern Works	Gravel delivery - Cavern Works	10.03	0.75	0.00	0.00	0.00	0.00
UP8	Cavern Works	Trailer delivery - Cavern Works	1.88	0.01	0.00	0.00	0.00	0.00
UP9	Cavern Works	Workforce (Shaft) - Cavern Works	5.02	0.11	0.00	0.00	0.00	0.00
UP10	Cavern Works	Shaft cuttings for disposal - Cavern Works	0.77	1.46	0.00	0.00	0.00	0.00
UP11	Cavern Works	Workforce (Mining) - Cavern Works	15.33	5.56	0.00	0.00	0.00	0.00
UP12	Cavern Works	Surface equipment (mobilization) - Cavern Works	1.88	0.05	0.00	0.00	0.00	0.00
UP13	Cavern Works	Subsurface equipment (mobilization) - Cavern Works	1.88	0.03	0.00	0.00	0.00	0.00
UP14	Cavern Works	Ground support - Cavern Works	0.80	0.02	0.00	0.00	0.00	0.00
UP15	Cavern Works	Explosives - Cavern Works	0.80	0.02	0.00	0.00	0.00	0.00
UP16	Cavern Works	Transportation of waste rock - Cavern Works	6.69	29.18	0.00	0.00	0.00	0.00
UP17	Surface Works	Workforce - Surface Works	30.79	7.39	0.00	0.00	0.00	0.00
UP18	Surface Works	Site clearing (overburden) - Surface Works	3.89	2.79	0.00	0.00	0.00	0.00
UP19	Surface Works	Civil foundation excavation Surface Works	2.39	1.28	0.00	0.00	0.00	0.00
UP20	Surface Works	Cement Trucks Surface Works	3.37	0.60	0.00	0.00	0.00	0.00
UP21	Surface Works	Equipment and material delivery Surface Works	0.81	0.26	0.00	0.00	0.00	0.00
UP22	Surface and Cavern Works	Potable Water - Surface and Cavern	0.08	0.24	0.00	0.00	0.00	0.00
UP23	Surface and Cavern Works	Non Potable Water - Surface and Cavern	0.45	1.79	0.00	0.00	0.00	0.00
UP24	Reservoir Fill	Non Potable Water - Reservoir Fill	3.02	12.94	0.00	0.00	0.00	0.00
<b>Total Traffic Exhaust</b>			<b>99.41</b>	<b>64.88</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Exhaust Emissions from Non-Road Engines</b>								
EXH-1	Surface Works	Indirect Equipment	998.85	1,602.67	-	-	-	-
EXH-2	Surface Works	Foundation and Compaction	4,690.23	289.44	-	-	-	-
EXH-3	Surface Works	Turbine Hall	340.53	128.74	-	-	-	-
EXH-4	Surface Works	Spheres	309.86	447.96	-	-	-	-
EXH-5	Surface Works	Primary Equipment	526.13	129.88	-	-	-	-
EXH-6	Surface Works	Structural	497.03	191.22	-	-	-	-
EXH-7	Surface Works	Piping	555.24	342.27	-	-	-	-
EXH-8	Surface Works	Mechanical	309.86	172.10	-	-	-	-
EXH-9	Cavern Works	Primary Equipment	596.60	46.59	-	-	-	-
EXH-10	Cavern Works	Mining Surface Equipment	519.84	768.33	-	-	-	-
EXH-11	Cavern Works	Mining Subsurface Equipment	700.54	818.76	-	-	-	-
<b>Total Non-Road Exhaust</b>			<b>10,044.72</b>	<b>4,937.95</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>Total Emissions</b>			<b>10,144.1</b>	<b>5,002.8</b>	<b>0.004</b>	<b>0.003</b>	<b>0.001</b>	<b>0.001</b>

Greenhouse Gases (GHGs)	Global Warming Potential (GWP)	Emission Rate (lb/hr)	Emission Rate (lb/hr)	Emission Rate (lb/hr CO <sub>2</sub> e)	Annual Emissions (TPY CO <sub>2</sub> e)
Carbon dioxide (CO <sub>2</sub> )	1	10,144.133	5,002.8	10,144	5,003
Methane (CH <sub>4</sub> )	25	0.004	0.003	0.10	0.07
Nitrous oxide (N <sub>2</sub> O)	298	0.001	0.001	0.24	0.16
<b>Total</b>					<b>5,003.06</b>

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Cavern Works															
	Clearing & Stripping								Shaft Construction		Mining Activities					
	Workforce	Equipment mobilization	Equipment demobilization	Fuel delivery	Fencing delivery	Concrete trucks	Gravel delivery	Trailer delivery	Workforce	Shaft cuttings for disposal	Workforce	Surface equipment – mobilization	Subsurface equipment – mobilization	Ground support	Explosives	On road trucks - waste rock truck
<b>Material Throughput</b>																
Total Area (acres)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Material Depth (in)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	--	--	--	--	--	305,100	--	--	513,000	--	--	--	--	--	10,240,992
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	--	--	--	--	--	11,300	--	--	19,000	--	--	--	--	--	379,296
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	--	--	--	--	--	105.0	--	--	130.0	--	--	--	--	--	130
Total Material Weight (tons)	--	--	--	--	--	--	16,018	--	--	33,345	--	--	--	--	--	665,664
<b>Operating Time</b>																
Total Operating Weeks (weeks) <sup>c</sup>	16	1	1	16	1	3	3	1	4	52	52	4	4	52	52	52
Total Operating Days (days) <sup>c</sup>	80	7	7	80	7	15	15	7	20	365	365	30	30	365	365	365
Daily Operating Hours (hrs/day)	2	2	2	2	2	10	10	2	2	12	2	2	2	2	2	24
<b>Vehicle and Travel Data</b>																
Vehicle Model <sup>d</sup>	Passenger Car	Tractor Trailer	Tractor Trailer	Fuel truck (tandem)	Tractor Trailer	Cement mix truck (10 yd)	Tandem truck load (12 yd)	Tractor Trailer	Passenger car	12 cy dump truck	Passenger car	Tractor Trailer	Tractor Trailer	Flatbed tractor trailer	Flatbed tractor trailer	Dump trucks (12 yd)
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	19.0	19.0	7.1	19.0	13.5	20.0	19.0	2.3	25.5	2.3	19.0	19.0	19.0	19.0	25.5
Vehicle Capacity (tons)	0.8	20.0	20.0	19.0	20.0	20.0	18.0	20.0	0.8	19.0	0.8	20.0	20.0	20.0	20.0	19.0
Vehicle Capacity (yd <sup>3</sup> )	--	--	--	--	--	--	12.0	--	--	12.0	--	--	--	--	--	12.0
Loaded Vehicle Weight (tons)	3.0	39.0	39.0	26.1	39.0	33.5	38.0	39.0	3.0	44.5	3.0	39.0	39.0	39.0	39.0	44.5
W = Average Vehicle Weight (tons)	2.7	29.0	29.0	16.6	29.0	23.5	29.0	29.0	2.7	35.0	2.7	29.0	29.0	29.0	29.0	35.0
Number of Vehicles (duration)	960	10	10	80	2	30	942	12	390	1,583	19,957	50	35	24	24	31,608
Number of Vehicles (daily)	12	2	2	1	1	2	63	2	18	5	55	2	2	1	1	87
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	7.7	1.3	1.3	0.6	0.6	1.3	40.6	1.3	11.6	3.2	35.4	1.3	1.3	0.6	0.6	56.0
Activity Duration Vehicle Miles Travelled (VMT)	618	6	6	52	1	19	607	8	251	1,020	12,855	32	23	15	15	20,359

<sup>a</sup> Material quantities based on the document TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)  
<sup>b</sup> The density of 130 lb/ft<sup>3</sup> used for shat material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience  
<sup>c</sup> Operating weeks are based on construction schedule information obtained from Hydrostor.  
<sup>d</sup> Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)  
<sup>e</sup> Empty vehicle weights were obtained from technical specifications of each vehicle.  
<sup>f</sup> Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel

**Table 1**  
**Material Throughput and Vehicle Traffic Count on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	17	18	19	20	21	22	23	24
	Surface Works			Surface Works & Cavern		Reservoir Fill		
	Workforce	Site clearing - overburden	Civil foundation excavation	Cement Trucks	Equipment and material delivery	Potable Water	Non Potable Water	Non Potable Water
<b>Material Throughput</b>								
Total Area (acres)	--	--	--	--	--	--	--	--
Material Depth (in)	--	--	--	--	--	--	--	--
Material Volume (ft <sup>3</sup> )	--	3,402,783	1,201,959	--	--	--	--	--
Material Volume (yd <sup>3</sup> ) <sup>a</sup>	--	126,029	44,517	--	--	--	--	--
Material Density (lb/ft <sup>3</sup> ) <sup>b</sup>	--	115	115	--	--	--	--	--
Total Material Weight (tons)	--	195,660	69,113	--	--	--	--	--
<b>Operating Time</b>								
Total Operating Weeks (weeks) <sup>c</sup>	52	16	12	4	52	52	52	52
Total Operating Days (days) <sup>c</sup>	240	120	90	30	365	365	365	365
Daily Operating Hours (hrs/day)	2	12	12	12	2	24	24	24
<b>Vehicle and Travel Data</b>								
Vehicle Model <sup>d</sup>	Passenger Car	12 cy dump truck	12 cy dump truck	12 cy cement truck	Flatbed	water truck 9000 gal	water truck 9000 gal	water truck 9000 gal
Empty Vehicle Weight (tons) <sup>e</sup>	2.3	25.5	25.5	23.0	19.0	23.2	23.2	23.2
Vehicle Capacity (tons)	0.8	19.0	19.0	24.0	20.0	12.0	12.0	12.0
Vehicle Capacity (yd <sup>3</sup> )	--	12.0	12.0	12.0	--	-	-	-
Loaded Vehicle Weight (tons)	3.0	44.5	44.5	47.0	39.0	35.3	35.3	35.3
W = Average Vehicle Weight (tons)	2.7	35.0	35.0	35.0	29.0	29.2	29.2	29.2
Number of Vehicles (duration)	92,160	10,502	4,822	2,771	969	260	1,974	14,289
Number of Vehicles (daily)	384	88	54	93	3	1	6	40
D = Distance traveled on unpaved roads (2-way miles) <sup>f</sup>	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.6
Daily Vehicle Miles Travelled (VMT)	71	16	10	17	1	1	4	26
Activity Duration Vehicle Miles Travelled (VMT)	17,077	1,946	893	513	180	167	1,271	9,204

<sup>a</sup>Material quantities based on the document TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>b</sup>The density of 130 lb/ft<sup>3</sup> used for silt material and waste, 115 lb/ft<sup>3</sup> used for surface material such as topsoil and overburden, and density of 105 lb/ft<sup>3</sup> used for a typical gravel material. Densities are assumed based on Golder's experience

<sup>c</sup>Operating weeks are based on construction schedule information obtained from Hydrostor.

<sup>d</sup>Vehicle model based on TWD 21-5375-00-5000-001 - Table 2 - Haul and Material Truck Quantities provided by Hydrostor (July 2021)

<sup>e</sup>Empty vehicle weights were obtained from technical specifications of each vehicle.

<sup>f</sup>Hauling distance is conservatively estimated based on road design. Fugitive dust generation is directly proportional to the distance of travel

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Clearing & Stripping														Shaft Construction					
	Haul Road 1		Haul Road 2		Haul Road 3		Haul Road 4		Haul Road 5		Haul Road 6		Haul Road 7		Haul Road 8		Haul Road 9		Haul Road 10	
	Workforce		Equipment mobilization		Equipment demobilization		Fuel delivery		Fencing delivery		Concrete trucks		Gravel delivery		Trailer delivery		Workforce		Shaft cuttings for disposal	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Vehicle and Travel Data <sup>b</sup></b>																				
W = Average Vehicle Weight (tons)	2.7	2.7	29.0	29.0	29.0	29.0	16.6	16.6	29.0	29.0	23.5	23.5	29.0	29.0	29.0	29.0	2.7	2.7	35.0	35.0
D = Distance traveled on unpaved roads (2-way miles)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Daily Operation Hours (hrs/day)	2	2	2	2	2	2	2	2	2	2	10	10	10	10	2	2	2	2	12	12
Total No. of Operating Days for activity (days)	80	80	7	7	7	7	80	80	7	7	15	15	15	15	7	7	20	20	365	365
No. of truck trips per day (trucks/day)	12	12	2	2	2	2	1	1	1	1	2	2	63	63	2	2	18	18	5	5
Total No. of trucks for activity (trucks)	960	960	10	10	10	10	80	80	2	2	30	30	942	942	12	12	390	390	1,583	1,583
Daily Vehicle Miles Travelled (VMT)	8	8	1	1	1	1	1	1	1	1	1	1	41	41	1	1	12	12	3	3
Activity Duration Vehicle Miles Travelled (VMT)	618	618	6	6	6	6	52	52	1	1	19	19	607	607	8	8	251	251	1,020	1,020
<b>Site Characteristics</b>																				
k = Particle size multiplier (lb/VMT) <sup>e</sup>	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>c</sup>	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>																				
Dust Control Efficiency (%) <sup>f</sup>	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
<b>Emission Factors <sup>a</sup></b>																				
Emission Factor (lb/VMT) - Daily	1.04	0.104	3.1	0.3	3.1	0.3	2.4	0.2	3.1	0.3	2.8	0.3	3.1	0.3	3.1	0.3	1.0	0.1	3.3	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.099	2.92	0.29	2.92	0.29	2.27	0.23	2.92	0.29	2.66	0.27	2.92	0.29	2.92	0.29	0.99	0.10	3.18	0.32
<b>Emission Rates <sup>a</sup></b>																				
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	8.0	0.8	3.9	0.4	3.9	0.4	1.5	0.2	2.0	0.2	3.6	0.4	123.9	12.4	3.9	0.4	12.1	1.2	10.7	1.1
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.0	0.0	0.1	0.0	1.6	0.2
Controlled Daily Emissions (lb/day)	1.2	0.1	0.6	0.1	0.6	0.1	0.2	0.0	0.3	0.0	0.5	0.1	18.6	1.9	0.6	0.1	1.8	0.2	1.6	0.2
Controlled Annual Emissions (TPY)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Controlled Hourly Emissions (lb/hr, daily basis)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.1	0.0	0.0	0.1	0.0	0.1	0.0
Emission Factor (lb/hr/mi)	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	2.4	0.2	0.1	0.0	0.2	0.0	0.2	0.0

<sup>a</sup> Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -

$$E = k * (s/12)^a * (W/3)^b * (365-P)/365$$

<sup>b</sup> See Appendix 5.1B (annual) Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>f</sup> Dust control efficiency based on 85% for basic watering plus chemical dust suppressors on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**Table 2**  
**Fugitive Particulate Matter (PM) Emissions from Vehicle Traffic on Unpaved Roads**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Mining Activities												Surface Works						Surface Works & Cavern				Reservoir Fill							
	Haul Road 11		Haul Road 12		Haul Road 13		Haul Road 14		Haul Road 15		Haul Road 16		Haul Road 17		Haul Road 18		Haul Road 19		Haul Road 20		Haul Road 21		Haul Road 22		Haul Road 23		Haul Road 24			
	Workforce		Surface equipment – mobilization		Subsurface equipment – mobilization		Ground support		Explosives		On road trucks - waste rock truck		Workforce		Site clearing - overburden		Civil foundation excavation		Cement Trucks		Equipment and material delivery		Potable Water		Non Potable Water		Non Potable Water			
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>		
<b>Vehicle and Travel Data<sup>b</sup></b>																														
W = Average Vehicle Weight (tons)	2.7	2.7	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	
D = Distance traveled on unpaved roads (2-way miles)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Daily Operation Hours (hrs/day)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Total No. of Operating Days for activity (days)	365	365	30	30	30	30	365	365	365	365	365	365	240	240	120	120	90	90.0	30	30	365	365	365	365.0	365	365.0	365	365.0		
No. of truck trips per day (trucks/day)	55	55	2	2	2	2	1	1	1	1	87	87	384	384	88	88	54	54.0	93	93	3	3	1	1.0	6	6.0	40	40.0		
Total No. of trucks for activity (trucks)	19,957	19,957	50	50	35	35	24	24	24	24	31,608	31,608	92,160	92,160	10,502	10,502	10,502	10,502	2,771	2,771	969	260	260	259.7	1,974	1,974	14,289	14,289		
Daily Vehicle Miles Travelled (VMT)	35	35	1	1	1	1	1	1	1	1	56	56	71	71	16	16	10	10.0	17	17	1	1	1	0.6	4	3.9	26	25.8		
Activity Duration Vehicle Miles Travelled (VMT)	12,855	12,855	32	32	23	23	15	15	15	15	20,359	20,359	17,077	17,077	1,946	1,946	893	893	513	513	180	180	167	167.3	1,271	1,271	9,204	9,204		
<b>Site Characteristics</b>																														
k = Particle size multiplier (lb/VMT) <sup>c</sup>	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15	1.5	0.15
s = Silt content of site specific unpaved roads (%) <sup>d</sup>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
P = Mean annual number of days with precipitation greater than or equal to 0.01 inch (0.25 mm) <sup>e</sup>	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
a (constant, AP-42, Table 13.2.2-2)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
b (constant, AP-42, Table 13.2.2-2)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
<b>Control Efficiency</b>																														
Dust Control Efficiency (%) <sup>e</sup>	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
<b>Emission Factors<sup>a</sup></b>																														
Emission Factor (lb/VMT) - Daily <sup>e</sup>	1.0	0.1	3.1	0.3	3.1	0.3	3.1	0.3	3.1	0.3	3.3	0.3	1.0	0.1	3.3	0.3	3.3	0.3	3.3	0.3	3.1	0.3	3.1	0.3	3.1	0.3	3.1	0.3	3.1	0.3
Emission Factor (lb/VMT) - Annual	0.99	0.10	2.92	0.29	2.92	0.29	2.92	0.29	2.92	0.29	3.18	0.32	0.99	0.10	3.18	0.32	3.18	0.32	3.18	0.32	2.92	0.29	2.93	0.29	2.93	0.29	2.93	0.29	2.93	0.29
<b>Emission Rates<sup>a</sup></b>																														
Uncontrolled Emission Factor (UEF) Equation - Daily (lb/day)	36.8	3.7	3.9	0.4	3.9	0.4	2.0	0.2	2.0	0.2	186.2	18.6	74.0	7.4	54.2	5.4	33.2	3.3	57.2	5.7	1.7	0.2	2.0	0.2	11.8	1.2	78.9	7.9		
Uncontrolled Emission Factor (UEF) Equation - Duration (tons)	6.39	0.64	0.05	0.00	0.03	0.00	0.02	0.00	0.02	0.00	32.34	3.23	8.49	0.85	3.09	0.31	1.42	0.14	0.82	0.08	0.26	0.03	0.25	0.02	1.86	0.19	13.48	1.35		
Controlled Daily Emissions (lb/day)	5.5	0.6	0.6	0.1	0.6	0.1	0.3	0.0	0.3	0.0	27.9	2.8	11.1	1.1	8.1	0.8	5.0	0.5	8.6	0.9	0.3	0.0	0.3	0.0	1.8	0.2	11.8	1.2		
Controlled Annual Emissions (TPY)	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.5	1.3	0.1	0.5	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	2.0	0.2		
Controlled Hourly Emissions (lb/hr, daily basis)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.1	0.5	0.0	0.3	0.0	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.0		
Emission Factor (lb/hr/mi)	0.7	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	3.6	0.4	5.0	0.5	3.7	0.4	2.2	0.2	3.9	0.4	0.1	0.0	0.0	0.0	0.2	0.0	1.5	0.2		

<sup>a</sup> Emission Factor (E) calculated from AP-42 Section 13.2.2 (Unpaved Roads) Equation 1a (Industrial Sites) -  
 $E = k * (s/12)^a * (W/3)^b * (365-P)/365$

<sup>b</sup> See Table 1 for number of vehicles and travel data.

<sup>c</sup> Particle size multiplier and constants from AP-42 Table 13.2.2-2 for industrial roads

<sup>d</sup> Silt content based on the Table 13.2.2-1 of AP-42 for Construction Sites

<sup>e</sup> Precipitation data based on annual summary data for 2020 Meteorological Data - Mojave Airport

<sup>f</sup> Dust control efficiency based on 70% for basic watering on unpaved roads according to the Document Emission Factors for Paved and Unpaved Roads by the Department of Environmental Quality, State of Utah, January 2015

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/day)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Hourly Emissions																	
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (lbs/hr)	Total PM <sub>2.5</sub> (lbs/hr)	Total VOC (lbs/hr)	Total NO <sub>x</sub> (lbs/hr)	Total CO (lbs/hr)	Total SO <sub>2</sub> (lbs/hr)											
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																																		
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617																	
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859																	
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859																	
<b>Daily Emissions (lbs/day)<sup>b</sup></b>																																		
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.64	80	2	5,300	LDGV	<6,000	Diesel	8	4.88E-02	2.05E-03	8.57E-04	1.31E-04	3.07E-04	1.21E-04	7.84E-05	1.05E-03	1.82E-05	8.31E-06	0.0005	0.0010	0.0244	0.0004											
Haul Road 2	Equipment mobilization - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000											
Haul Road 3	Equipment demobilization - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000											
Haul Road 4	Fuel delivery - Cavern Works	0.64	80	2	33,200	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000											
Haul Road 5	Fencing delivery - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000											
Haul Road 6	Concrete trucks - Cavern Works	0.64	15	10	47,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0001	0.0007	0.0003	0.0000											
Haul Road 7	Gravel delivery - Cavern Works	0.64	15	10	58,000	HDGV8a	33,001-60,000	Diesel	41	9.25E-02	2.12E-01	1.15E-03	2.41E-03	6.62E-03	2.34E-03	1.70E-03	1.66E-02	3.76E-04	1.68E-04	0.0017	0.0212	0.0093	0.0001											
Haul Road 8	Trailer delivery - Cavern Works	0.64	7	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000											
Haul Road 9	Workforce (Shaft) - Cavern Works	0.64	20	2	5,300	LDGV	<6,000	Diesel	12	7.32E-02	3.08E-03	1.29E-03	1.97E-04	4.60E-04	1.81E-04	1.18E-04	1.58E-03	2.74E-05	1.25E-05	0.0008	0.0015	0.0366	0.0006											
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.64	365	12	70,000	HDDV8b	>60,000	Diesel	3	7.34E-03	1.68E-02	9.15E-05	1.91E-04	5.26E-04	1.85E-04	1.35E-04	1.32E-03	2.99E-05	1.34E-05	0.0001	0.0014	0.0006	0.0000											
Haul Road 11	Workforce (Mining) - Cavern Works	0.64	365	2	5,300	LDGV	<6,000	Diesel	35	2.24E-01	9.41E-03	3.93E-03	6.01E-04	1.41E-03	5.55E-04	3.59E-04	4.82E-03	8.36E-05	3.81E-05	0.0024	0.0047	0.1119	0.0020											
Haul Road 12	Surface equipment (mobilization) - Cavern Works	0.64	30	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000											
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	0.64	30	2	58,000	HDGV8a	33,001-60,000	Diesel	1	2.94E-03	6.73E-03	3.66E-05	7.65E-05	2.10E-04	7.41E-05	5.41E-05	5.28E-04	1.19E-05	5.34E-06	0.0003	0.0034	0.0015	0.0000											
Haul Road 14	Ground support - Cavern Works	0.64	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000											
Haul Road 15	Explosives - Cavern Works	0.64	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0001	0.0017	0.0007	0.0000											
Haul Road 16	Transportation of waste rock - Cavern Works	0.64	365	24	70,000	HDDV8b	33,001-60,000	Diesel	56	1.28E-01	2.93E-01	1.59E-03	3.33E-03	9.15E-03	3.22E-03	2.35E-03	2.30E-02	5.20E-04	2.32E-04	0.0010	0.0122	0.0053	0.0001											
Haul Road 17	Workforce - Surface Works	0.19	240	2	5,300	LDGV	<6,000	Diesel	71	4.50E-01	1.89E-02	7.89E-03	1.21E-03	2.82E-03	1.11E-03	7.22E-04	9.68E-03	1.68E-04	7.65E-05	0.0048	0.0095	0.2248	0.0039											
Haul Road 18	Site clearing (overburden) - Surface Works	0.19	120	12	70,000	HDDV8b	>60,000	Diesel	16	3.72E-02	8.52E-02	4.63E-04	9.68E-04	2.66E-03	9.38E-04	6.84E-04	6.68E-03	1.51E-04	6.76E-05	0.0006	0.0071	0.0031	0.0000											
Haul Road 19	Civil foundation excavation Surface Works	0.19	90	12	70,000	HDDV8b	>60,000	Diesel	10	2.28E-02	5.23E-02	2.84E-04	5.94E-04	1.63E-03	5.76E-04	4.20E-04	4.10E-03	9.28E-05	4.15E-05	0.0003	0.0044	0.0019	0.0000											
Haul Road 20	Cement Trucks Surface Works	0.19	30	12	70,000	HDDV8b	>60,000	Diesel	17	3.93E-02	9.01E-02	4.90E-04	1.02E-03	2.81E-03	9.92E-04	7.23E-04	7.06E-03	1.60E-04	7.15E-05	0.0006	0.0075	0.0033	0.0000											
Haul Road 21	Equipment and material delivery Surface Works	0.19	365	2	58,000	HDGV8a	33,001-60,000	Diesel	1	1.27E-03	2.91E-03	1.58E-05	3.30E-05	9.08E-05	3.20E-05	2.33E-05	2.28E-04	5.16E-06	2.31E-06	0.0001	0.0015	0.0006	0.0000											
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	1	1.47E-03	3.37E-03	1.83E-05	3.82E-05	1.05E-04	3.71E-05	2.70E-05	2.64E-04	5.97E-06	2.67E-06	0.0000	0.0001	0.0001	0.0000											
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	4	8.81E-03	2.02E-02	1.10E-04	2.29E-04	6.31E-04	2.22E-04	1.62E-04	1.58E-03	3.58E-05	1.60E-05	0.0001	0.0008	0.0004	0.0000											
Haul Road 24	Non Potable Water - Reservoir Fill	0.64	365	24	58,482	HDGV8a	33,001-60,000	Diesel	26	5.88E-02	1.35E-01	7.32E-04	1.53E-03	4.21E-03	1.48E-03	1.08E-03	1.06E-02	2.39E-04	1.07E-04	0.0004	0.0056	0.0024	0.0000											

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors (see Table B-2.)

**TABLE 3**  
**ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase**  
**Gem Site - Hydrostor**

Road ID	Description	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Average Haul Weight (lbs)	MOVES Matching Vehicle Type		Fuel Type	Total Miles Travelled (VMT/year)	Pollutants from Vehicle Exhaust and Tire & Brake Wear							Annual Emissions														
						Vehicle Type	Weight Range (lbs)			CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub> Exhaust	PM <sub>10</sub> TBW	PM <sub>2.5</sub> Exhaust	PM <sub>2.5</sub> TBW	VOC	Total PM <sub>10</sub> (tons/yr)	Total PM <sub>2.5</sub> (tons/yr)	Total VOC (tons/yr)	Total NO <sub>x</sub> (tons/yr)	Total CO (tons/yr)	Total SO <sub>2</sub> (tons/yr)								
<b>Lifetime Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile)<sup>a</sup></b>																															
						LDGV	<6,000	Diesel		2.8656	0.1205	0.0503	0.0077	0.0180	0.0071	0.0046	0.0617														
						HDGV8a	33,001-60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859														
						HDDV8b	>60,000	Diesel		1.0344	2.3708	0.0129	0.0269	0.0741	0.0261	0.0190	0.1859														
<b>Annual Emissions (lbs/year)<sup>b</sup></b>																															
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.64	80	2	5300	LDGV	<6,000	Diesel	618	3.91	0.16	0.07	0.01	0.02	0.01	0.01	0.08	0.0000	0.0000	0.0000	0.0001	0.0020	0.0000								
Haul Road 2	Equipment mobilization - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	6	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 3	Equipment demobilization - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	6	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 4	Fuel delivery - Cavern Works	0.64	80	2	33200	HDGV8a	33,001-60,000	Diesel	52	0.12	0.27	0.00	0.00	0.01	0.00	0.00	0.01	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000								
Haul Road 5	Fencing delivery - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	1	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 6	Concrete trucks - Cavern Works	0.64	15	10	47000	HDGV8a	33,001-60,000	Diesel	19	0.04	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000								
Haul Road 7	Gravel delivery - Cavern Works	0.64	15	10	58000	HDGV8a	33,001-60,000	Diesel	607	1.38	3.17	0.02	0.04	0.10	0.03	0.03	0.08	0.0001	0.0000	0.0000	0.0016	0.0007	0.0000								
Haul Road 8	Trailer delivery - Cavern Works	0.64	7	2	58000	HDGV8a	33,001-60,000	Diesel	8	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 9	Workforce (Shaft) - Cavern Works	0.64	20	2	5300	LDGV	<6,000	Diesel	251	1.59	0.07	0.03	0.00	0.01	0.00	0.00	0.03	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000								
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.64	365	12	70000	HDDV8b	>60,000	Diesel	1,020	2.33	5.33	0.03	0.06	0.17	0.06	0.04	0.14	0.0001	0.0001	0.0001	0.0027	0.0012	0.0000								
Haul Road 11	Workforce (Mining) - Cavern Works	0.64	365	2	5300	LDGV	<6,000	Diesel	12,855	81.21	3.41	1.43	0.22	0.51	0.20	0.13	1.75	0.0004	0.0002	0.0009	0.0017	0.0406	0.0007								
Haul Road 12	Surface equipment (mobilization) - Cavern Wc	0.64	30	2	58000	HDGV8a	33,001-60,000	Diesel	32	0.07	0.17	0.00	0.00	0.01	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000								
Haul Road 13	Subsurface equipment (mobilization) - Cavern	0.64	30	2	58000	HDGV8a	33,001-60,000	Diesel	23	0.05	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000								
Haul Road 14	Ground support - Cavern Works	0.64	365	2	58000	HDGV8a	33,001-60,000	Diesel	15	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 15	Explosives - Cavern Works	0.64	365	2	58000	HDGV8a	33,001-60,000	Diesel	15	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
Haul Road 16	Transportation of waste rock - Cavern Works	0.64	365	24	70000	HDDV8b	33,001-60,000	Diesel	20,359	46.43	106.41	0.58	1.21	3.32	1.17	0.85	2.77	0.0023	0.0010	0.0014	0.0532	0.0232	0.0003								
Haul Road 17	Workforce - Surface Works	0.19	240	2	5300	LDGV	<6,000	Diesel	17,077	107.88	4.54	1.89	0.29	0.68	0.27	0.17	2.32	0.0005	0.0002	0.0012	0.0023	0.0539	0.0009								
Haul Road 18	Site clearing (overburden) - Surface Works	0.19	120	12	70000	HDDV8b	>60,000	Diesel	1,946	4.44	10.17	0.06	0.12	0.32	0.11	0.08	0.26	0.0002	0.0001	0.0001	0.0051	0.0022	0.0000								
Haul Road 19	Civil foundation excavation Surface Works	0.19	90	12	70000	HDDV8b	>60,000	Diesel	893	2.04	4.67	0.03	0.05	0.15	0.05	0.04	0.12	0.0001	0.0000	0.0001	0.0023	0.0010	0.0000								
Haul Road 20	Cement Trucks Surface Works	0.19	30	12	70000	HDDV8b	>60,000	Diesel	513	1.17	2.68	0.01	0.03	0.08	0.03	0.02	0.07	0.0001	0.0000	0.0000	0.0013	0.0006	0.0000								
Haul Road 21	Equipment and material delivery Surface Worl	0.19	365	2	58000	HDGV8a	33,001-60,000	Diesel	180	0.41	0.94	0.01	0.01	0.03	0.01	0.01	0.02	0.0000	0.0000	0.0000	0.0005	0.0002	0.0000								
Haul Road 22	Potable Water - Surface and Cavern	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	167	0.38	0.87	0.00	0.01	0.03	0.01	0.01	0.02	0.0000	0.0000	0.0000	0.0004	0.0002	0.0000								
Haul Road 23	Non Potable Water - Surface and Cavern	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	1,271	2.90	6.64	0.04	0.08	0.21	0.07	0.05	0.17	0.0001	0.0001	0.0001	0.0033	0.0014	0.0000								
Haul Road 24	Non Potable Water - Reservoir Fill	0.64	365	24	58482	HDGV8a	33,001-60,000	Diesel	9,204	20.99	48.10	0.26	0.55	1.50	0.53	0.39	1.25	0.0010	0.0005	0.0006	0.0241	0.0105	0.0001								

<sup>a</sup> Lifetime mileage-weighted average model year based emission factors from Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Argonne National Laboratory, 2013.

<sup>b</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

**Table 4**  
**Estimation of Emissions Factors for Non-Road Equipment Used in the Project**  
**Construction Phase**  
**Gem Site - Hydrostor**

Equipment Description	Number of Equipment	Engine Power (hp) <sup>g</sup>	Engine Tier Rating	Unadjusted Emission Factor (EFs) <sup>a</sup>					Transient Adjustment Emission Factor (TAF) <sup>b</sup>					Deterioration Emission Factor (DF) <sup>c</sup>				S Adjustment <sup>d</sup> (g/hp-hr)	Adjusted Emission Factor (EFadj) <sup>e</sup>				Emission Factor <sup>f</sup>	
				HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	BSFC	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>		HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>
				(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(lb/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)		(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)
<b>Surface Works</b>																								
<u>Indirect</u>																								
60 kW Diesel Gensets	12	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
<u>Foundation and Compaction</u>																								
Wheel Loader	2	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Crawler Loader	12	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Grader	7	160	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Crawler dozer	2	120	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Scraper	9	270	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Backhoe	16	120	4	0.1314	0.0870	0.2760	0.0092	0.367	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.257	0.337	0.032	625.645	0.0058
Roller	11	100	4	0.1314	0.2370	0.2760	0.0092	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.020	595.821	0.0055
Pile driver hammer	4	250	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<u>Turbine Hall</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	5	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Spheres</u>																								
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Primary Equipment</u>																								
Cranes	3	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	8	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Structural</u>																								
Cranes	4	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
Welding machine	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
<u>Piping</u>																								
Welding machine	12	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
Cranes	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<u>Mechanical</u>																								
Welding machines	4	50	4	0.1314	0.1530	0.2760	0.0184	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	0.309	0.453	0.337	0.064	695.650	0.0064
Crane	2	200	4	0.1314	0.0750	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.086	0.278	0.014	530.613	0.0049
<b>Cavern Works</b>																								
Drill rigs (electrical)	3	675	4	0.1314	0.1330	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.153	0.278	0.014	530.613	0.0049
30 ton cranes	3	173	4	0.1314	0.0870	0.2760	0.0092	0.367	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.100	0.278	0.014	530.613	0.0049
6" water pumps	3	58	4	0.1314	0.2370	0.2760	0.0184	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.027	589.939	0.0054
Long stick track hoe	1	187	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Off road dump truck, 30 t	1	370	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
<u>Mining Surface Equipment</u>																								
Off road dump truck, 30t	2	370	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Front end loader	1	250	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
All terrain forklift	1	110	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
<u>Mining Subsurface Equipment</u>																								
Bolter (semi-electrical)	3	55	4	0.1314	0.2370	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.040	595.821	0.0055
Jumbo (semi-electrical)	2	90	4	0.1314	0.2370	0.2760	0.0092	0.408	1.00	1.00	1.00	1.00	1.00	1.027	1.151	1.008	1.473	0.000	0.135	0.273	0.278	0.014	589.939	0.0054
Scissor lift	1	138	4	0.1314	0.0870	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.153	0.289	0.020	535.902	0.0049
Welder	1	19	4	0.4380	2.1610	4.4399	0.2800	0.408	2.29	2.57	1.21	2.37	1.18	1.027	1.151	1.008	1.473	0.000	1.030	6.392	5.415	0.977	693.350	0.0064
Buggy	1	47	4	0.1314	0.1530	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.003	1.101	1.009	1.473	0.000	0.138	0.258	0.290	0.040	595.832	0.0055
Loaders/haul/dump	5	201	4	0.1314	0.0750	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.132	0.289	0.020	535.902	0.0049
Boom lift	1	147	4	0.1314	0.8700	0.2760	0.0092	0.367	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	1.532	0.289	0.020	535.902	0.0049
Skid steer	1	61	4	0.1314	0.2370	0.2760	0.0184	0.408	1.05	1.53	1.04	1.47	1.01	1.027	1.151	1.008	1.473	0.000	0.142	0.417	0.289	0.040	595.821	0.0055

<sup>a</sup> Zero-Hour, steady-state emission factors for nonroad CI engines from EPA-420-B-16-022, Table A4

<sup>b</sup> Transient Adjustment Factors by Equipment Type for Nonroad CI Equipment, Table A5.

<sup>c</sup> Deterioration Factors for Nonroad Diesel Engines, Table A6.

<sup>d</sup> Adjustment to PM emission factor to account for variations in fuel sulfur content is made using the following equation -

$$\begin{aligned} \text{soxcnv} &= 0.02247 \text{ grams PM sulfur/grams fuel sulfur consumed} \\ \text{soxbas} &= 0.33 \text{ percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 1 and 2)} \\ &= 0.0015 \text{ percent (default certification fuel sulfur weight percent for diesel engines, Tier Ratings 3 and 4)} \\ \text{soxdsl} &= 0.0015 \text{ percent (15 ppm is the maximum ultra low sulfur diesel - ULSD)} \end{aligned}$$

<sup>e</sup> For all pollutants except PM, adjusted Emission Factor = UAF x TAF x DF.

For PM, adjusted Emission Factor = UAF x TAF x DF -  $S_{\text{PM adj}}$ .

<sup>f</sup> Emission Factor for  $\text{SO}_2$  =  $[\text{BSFC} \times 453.6 \times (1 - \text{soxcnv}) - \text{HC}] \times 0.01 \times \text{soxdsl} \times (64/32)$ .

**Table 5**  
**Estimation of Emissions Rates for Non-Road Equipment used in the Project**  
**Construction Phase**  
**Gem Site - Hydrostor**

Equipment Description	NUMBER OF EQUIPMENT	ENGINE POWER (hp)	Assumed Load (%)	Availability (%)	HOURS OF OPERATION <sup>d</sup>	Emission Factors <sup>a</sup>						Hourly Emission Rates (Average Hourly) <sup>b</sup>						Annual Emission Rates (Average Annual) <sup>c</sup>																																																											
						HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>	HC	CO	NOx	PM <sub>10</sub> /PM <sub>2.5</sub>	CO <sub>2</sub>	SO <sub>2</sub>																																																						
						(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-h)	(g/hp-hr)	(g/hp-h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	(kg/h)	TPY	TPY	TPY	TPY	TPY	TPY																																																						
<b>Surface Works</b>																																																																													
<b>Indirect Equipment</b>																																																																													
60 kW Diesel Gensets	12	100	80%	80%	2,912	0.135	0.273	0.278	0.014	589.939	0.005	0.104	0.210	0.214	0.010	453.073	0.004	0.33	0.67	0.69	0.03	1453.92	0.01																																																						
						<b>EXH-1 Total (kg/h and tonne/year)</b>																																																																							
						0.228						0.462						0.471						0.023						998.854						0.009						0.37						0.74						0.76						0.04						1602.67						0.01					
<b>Foundation and Compactor</b>																																																																													
Wheel Loader	2	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.014	0.015	0.028	0.002	51.447	0.000	0.00	0.00	0.00	0.00	6.35	0.00																																																						
Crawler Loader	12	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.082	0.088	0.167	0.011	308.679	0.003	0.01	0.01	0.02	0.00	38.10	0.00																																																						
Grader	7	160	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.063	0.069	0.130	0.009	240.084	0.002	0.01	0.01	0.02	0.00	29.63	0.00																																																						
Crawler dozer	2	120	50%	80%	112	0.142	0.153	0.289	0.020	535.902	0.005	0.014	0.015	0.028	0.002	51.447	0.000	0.00	0.00	0.00	0.00	6.35	0.00																																																						
Scraper	9	270	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.138	0.128	0.281	0.019	520.896	0.005	0.02	0.02	0.03	0.00	64.29	0.00																																																						
Backhoe	16	120	50%	80%	112	0.309	0.257	0.337	0.032	625.645	0.006	0.237	0.198	0.259	0.025	480.495	0.004	0.03	0.02	0.03	0.00	59.30	0.00																																																						
Roller	11	100	50%	80%	112	0.142	0.417	0.289	0.020	595.821	0.005	0.062	0.184	0.127	0.009	262.161	0.002	0.01	0.02	0.02	0.00	32.36	0.00																																																						
Pile driver hammer	4	250	50%	80%	112	0.135	0.086	0.278	0.014	530.613	0.005	0.054	0.035	0.111	0.005	212.245	0.002	0.01	0.00	0.01	0.00	26.20	0.00																																																						
						<b>EXH-2 Total (kg/h and tonne/year)</b>																																																																							
						1.463						1.610						2.492						0.182						4690.228						0.043						0.08						0.09						0.14						0.01						262.58						0.00					
						0.09						0.10						0.15						0.01						0.01						0.01						0.03						0.00						52.39						0.00																	
<b>Turbine Hall</b>																																																																													
Cranes	2	200	50%	80%	560	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.01	0.01	0.03	0.00	52.39	0.00																																																						
Welding machine	5	50	50%	80%	840	0.309	0.453	0.337	0.064	695.650	0.006	0.031	0.045	0.034	0.006	69.565	0.001	0.03	0.04	0.03	0.01	64.39	0.00																																																						
						<b>EXH-3 Total (kg/h and tonne/year)</b>																																																																							
						0.052						0.059						0.078						0.009						154.463						0.001						0.04						0.05						0.06						0.01						116.79						0.00					
						0.116						0.130						0.172						0.019						340.532						0.003						0.05						0.06						0.06						0.01						128.74						0.00					
<b>Spheres</b>																																																																													
Cranes	2	200	50%	80%	2,912	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.07	0.04	0.14	0.01	272.44	0.00																																																						
Welding machine	4	50	50%	80%	2,184	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.06	0.09	0.06	0.01	133.94	0.00																																																						
						<b>EXH-4 Total (kg/h and tonne/year)</b>																																																																							
						0.046						0.050						0.071						0.007						140.550						0.001						0.13						0.13						0.21						0.02						406.38						0.00					
						0.102						0.110						0.158						0.016						309.859						0.003						0.14						0.14						0.23						0.02						447.96						0.00					
<b>Primary Equipment</b>																																																																													
Cranes	3	200	50%	80%	448	0.135	0.086	0.278	0.014	530.613	0.005	0.032	0.021	0.067	0.003	127.347	0.001	0.02	0.01	0.03	0.00	62.87	0.00																																																						
Welding machine	8	50	50%	80%	448	0.309	0.453	0.337	0.064	695.650	0.006	0.049	0.072	0.054	0.010	111.304	0.001	0.02	0.04	0.03	0.01	54.95	0.00																																																						
						<b>EXH-5 Total (kg/h and tonne/year)</b>																																																																							
						0.082						0.093						0.121						0.014						238.651						0.002						0.04						0.05						0.06						0.01						117.82						0.00					
						0.180						0.205						0.266						0.030						526.135						0.005						0.04						0.05						0.07						0.01						129.88						0.00					
<b>Structural</b>																																																																													
Cranes	4	200	50%	80%	560	0.135	0.086	0.278	0.014	530.613	0.005	0.043	0.028	0.089	0.004	169.796	0.002	0.03	0.02	0.05	0.00	104.78	0.00																																																						
Welding machine	4	50	50%	80%	1,120	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.03	0.04	0.03	0.01	68.69	0.00																																																						
						<b>EXH-6 Total (kg/h and tonne/year)</b>																																																																							
						0.068						0.064						0.116						0.009						225.448						0.002						0.06						0.06						0.09						0.01						173.47						0.00					
						0.150						0.141						0.256						0.021						497.027						0.005						0.06						0.07						0.10						0.01						191.22						0.00					
<b>Piping</b>																																																																													
Welding machine	12	50	50%	80%	1,232	0.309	0.453	0.337	0.064	695.650	0.006	0.074	0.109	0.081	0.015	166.956	0.002	0.10	0.15	0.11	0.02	226.67	0.00																																																						
Cranes	2	200	50%	80%	896	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.02	0.01	0.04	0.00	83.83	0.00																																																						
						<b>EXH-7 Total (kg/h and tonne/year)</b>																																																																							
						0.096						0.122						0.125						0.018						251.854						0.002						0.12						0.16						0.15						0.02						310.50						0.00					
						0.211						0.270						0.276						0.039						555.243						0.005						0.13						0.18						0.17						0.03						342.27						0.00					
<b>Mechanical</b>																																																																													
Welding machines	4	50	50%	80%	1,008	0.309	0.453	0.337	0.064	695.650	0.006	0.025	0.036	0.027	0.005	55.652	0.001	0.03	0.04	0.03	0.01	61.82	0.00																																																						
Crane	2	200	50%	80%	1,008	0.135	0.086	0.278	0.014	530.613	0.005	0.022	0.014	0.045	0.002	84.898	0.001	0.02	0.02	0.05	0.00	94.31	0.00																																																						
						<b>EXH-8 Total (kg/h and tonne/year)</b>																																																																							
						0.046						0.050						0.071						0.007						140.550						0.001						0.05						0.06						0.08						0.01						156.13						0.00					
						0.102						0.110						0.158						0.016						309.859						0.003						0.06						0.06						0.09						0.01						172.10						0.00					
<b>Cavern Works</b>																																																																													
<b>Primary Equipment</b>																																																																													
Drill rigs (electrical)	3	675	0%	0%	308	0.135	0.153	0.278	0.014	530.613	0.005	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00																																																						
30 ton cranes	3	173	50%	80%	112	0.135	0.100	0.278	0.014	530.613	0.005	0.028	0.021	0.058	0.003	110.155	0.001	0.00	0.00	0.01	0.00	13.60	0.00																																																						
6" water pumps	3	58	50%	80%	308	0.135	0.273	0.278	0.027	589.939	0.005	0.009	0.019	0.019	0.002	41.060	0.000	0.00	0.01	0.01	0.00	13.94	0.00																																																						
Long stick track hoe	1	187	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.011	0.010	0.022	0.001	40.085	0.000	0.00	0.00	0.00	0.00	4.95	0.00																																																						
Off road dump truck, 30 t	1	370	50%	80%	112	0.142	0.132	0.289	0.020	535.902	0.005	0.021	0.020	0.043	0.003	79.313	0.001	0.00	0.00	0.01	0.00	9.79	0.00																																																						
						<b>EXH-9 Total (kg/h and tonne/year)</b>																																																																							
						0.069						0.069						0.142						0.009						270.614						0.002						0.01						0.01						0.02						0.00						42.27						0.00					
						0.152						0.153						0.312						0.020						596.601						0.005						0.01						0.01						0.02						0.00						46.59						0.00					
<b>Mining Surface Equipment</b>																																																																													
Off road dump truck, 30t	2	370	50%	80%	2,464	0.142	0.132	0.289	0.020	535.902	0.005	0.042	0.039	0.086	0.006	158.627	0.001	0.11	0.11	0.23	0.02	430.72	0.00																																																						
Front end loader	1	250	50%	80%	3,696	0.142	0.132	0.289	0.020	535.902	0.005	0.014	0.013	0.029	0.002	53.590	0.000	0.06	0.05	0.12	0.01	218.27	0.00																																																						
All terrain forklift	1	110	50%	80%	1,848	0.142	0.153	0.289	0.020	535.902	0.005	0.006	0.007	0.013	0.001	23.580	0.000	0.01	0.01	0.03	0.00	48.02	0.00																																																						
						<b>EXH-10 Total (kg/h and tonne/year)</b>																																																																							
						0.062						0.059						0.127						0.009						235.797						0.002						0.18						0.17						0.38						0.03						697.02						0.01					
						0.137						0.130						0.281						0.019						519.842						0.005						0.2																																			

**TABLE 6**  
**ESTIMATION OF PM10 AND PM2.5 EMISSION FACTORS AND RATES FOR BATCH/CONTINUOUS DROP TRANSFER OPERATIONS**  
**Construction Phase**  
**Gem Site - Hydrostor**

ID	Material Handling Area	Material Type	Operational Data		Material Throughput <sup>a</sup>				Number of Transfers	Moisture Content (M) <sup>b</sup> (%)	Emission Control Data		Daily Uncontrolled Emission Factor <sup>c</sup>		Daily Controlled Emission Factor <sup>c</sup>		Estimated Emission Rate (ER)			
			(hr/day)	(# days)	Total	Total	Daily	Hourly			Method	Efficiency (%)	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>		PM <sub>2.5</sub>	
					(CY)	(tons)	(tons/day)	(tons/hr)					(lb/ton)	(lb/ton)	(lb/ton)	(lb/ton)	(lb/hr)	(tons/year)	(lb/hr)	(tons/year)
<b>Caverns Works</b>																				
TA1	Clearing and Stripping - Truck unloading	Gravel	10	15	11,300	16,018	1,068	106.8	1	2	None	0	0.0148	0.0022	0.0148	0.0022	0.66	0.08	0.10	0.01
TA2	Shaft cuttings for disposal - Truck loading	Topsoil/Overburden	12	365	19,000	33,345	91	7.6	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.00	0.01	0.00	0.00
TA3	Mining Activities - Truck loading	Waste Rock	24	365	379,296	665,664	1,824	76.0	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.07	0.17	0.01	0.03
<b>Surface Works</b>																				
TA4	Site clearing - Truck loading	Topsoil	12	120	126,029	195,660	1,631	135.9	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.06	0.06	0.01	0.01
TA5	Excavations Activities - Truck loading	Overburden	12	90	44,517	69,113	768	64.0	1	15	None	0	0.0009	0.0001	0.0009	0.0001	0.03	0.02	0.00	0.00

<sup>a</sup> See Appendix 5.1B (annual) Table 1 for material throughput information.

<sup>b</sup> Moisture content data based on the Golder specialist's experience in soils.

<sup>c</sup> Based on Emission Factor of USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

**Uncontrolled EF (UEF) Equation :**

$$UEF \text{ (lb/ton)} = k \times (0.0032) \times (U / 5)^{1.3} / [(M / 2)^{1.4}]$$

where: U = Mean wind speed (miles/hr) \*

k = Particle size multiplier

**Controlled EF (CEF) Equation :**

$$CEF \text{ (lb/ton)} = UEF \text{ (lb/ton)} \times [100\% - \text{Control efficiency (\%)}]$$

36.33	11.87	0.35	0.053
Daily	Annual	(PM10)	(PM2.5)

\* Calculated from the Mojave Airport 2020 met data

Emission factor: USEPA, 2006; AP-42, Section 13.2.4 for Aggregate Handling and Storage Piles.

**Table 7**  
**Fugitive PM Emissions from Bulldozers**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Bulldozing/Scraping Activities	
	Foundation and Compaction - Surface Works	Mining Surface
<b>ID</b>	<b>B1</b>	<b>B2</b>
<b>Operational Data</b>		
Daily Operation Hours (hrs/day)	4	12
Total No. of Operating Days for activity (days)	150	365
No. of active bulldozers/loaders/excavators/scrapers	2	1
<b>Site Characteristics <sup>b</sup></b>		
M = Moisture content (%)	3.4	3.4
s = Silt content of site specific unpaved roads (%)	7.5	7.5
<b>Control Efficiency</b>		
Dust Control Method <sup>c</sup>	Watering	Watering
Dust Control Efficiency (%)	70	70
<b>Calculated PM Emission Factors (EF) <sup>a</sup></b>		
Uncontrolled TSP EF (lb/hr)	13.03	13.03
Controlled TSP EF (lb/hr)	3.91	3.91
Uncontrolled PM <sub>15</sub> EF (lb/hr)	3.70	3.70
Controlled PM <sub>15</sub> EF (lb/hr)	1.11	1.11
Uncontrolled PM <sub>10</sub> EF (lb/hr)	2.78	2.78
Controlled PM <sub>10</sub> EF (lb/hr)	0.83	0.83
Uncontrolled PM <sub>2.5</sub> EF (lb/hr)	1.37	1.37
Controlled PM <sub>2.5</sub> EF (lb/hr)	0.41	0.41
<b>Estimated Emissions Rates (ER) <sup>d</sup></b>		
PM <sub>10</sub> ER lb/hr (daily basis)	0.22	0.33
PM <sub>10</sub> ER tons (year)	0.40	1.460
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.11	0.16
PM <sub>2.5</sub> ER tons (year)	0.197	0.719

<sup>a</sup> Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on bulldozing for overburden:

Uncontrolled TSP EF (UEF) Equation :  $UEF (lb/hr) = 5.7 \times (s)^{1.2} / (M)^{1.3}$   
 Controlled TSP EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>15</sub> EF (UEF) Equation :  $UEF (lb/hr) = 1.0 \times (s)^{1.5} / (M)^{1.4}$   
 Controlled PM<sub>15</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>10</sub> EF (UEF) Equation :  $UEF (kg/hr) = 0.75 \times \text{UEF of PM}_{15}$   
 Controlled PM<sub>10</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$   
 Uncontrolled PM<sub>2.5</sub> EF (UEF) Equation :  $UEF (kg/hr) = 0.105 \times \text{UEF of TSP}$   
 Controlled PM<sub>2.5</sub> EF (CEF) Equation :  $CEF (lb/hr) = UEF (lb/hr) \times [100 - \text{Control efficiency} (\%)]$

<sup>b</sup> Moisture content and silt sample data based on the Table 13.2.4-1 of the AP-42.

<sup>c</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March 2012).

<sup>d</sup> ER = EF x No. of active bulldozers.

**Table 8**  
**Fugitive Particulate Matter (PM) Emissions from Grading Activities**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Surface Works	
	Foundation and Compaction	
<b>ID</b>		<b>G1</b>
<b>Operational Data <sup>a</sup></b>		
Daily Operation Hours (hrs/day)		4
Total No. of Operating Days for activity (days)		150
No. of active motor graders		6
<b>Vehicle Data</b>		
Mean Vehicle Speed (S) (mph) <sup>b</sup>		3.3
<u>Basis for vehicle miles traveled (VMT)</u>		
Number of vehicles	daily	7
	annually	1050
Grader Utilization per day (%)		50
Distance traveled/vehicle/day (miles per grader)		6.6
VMT (no. vehicles x mi traveled)	daily	46.2
	annually	6930.0
<b>Control Efficiency</b>		
Dust Control Method <sup>c</sup>		Watering
Dust Control Efficiency (%)		70
<b>Scaling Factors (unitless)</b>		
TSP		1.0
PM <sub>15</sub>		1.0
PM <sub>10</sub>		0.6
PM <sub>2.5</sub>		0.031
<b>Calculated Emission Factors (EF) <sup>d</sup></b>		
Uncontrolled TSP EF (lb/VMT)		0.79
Uncontrolled PM <sub>15</sub> EF (lb/VMT)		0.56
Uncontrolled PM <sub>10</sub> EF (lb/VMT)		0.33
Uncontrolled PM <sub>2.5</sub> EF (lb/VMT)		0.02
<b>Estimated Uncontrolled Emission Rate (ER) <sup>e</sup></b>		
TSP ER lb/hr (daily basis)		1.52
	tons/yr	2.74
PM <sub>10</sub> ER lb/hr (daily basis)		0.64
	tons/yr	1.15
PM <sub>2.5</sub> ER lb/hr (daily basis)		0.05
	tons/yr	0.08
<b>Estimated Controlled Emission Rate (ER)</b>		
TSP ER lb/hr (daily basis)		0.46
	tons/yr	0.82
PM <sub>10</sub> ER lb/hr (daily basis)		0.19
	tons/yr	0.35
PM <sub>2.5</sub> ER lb/hr (daily basis)		0.01
	tons/yr	0.03

<sup>a</sup> Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines.

<sup>b</sup> Mean vehicle speed for graders based on the grader operations' time estimations by <http://www.ocw.upj.ac.id/>

<sup>c</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March 2012).

<sup>d</sup> Emission Factor equations from Table 11.9-1 of US EPA AP-42 Section 11.9 for Western Surface Coal Mines, based on grading

Uncontrolled PM<sub>15</sub> EF (UEF) Equation

UEF (lb/VMT) = 0.051 x S<sup>2.4</sup> x Scaling Factor

Uncontrolled TSP EF (UEF) Equation

UEF (lb/VMT) = 0.040(S)<sup>2.5</sup> x Scaling Factor

PM<sub>10</sub> EF = PM<sub>15</sub> EF x Scaling factor for PM-10

PM<sub>2.5</sub> EF = TSP EF x Scaling factor for PM-2.5

<sup>e</sup> ER = EF x VMT

**Table 9  
Fugitive PM Emissions from Wind Erosion of Exposed Surface Areas  
Construction Phase  
Gem Site - Hydrostor**

Parameters	Activity Areas
	Clearing & Stripping
<b>ID</b>	<b>WE1</b>
<b>Operational Data</b>	
Hours of Exposure (hrs/day)	24
Hours of Exposure (hrs/yr)	3360
Unvegetated Surface Area (acres) <sup>b</sup>	35.3
<b>Site Characteristics<sup>c</sup></b>	
Daily hours of precipitation ≥ 0.25 mm (p)	0
Annual days of precipitation ≥ 0.25 mm (p)	16
Daily % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	67.7
Annual % of time hourly wind speed ≥ 5.4 m/s (12 mph) (p)	39.9
<b>Control Efficiency</b>	
Dust Control Method <sup>d</sup>	Watering as needed
Dust Control Efficiency (%) <sup>d</sup>	70
<b>Particle Size Multipliers (k)<sup>e</sup></b>	
For TSP	1.0
For PM <sub>10</sub>	0.50
For PM <sub>2.5</sub>	0.25
<b>Calculated PM Emission Factors (EF)<sup>a</sup></b>	
Uncontrolled TSP EF (ton/acre/yr)	0.38
Uncontrolled PM <sub>10</sub> EF (ton/acre/yr)	0.19
Uncontrolled PM <sub>2.5</sub> EF (ton/acre/yr)	0.095
Controlled TSP EF (ton/acre/yr)	0.11
Controlled PM <sub>10</sub> EF (ton/acre/yr)	0.06
Controlled PM <sub>2.5</sub> EF (ton/acre/yr)	0.029
<b>Estimated Emissions Rates<sup>a</sup></b>	
TSP ER lb/hr (daily basis)	0.92
TSP ER tons (year)	4.02
PM <sub>10</sub> ER lb/hr (daily basis)	0.46
PM <sub>10</sub> ER tons (year)	2.01
PM <sub>2.5</sub> ER lb/hr (daily basis)	0.23
PM <sub>2.5</sub> ER tons (year)	1.01

<sup>a</sup> Emission factor equation from Table 11.9-4 (wind erosion of exposed areas) of US EPA AP-42 Section 11.9 for Western Surface Coal Mines:

Uncontrolled TSP EF (UEF) Equation :  $UEF \text{ (ton/acre/yr)} = k \times 0.38$   
 Controlled TSP EF (CEF) Equation :  $CEF \text{ (ton/acre/yr)} = UEF \text{ (ton/acre/yr)} \times [100 - \text{Control efficiency (\%)}]$

<sup>b</sup> Area of unvegetated surface based on the total area of the future plant. It was considered the half of the total area of the site where clearing and stripping activities will be happening in 12 months

<sup>c</sup> Based on hourly surface meteorological data from the Mojave Airport for 2020.

<sup>d</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, any soil excavated or graded should be sufficiently watered to prevent excessive dust (March 2012).

<sup>e</sup> Particle size based on AP-42 Section 13.2.5 recommendation.

**Table 10**  
**Fugitive PM Emissions from Wind Erosion of Stock Piles**  
**Construction Phase**  
**Gem Site - Hydrostor**

Parameters	Cavern Works		Surface Works	
	Shaft Cutting	Waste Rock - Mining	Site Clearing	Excavations
<b>Activity ID</b>	<b>WS1</b>	<b>WS2</b>	<b>WS3</b>	<b>WS4</b>
<b>Operational Data</b>				
Daily Operation Hours (hrs/day)	24	24	24	24
No. of Annual Operating Days (days/yr)	365	365	120	90
Material Type	Topsoil/Overburden	Waste Rock	Topsoil	Overburden
Pile Description (shape)	Conical	Conical	Conical	Conical
Height of Pile (m) <sup>a</sup>	3.4	9	9	7
Total Material Piled (tons)	33,345	665,664	195,660	69,113
Daily Material Piled (tons/day)	91	1,824	1,631	768
Daily Material Piled (m <sup>3</sup> /day) <sup>b</sup>	40	795	803	378
Cone-shaped pile base area (m <sup>2</sup> )	36	261	263	159
Cone-shaped pile base radius (m)	3.4	9.1	9.2	7.1
Estimated angle of repose (degrees)	45.0	45.0	45.0	45.0
Cone-shaped pile exposed surface area (m <sup>2</sup> )	50	369	372	225
Rectangular Pile Length (m)	--	--	--	--
Rectangular Pile Width (m)	--	--	--	--
Rectangular pile exposed surface area (m <sup>2</sup> )	--	--	--	--
No. of piles	1	1	1	1
<b>Emissions Factor</b>				
Annual Erosion Potential, P (g/m <sup>2</sup> /yr) <sup>c</sup>	17167.8	17167.8	17167.8	17167.8
Annual % of time hourly wind speed ≥ 5.4 m/s or 12 mph <sup>d</sup>	39.9	39.9	39.9	39.9
Annual hours with wind speed ≥ 5.4 m/s or 12 mph <sup>e</sup>	3455	3455.0	3455.0	3455.0
<b>Control Efficiency</b>				
Dust Control Method <sup>e</sup>	Watering	Watering	Watering	Watering
Dust Control Efficiency (%) <sup>f</sup>	50	50	50	50
<b>Particle Size Multipliers (k)<sup>g</sup></b>				
For TSP	1.0	1.0	1.0	1.0
For PM <sub>10</sub>	0.50	0.50	0.50	0.50
For PM <sub>2.5</sub>	0.075	0.075	0.075	0.075
<b>Estimated Emissions Rates (ER)<sup>g</sup></b>				
Annual TSP ER ton/yr	0.48	3.50	3.52	2.13
Annual PM <sub>10</sub> ER ton/yr	0.24	1.75	1.76	1.07
Annual PM <sub>2.5</sub> ER ton/yr	0.04	0.26	0.26	0.16
TSP ER lb/hr (annual basis)	0.11	0.80	0.80	0.49
PM <sub>10</sub> ER lb/hr (annual basis)	0.05	0.40	0.40	0.24
PM <sub>2.5</sub> ER lb/hr (annua basis)	0.01	0.06	0.06	0.04

<sup>a</sup> Height estimated to result in a 45 degree angle of repose based on the daily throughput.

<sup>b</sup> The densities are provided in Table 1 for each material

<sup>c</sup> Annual wind erosion potential estimated based on Equation 3 of AP-42 Section 13.2.5 (Industrial Wind Erosion). Threshold wind speed assumed to be 0.50 m/s.

<sup>d</sup> Based on hourly surface meteorological data from Mojave Airport for 2020.

<sup>e</sup> According to the Air Pollutant Mitigation Measure for Construction site for Eastern Kern APCD, stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust (March 2012).

<sup>f</sup> Control Efficiency based for water sprays in Stockpiles, Table 4 of Emission Estimation Technique Manual - National Pollutant Inventory, Australian Government, January 2012.

<sup>g</sup> Annual emissions estimated based on the exposed surface area and the wind erosion potential. Hourly emissions estimated from annual rates based.

**TABLE 11**  
**GREENHOUSE GASES EMISSION ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK TRAFFIC**  
**Construction Phase**  
**Gem Site - Hydrostor**

Road ID	Description	Vehicle	Roundtrip Distance (mi)	Total Operating Days (days)	Daily Operating Hours (hrs/day)	Fuel Consumption mpg (miles/gallon)	Fuel Type	Default High Heat Value (MMBtu/gallon) <sup>a</sup>	Total Miles Travelled (VMT/day)	Total Miles Travelled (VMT/year)
							Distillate Fuel Oil No 2	0.138		
Haul Road 1	Workforce (Site Clearing) - Cavern Works	Passenger Car	0.64	80	2	26	ULSD	0.138	8	618
Haul Road 2	Equipment mobilization - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	6
Haul Road 3	Equipment demobilization - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	6
Haul Road 4	Fuel delivery - Cavern Works	Fuel truck (tandem)	0.64	80	2	7	ULSD	0.138	1	52
Haul Road 5	Fencing delivery - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	1
Haul Road 6	Concrete trucks - Cavern Works	Cement mix truck (10 yd)	0.64	15	10	8	ULSD	0.138	1	19
Haul Road 7	Gravel delivery - Cavern Works	Tandem truck load (12 yd)	0.64	15	10	9	ULSD	0.138	41	607
Haul Road 8	Trailer delivery - Cavern Works	Tractor Trailer	0.64	7	2	8	ULSD	0.138	1	8
Haul Road 9	Workforce (Shaft) - Cavern Works	Passenger car	0.64	20	2	26	ULSD	0.138	12	251
Haul Road 10	Shaft cuttings for disposal - Cavern Works	12 cy dump truck	0.64	365	12	8	ULSD	0.138	3	1,020
Haul Road 11	Workforce (Mining) - Cavern Works	Passenger car	0.64	365	2	26	ULSD	0.138	35	12,855
Haul Road 12	Surface equipment (mobilization) - Cavern Works	Tractor Trailer	0.64	30	2	8	ULSD	0.138	1	32
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	Tractor Trailer	0.64	30	2	8	ULSD	0.138	1	23
Haul Road 14	Ground support - Cavern Works	Flatbed tractor trailer	0.64	365	2	9	ULSD	0.138	1	15
Haul Road 15	Explosives - Cavern Works	Flatbed tractor trailer	0.64	365	2	9	ULSD	0.138	1	15
Haul Road 16	Transportation of waste rock - Cavern Works	Dump trucks (12 yd)	0.64	365	24	8	ULSD	0.138	56	20,359
Haul Road 17	Workforce - Surface Works	Passenger Car	0.19	240	2	26	ULSD	0.138	71	17,077
Haul Road 18	Site clearing (overburden) - Surface Works	12 cy dump truck	0.19	120	12	8	ULSD	0.138	16	1,946
Haul Road 19	Civil foundation excavation Surface Works	12 cy dump truck	0.19	90	12	8	ULSD	0.138	10	893
Haul Road 20	Cement Trucks Surface Works	12 cy cement truck	0.19	30	12	10	ULSD	0.138	17	513
Haul Road 21	Equipment and material delivery Surface Works	Flatbed	0.19	365	2	8	ULSD	0.138	1	180
Haul Road 22	Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	1	167
Haul Road 23	Non Potable Water - Surface and Cavern	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	4	1,271
Haul Road 24	Non Potable Water - Reservoir Fill	water truck 9000 gal	0.64	365	24	8	ULSD	0.138	26	9,204

<sup>a</sup> Default High Heat Value for Distillate Fuel Oil No 2 and default CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emission factors, Table C1 and C2 to Subpart C of Part 98.  
<sup>b</sup> Mileage-weighted average emission factors (g/mile) based on the following formula: HHV (MMBtu/gallon) x EF (Kg/MMBtu) x (1/mpg) x (1000 g/kg)  
<sup>c</sup> Emissions estimated based on methodology from Chapter 13.2.1 of EPA's AP-42, Compilation of Air Pollutant Emissions Factors. See Table B-2.

**TABLE 11  
GREENHOUSE GASES EMISSION ESTIMATION OF ENGINE EXHAUST AND TIRE AND BRAKE WEAR EMISSIONS FOR HAUL TRUCK  
TRAFFIC  
Construction Phase  
Gem Site - Hydrostor**

Mileage-Weighted Average Air Pollutant Emissions Factors (g/mile) <sup>b</sup>			Daily Emissions <sup>c</sup>			Hourly Emissions <sup>c</sup>			Annual Emissions <sup>c</sup>		
CO2	CH4	N2O	Total CO <sub>2</sub> (lbs/day)	Total CH <sub>4</sub> (lbs/day)	Total N <sub>2</sub> O (lbs/day)	Total CO <sub>2</sub> (lbs/hr)	Total CH <sub>4</sub> (lbs/hr)	Total N <sub>2</sub> O (lbs/hr)	Total CO <sub>2</sub> (tons/yr)	Total CH <sub>4</sub> (tons/yr)	Total N <sub>2</sub> O (tons/yr)
<b>Emission Factor (kg/MMBtu)<sup>a</sup></b>											
73.9600	0.0030	0.0006									
392.6	0.016	0.003	6.6892	0.0003	0.0001	3.3446	0.0001	0.0000	0.2676	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0094	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0094	0.0000	0.0000
1,523.4	0.062	0.012	2.1632	0.0001	0.0000	1.0816	0.0000	0.0000	0.0865	0.0000	0.0000
1,327.2	0.054	0.011	1.8847	0.0001	0.0000	0.9423	0.0000	0.0000	0.0019	0.0000	0.0000
1,360.9	0.055	0.011	3.8649	0.0002	0.0000	0.3865	0.0000	0.0000	0.0290	0.0000	0.0000
1,121.6	0.045	0.009	100.3378	0.0041	0.0008	10.0338	0.0004	0.0001	0.7499	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0113	0.0000	0.0000
392.6	0.016	0.003	10.0338	0.0004	0.0001	5.0169	0.0002	0.0000	0.1087	0.0000	0.0000
1,300.2	0.053	0.011	9.2314	0.0004	0.0001	0.7693	0.0000	0.0000	1.4616	0.0001	0.0000
392.6	0.016	0.003	30.6588	0.0012	0.0002	15.3294	0.0006	0.0001	5.5624	0.0002	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0471	0.0000	0.0000
1,327.2	0.054	0.011	3.7694	0.0002	0.0000	1.8847	0.0001	0.0000	0.0330	0.0000	0.0000
1,121.6	0.045	0.009	1.5927	0.0001	0.0000	0.7963	0.0000	0.0000	0.0191	0.0000	0.0000
1,121.6	0.045	0.009	1.5927	0.0001	0.0000	0.7963	0.0000	0.0000	0.0191	0.0000	0.0000
1,300.2	0.053	0.011	160.6256	0.0065	0.0013	6.6927	0.0003	0.0001	29.1785	0.0012	0.0002
392.6	0.016	0.003	61.5771	0.0025	0.0005	30.7886	0.0012	0.0002	7.3893	0.0003	0.0001
1,300.2	0.053	0.011	46.7385	0.0019	0.0004	3.8949	0.0002	0.0000	2.7890	0.0001	0.0000
1,300.2	0.053	0.011	28.6804	0.0012	0.0002	2.3900	0.0001	0.0000	1.2805	0.0001	0.0000
1,063.2	0.043	0.009	40.3900	0.0016	0.0003	3.3658	0.0001	0.0000	0.6017	0.0000	0.0000
1,327.2	0.054	0.011	1.6265	0.0001	0.0000	0.8133	0.0000	0.0000	0.2627	0.0000	0.0000
1,275.8	0.052	0.010	1.8117	0.0001	0.0000	0.0755	0.0000	0.0000	0.2352	0.0000	0.0000
1,275.8	0.052	0.010	10.8699	0.0004	0.0001	0.4529	0.0000	0.0000	1.7879	0.0001	0.0000
1,275.8	0.052	0.010	72.4662	0.0029	0.0006	3.0194	0.0001	0.0000	12.9432	0.0005	0.0001

**APPENDIX 5.1C**

## Construction Impact Analysis

# Table of Contents

<b>1.0 CONSTRUCTION IMPACT ANALYSIS .....</b>	<b>1</b>
1.1 Construction Phases .....	1
1.2 Available Mitigation Measures .....	3
1.3 Emissions Summary .....	4
1.4 Analysis of Ambient Concentrations from Construction.....	5
1.4.1 Measured Background.....	5
1.4.2 Dispersion Model .....	5
1.4.3 Modeling Results and Impacts.....	6

## TABLES

Table 1: On-Site Construction Emissions Inventory Summary .....	4
Table 2: Off-Site Construction Emissions Inventory Summary .....	5
Table 3: Construction Air Quality Impact Results– Ambient Air Quality Standards .....	6

## 1.0 CONSTRUCTION IMPACT ANALYSIS

### 1.1 Construction Phases

It is expected to take 63 months from commencement of construction until operation. Construction activities will occur during months 1 through 60, testing and start-up will occur in months 60 to 62, and commercial operation will occur in month 63. Surface work will normally occur in 8-hour shifts, 5 days a week. Cavern work is planned as follows:

- Site Preparation (months 1 through 4) – 10 hours/day x 5 days
- Shaft Drilling (months 5 through 18) – 12 hours/day x 10 days, 4 days off
- Mining (months 19 until completion) – 24 hours/day x 7 days/week, 12-hour shifts

The peak construction workforce is expected to be on site during months 18 through 29. Offsite transmission infrastructure construction is assumed to be constructed for 24 months, started in the last quarter of the first year of the construction schedule. Construction will be divided into two main areas, surface, and caverns, with additional subdivisions as follows:

- Surface
  - Mobilization and site preparation
  - Site civil and foundations
  - Installation of major structures and equipment
  - Structural and architectural
  - Piping, mechanical and electrical
  - Controls
  - Pre-Commissioning
- Caverns
  - Site preparation and cleaning
  - Cavern shaft drilling
  - Cavern mining

The Gem Energy Storage Center (Gem/GESC) site consists of two parcels with a combined area of approximately 71 acres. The site is relatively flat and it is currently vacant. The site will require minimal grading for the surface activities. Site preparation includes finish grading, excavation of footings and foundations, and backfilling operations. After site preparation is finished, construction of the foundations and structures is expected to begin. Once foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

Construction-related emissions from the construction of GESC will result from the following:

- Combustion of fuel in vehicles onsite
- Exhaust from diesel-powered engines onsite
- Fugitive dust from vehicle travel on unpaved roads onsite
- Fugitive dust from wind erosion, grading, and bulldozing onsite
- Fugitive dust from material loading and unloading operations onsite
- Combustion of fuel in vehicles offsite
- Exhaust from diesel-powered engines offsite
- Fugitive dust from vehicle travel on paved and unpaved roads offsite

Appendix 5.1D provides detailed emission calculations and assumptions for construction of the GESC.

For the dispersion modeling analysis, the worst-case consecutive 12-month period (months 18 to 29) during the construction process was selected to represent worst-case annual emissions. Some construction activities that occur in each month do not occur in all 12 months, so emissions used in the dispersion models with 24-hours and shorter averaging periods were entered for the two worst-case individual months, which were identified as months 18 and 26. The worst-case month was chosen to represent the modeled ambient air concentration. The activities occurring in months 18 and 26 are listed below:

### **Month 18**

- Surface
  - Site Civil and Foundations
  - Installation of major structures and equipment
    - Turbine Hall
    - Spherical Pressure vessels
- Caverns
  - Shaft Cutting and Disposal (last month of the activity)
  - Cavern Shaft Drilling
- Other activities: transport of potable and non-potable to support surface and cavern activities

### **Month 26**

- Surface
  - Installation of major structures and equipment
    - Spherical Pressure vessels
  - Piping, mechanical and Electrical

- Caverns
  - Cavern Shaft Drilling
  - Cavern Mining (surface and subsurface)
- Other activities: transport of potable and non-potable to support surface and cavern activities, and transport of non-potable water to fill the reservoir.

Emissions rates in months 18 and 26 were used to model short-term averaging periods (1-hour, 3-hours, 8-hours, and 24 hours) and the emissions of the selected period (months 18 through 29) was used to model annual averaging periods. Note that only on-site (direct) emissions were modeled to identify impacts generated by the construction activities of GESC. Off-site (indirect) emissions were quantified but not considered in the dispersion model.

## 1.2 Available Mitigation Measures

The following mitigation measures are proposed to control fugitive dust and exhaust emissions from the diesel heavy equipment used during construction of Gem:

- The on-site construction mitigation manager will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.
- All unpaved roads and disturbed areas in the project and laydown construction sites will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of a twice daily construction activity period. Watering may be reduced or eliminated during periods of precipitation. Watering should be used with appropriate dust suppressant compounds along haul roads.
- Onsite vehicle speeds will be limited to 15 mph on unpaved areas within the project construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways unless an alternative route is provided.
- Streets adjacent to the project site should be kept clean and accumulated silt removed. Sweetser Road will be watered on a minimum twice daily.
- All clearing, grading, earth moving, and excavation activities should cease during periods of winds greater than 20 mph (averaged over one hour), if disturbed material is easily windblown, or when dust plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property.
- All fine material transported offsite should be either sufficiently watered or securely covered to prevent excessive dust.
- Areas disturbed by clearing, earth moving, or excavation activities should be minimized.

- Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed.
- Equipment with reciprocating engines used for construction should be EPA- Tier 4 engine for equipment over 100 horsepower.
- Perform periodic maintenance and inspections per the manufacturer's specifications.
- Reduce idling time through equipment and construction scheduling.
- Stack height of the ventilation shaft should no less than 20 feet.
- Use low sulfur (CARB) diesel fuel containing no more than 15 parts per million (ppm) sulfur.

### 1.3 Emissions Summary

Tables 1 and 2 show the estimated onsite and offsite emissions for the selected construction period after applying the mentioned mitigation measures. Detailed emission calculations are shown in Appendix 5.1B, including estimates of greenhouse gas (CO<sub>2</sub>e).

**Table 1: On-Site Construction Emissions Inventory Summary**

Activity	Emissions (Tons/year)					
	PM10	PM2.5	NOx	VOC	CO	SO2
Unpaved Roads	10.74	1.07	-	-	-	-
Exhaust Emissions from Haul Truck Traffic on Unpaved Roads	0.005	0.002	0.099	0.005	0.139	0.002
Equipment Exhaust	0.20	0.20	2.54	1.38	1.98	0.05
Material Handling	0.33	0.05	-	-	-	-
Bulldozing	1.86	0.92	-	-	-	-
Grading	0.35	0.03	-	-	-	-
Wind Erosion of Exposed Surface Areas	2.01	1.01	-	-	-	-
Wind Erosion of Stockpiles	4.81	0.72	-	-	-	-
<b>Total</b>	<b>20.30</b>	<b>4.00</b>	<b>2.64</b>	<b>1.38</b>	<b>2.12</b>	<b>0.05</b>

PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns; NOx = nitrogen oxides; VOC = volatile organic compounds; CO = carbon monoxide; SO2 = sulfur dioxide

**Table 2: Off-Site Construction Emissions Inventory Summary**

Activity	Emissions (Tons/year)					
	PM10	PM2.5	NOx	VOC	CO	SO2
Equipment Exhaust (Transmission Line)	0.02	0.02	0.36	0.21	0.16	0.01
Unpaved Road Fugitive Dust	21.25	2.13	-	-	-	-
Paved Road Fugitive Dust	19.7	4.97	-	-	-	-
Worker Commute Exhaust	0.18	0.08	0.86	0.44	20.53	0.36
Hauling Waste Rock Exhaust	0.05	0.02	1.07	0.08	0.47	0.01
Deliveries from Los Angeles and Oakland Ports	0.77	0.34	17.97	1.41	7.84	0.1
<b>Total</b>	<b>41.97</b>	<b>7.56</b>	<b>20.26</b>	<b>2.14</b>	<b>29.0</b>	<b>0.48</b>

PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns; NOx = nitrogen oxides; VOC = volatile organic compounds; CO = carbon monoxide; SO2 = sulfur dioxide

Total CO<sub>2e</sub> emissions are as follows:

- On-site construction CO<sub>2e</sub> = 5,003.06 tons/year
- Off-site construction CO<sub>2e</sub> = 13,983.60 tons/year

## 1.4 Analysis of Ambient Concentrations from Construction

Ambient air quality concentrations from emissions during the construction of the GESC were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, surrounding topography, and the sources of emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

### 1.4.1 Measured Background

The maximum representative background concentrations for the most recent 3-year period are summarized in Table 5.1-8 (Section 5.1 Air Quality). Appendix 5.1G provides a summary of measured ambient air quality concentrations for NO<sub>x</sub>, SO<sub>2</sub>, CO, PM<sub>2.5</sub>, and PM<sub>10</sub> by year and site for the period between 2018-2020.

### 1.4.2 Dispersion Model

The AERMOD model (version 21112) was used to estimate ground level concentrations for the GESC. Base elevations and receptor hill heights were determined using USGS Digital Elevation Map data with a resolution of 1 arcsecond and processed using AERMAP (version 18081). Building downwash was included in the model and processed using Building Profile Input Program (BPIP) version 04274. The purpose of the AERMOD modeling analysis was to evaluate compliance with the California State and Federal ambient air quality standards.

Appendix 5.1D shows the modeling parameters used in the modeling for construction phase of the GES. Appendix 5.1E present the list of modeling files that are being provided electronically to the appropriate agencies.

### 1.4.3 Modeling Results and Impacts

The modeling analysis results are summarized in Table 3. To determine the magnitude and location of the maximum impacts for each pollutant and averaging period, the AERMOD model was used with all 5 years of meteorology. Nitrogen Dioxide (NO<sub>2</sub>) concentrations were computed using the Ambient Ratio Method Version 2 (ARM2) following EPA guidance, using 0.5 and 0.9 for the default minimum and maximum NO<sub>2</sub>/NO<sub>x</sub> ratios, respectively.

Modeled construction impacts due to facility emissions alone for all pollutants are below the California Ambient Air Quality Standards (CAAQS) and the National Ambient Air Quality Standards (NAAQS). Table 3 also shows maximum background levels that have occurred in the last 3 years and the resulting total ambient impacts (modeled construction impacts plus background concentrations).

**Table 3: Construction Air Quality Impact Results– Ambient Air Quality Standards**

Pollutant	Averaging Time	Month	Maximum Concentration (µg/m <sup>3</sup> )	Background (µg/m <sup>3</sup> )	Total (µg/m <sup>3</sup> )	Ambient Air Quality Standard (µg/m <sup>3</sup> )	
						CAAQS	NAAQS
NO <sub>2</sub>	1-hr (highest)	18	219.2	97.8	317.0	339	-
	1-hr (highest)	26	135.4	97.8	233.2	339	-
	1-hr (98th percentile)	18	108.1	75.2	183.3	-	188
	1-hr (98th percentile)	26	83.7	75.2	158.9	-	188
	Annual maximum	Year	12.7	16.3	29.0	57	100
CO <sup>a</sup>	1-hr (highest)	18	325.0	1,828.6	2,153.6	23,000	40,000
	1-hr (highest)	26	222.0	1,828.6	2,050.5	23,000	40,000
	8-hr (highest)	18	91.6	1,222.2	1,313.8	10,000	10,000
	8-hr (highest)	26	96.3	1,222.2	1,318.5	10,000	10,000
SO <sub>2</sub> <sup>a</sup>	1-hr (highest)	18	7.9	25.9	33.8	655	-
	1-hr (highest)	26	3.0	25.9	28.8	655	-
	1-hr (99th percentile)	18	6.5	25.9	32.4	-	196
	1-hr (99th percentile)	26	2.9	25.9	28.8	-	196
	3-hr (highest)	18	2.8	25.9	-	-	1,300
	3-hr (highest)	26	2.1	25.9	-	-	1,300
	24-hr (highest)	18	1.2	8.9	10.1	105	-
	24-hr (highest)	26	0.5	8.9	9.4	105	-
PM10	24-hr (highest)	18	40.6	248.0	<b>288.6</b>	50	--
	24-hr (highest)	26	49.4	248.0	<b>297.4</b>	50	-
	24-hr (6th highest)	18	31.8	192.0	<b>223.8</b>	-	150

Pollutant	Averaging Time	Month	Maximum Concentration ( $\mu\text{g}/\text{m}^3$ )	Background ( $\mu\text{g}/\text{m}^3$ )	Total ( $\mu\text{g}/\text{m}^3$ )	Ambient Air Quality Standard ( $\mu\text{g}/\text{m}^3$ )	
						CAAQS	NAAQS
	24-hr (6th highest)	26	37.4	192.0	<b>229.4</b>	-	150
	Annual maximum	Year	18.9	35.3	<b>54.2</b>	20	-
PM2.5	24-hr (98th percentile)	18	3.7	24.3	28.1	-	35
	24-hr (98th percentile)	26	2.4	24.3	26.8	-	35
	Annual maximum	Year	3.1	7.3	10.4	12	-
	5-year average annual	Year	2.2	7.3	9.6	-	12

Source: Section 5.1, Air Quality, Appendix 5.1D and 5.1G.

<sup>a</sup> Results for SO<sub>2</sub> and CO are reported as the H1H even though the NAAQS allows other forms of compliance. Using the H1H is more conservative.

$\mu\text{g}/\text{m}^3$  = micrograms per cubic meter; CAAQS = California Ambient Air Quality Standards; NAAQS = National Ambient Air Quality Standards; NO<sub>2</sub> = nitrogen dioxide; hr = hour; CO = carbon monoxide; SO<sub>2</sub> = sulfur dioxide; PM10 = particulate matter less than 10 microns; PM2.5 = particulate matter less than 2.5 microns.

As shown in Table 3, the modeled concentrations for construction phase activities are less than all the CAAQS and NAAQS. The total concentrations (including background) are less than all the CAAQS and NAAQS except for the PM10 CAAQS. The modeled exceedances of the CAAQS for PM10 are due to high background concentrations, which already exceed the CAAQS (the area is already designated as a state nonattainment for the PM10 CAAQS).

**APPENDIX 5.1D**

**Air Dispersion Modeling and Model  
Options and Parameters**

# Table of Contents

<b>1.0 AIR DISPERSION MODELING</b> .....	<b>1</b>
1.1 Modeling Scenarios.....	1
1.1.1 Construction .....	1
1.1.2 Operation .....	1
1.2 Emission Inventory.....	1
1.2.1 Emission Calculation.....	1
1.2.2 Selection of the Modeled Sources .....	2
<b>2.0 MODELING METHODOLOGY</b> .....	<b>2</b>
2.1 Model Selection.....	2
2.2 Meteorological Data .....	3
2.3 Terrain .....	3
2.4 Building Downwash Effects.....	3
2.5 Receptor Locations .....	6
2.6 Modeled Sources .....	6
2.6.1 Construction .....	6
2.6.2 Operation .....	6
<b>3.0 MODELING RESULTS</b> .....	<b>8</b>

## TABLES

Table 1: Gem Site Buildings .....	<b>Error! Bookmark not defined.</b>
Table 1: Gem Site Buildings .....	3
Table 2: Point Emission Sources – Operation Phase .....	8
Table 3: Construction Air Quality Modeling Results .....	8
Table 4: Operation Air Quality Modeling Results .....	9

## FIGURES

- Figure 1 Windrose – Station Mojave Airport (2009 – 2013)
- Figure 2 Location of Construction Modeling Sources

## 1.0 AIR DISPERSION MODELING

### 1.1 Modeling Scenarios

#### 1.1.1 Construction

It is expected to take 63 months from commencement of construction until operation. Construction activities will occur during months 1 through 60, testing and start-up will occur in months 60 to 62, and commercial operation will occur in month 63. Surface work will normally occur in 8-hour shifts, 5 days a week. Cavern work is planned to be most the time 24 hours/day x 7 days/week, 12hour shifts (starting in month 19 until completion).

The peak construction workforce is expected to be on site during months 18 through 29. Offsite transmission infrastructure construction is assumed to be constructed for 24 months, started in the last quarter of the first year of the construction schedule.

For the construction modeling, it has been selected a the worst-case consecutive 12-month period (Month 18 to 29) during the construction process which has activities that produce the highest emissions. Some construction activities that occur in each month do not occur in all 12 months, so emissions used in dispersion models with 24-hour and shorter averaging periods were entered for the two worst-case individual months, which were identified as months 18 and 26. The worst-case month was chosen to represent the modeled ambient air concentration. Additional details are contained in Appendix 5.1C.

#### 1.1.2 Operation

The GESC will be a 500- megawatt (MW) Advanced Compressed Air Energy Storage (A-CAES) process consisting of five, 100-MW (nominal) power blocks. Each power block will contain a motor-driven air compressor drivetrain, heat exchangers, an air turbine generator including their ancillary equipment. Each power block will share a common set of thermal storage tanks (hot and cold) and the air storage cavern. GESC does not require the combustion of fossil fuel and will not produce air emissions from combustion during normal operation.

The project will include two diesel-fired reciprocating internal combustion engines driving emergency generators to maintain critical loads in the event of a loss of power. These engines are expected to operate for 50 hours (each) per year for testing and maintenance but will be limited to 200 hours per year. Only one engine will operate at a given time. Other than during testing and maintenance, the engines would only be operated in an emergency where a power outage has occurred. This emergency backup equipment does not need to operate for the Gem facility to function during normal operation.

### 1.2 Emission Inventory

#### 1.2.1 Emission Calculation

Particulate matter emissions were estimated in accordance with current EPA recommendations and techniques as presented in AP 42, Compilation of Air Pollutant Emission Factors (EPA 2006), and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA 1992). Other reference documents, such as the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook (September 2006) were also used. Pollutant emissions from diesel engines associated with the non-stationary equipment and haul trucks were estimated following the methods in EPA's Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression Ignition (Report No. NR-009D) (assumptions and methods used by EPA's NONROAD2008 model).

## 1.2.2 Selection of the Modeled Sources

The types and sources of the PM<sub>10</sub>, PM<sub>2.5</sub>, and gaseous emissions (SO<sub>2</sub>, NO<sub>x</sub> and CO) associated with the construction and operation activities of the GESG consist of:

- Construction
  - On-site
    - Fugitive dust from vehicle travel on unpaved roads
    - Combustion of fuel in vehicles on unpaved roads
    - Bulldozing and grading activities
    - Wind erosion of active storage piles and exposed surfaces
    - Material handling activities associated with loading and unloading of trucks
    - Exhaust from diesel-powered engines
  - Off-site
    - Fugitive dust from vehicle travel on paved and unpaved roads
    - Combustion of fuel in vehicles on paved and unpaved roads
    - Exhaust from diesel-powered engines
- Operation
  - Combustion of two 5 MW diesel-fired internal combustion engines driving generators for emergency use (only one engine will operate at a given time)

Detailed emissions calculation tables and summary emission estimated for operation and construction are presented in Appendix 5.1A and 5.1B, respectively.

## 2.0 MODELING METHODOLOGY

### 2.1 Model Selection

The selection of air quality models to calculate air quality impacts must be based on the models' ability to simulate impacts in the vicinity of the proposed Project. The American Meteorological Society and EPA Regulatory Model (AERMOD) dispersion model are available on the EPA's Internet website, Support Center for Regulatory Air Models (SCRAM), within the Technology Transfer Network (TTN). The EPA recommends that AERMOD be used to predict pollutant concentrations at receptors located within 50 kilometers (km) of a source. AERMOD calculates hourly concentrations based on hourly meteorological data. AERMOD is applicable for the types of sources and areas in which the GESG is located since it is recognized as containing the latest scientific algorithms for simulating plume behavior in all types of terrain.

The latest version of AERMOD (version 21112) was used to predict the maximum pollutant concentrations at the ambient boundary out to 10 km due to direct construction and operation activities at the GESG.

For modeling analyses that undergo regulatory reviews, such as determining compliance with CAAQS and NAAQS, the following model features are recommended by EPA and are referred to as the regulatory default options in AERMOD and were used in this model:

- Final plume rise at all receptor locations
- Stack tip downwash
- Buoyancy induced dispersion
- Default wind speed profile coefficients for rural mode
- Default vertical potential temperature gradients
- Calm wind processing

## 2.2 Meteorological Data

To predict maximum pollutant impacts, AERMOD requires processed hourly meteorological data that consists of hourly-averaged surface observations, twice-daily upper air sounding data, and land use parameters characteristic of the immediate area surrounding the meteorological measurement location. Surface parameters required for input to AERMOD include wind direction and wind speed, dry bulb temperature, and additional parameters needed to estimate the stability of unstable and stable atmospheres. For stability calculations in an unstable atmosphere, solar radiation, temperature, and opaque cloud measurements are used to estimate net radiation. For a stable atmosphere, opaque cloud cover, temperature, and wind speed measurements are used.

Meteorological data are typically processed using AERMET and AERSURFACE. AERMET requires surface meteorological data, upper air meteorological data, and surface parameter data (supplied from AERSURFACE). CARB has meteorological datasets developed for use with AERMOD. The dataset used in this analysis was based on data derived from the Mojave Airport 35.067 latitude, -118.15 longitude for the period of January 1, 2009, to January 2, 2014. The station is located approximately 21 km northeast of GESC. The base elevation of the surface station is 849.5 meters above sea level. A wind rose showing wind speed, direction, and frequency is presented in Figure 1.

## 2.3 Terrain

The terrain within approximately 2km of GESC varies between 750 meters and 1000 meters and increases to approximately 1800 meters 10km to the northwest of GESC. Base elevations were determined using USGS Digital Elevation Map data with a resolution of 1 arcsecond and processed using AERMAP (version 18081).

## 2.4 Building Downwash Effects

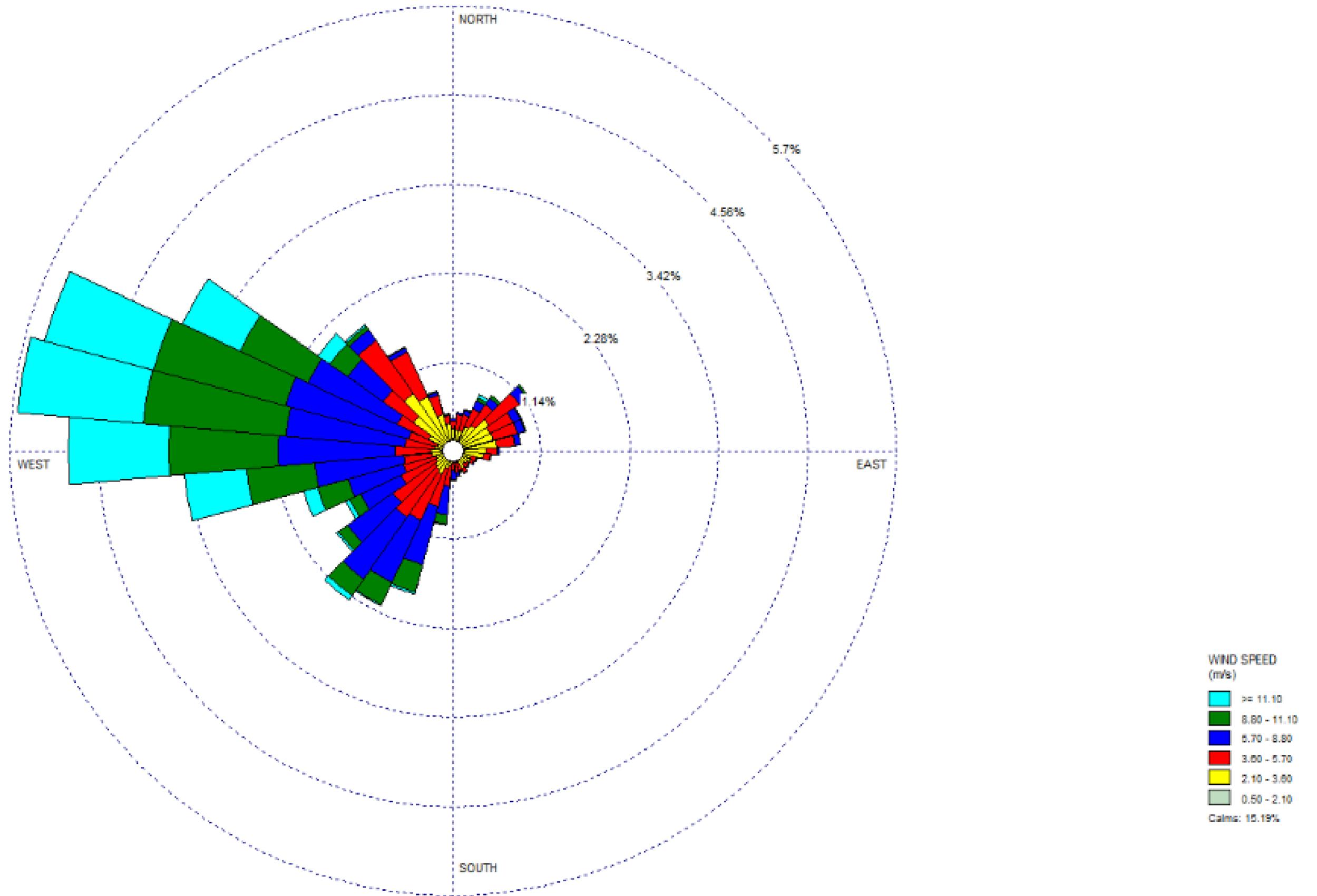
Building downwash was included in the model and processed using Building Profile Input Program (BPIP) version 04274. Nine buildings are included in the BPIP model to estimate downwash. Building data was obtained from a 3-dimensional Model of the GESC and CAD drawings. The dimensions of building structures associated with the downwash analysis are provided in Table 1.

**Table 1: Gem Site Buildings**

AERMOD ID	Structure	Height (ft)	Width (ft)	Length (ft)
BLD_1	Water Tank	80	Circular Type (diameter: 155 ft)	
BLD_2	Turbine Hall	101	65	1365
BLD_3	Workshop Maintenance	52	72	70
BLD_4	Control Room	40	60	60

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AERMOD ID	Structure	Height (ft)	Width (ft)	Length (ft)
BLD_5	Electric Gallery 1	28	45	560
BLD_6	Electric Gallery 2	28	45	560
BLD_7	GIS Building	35	85	140
BLD_8	Transformer Building 50TR-101A	39	42	56
BLD_9	Transformer Building 50TR-101B	39	42	56



## 2.5 Receptor Locations

Receptor elevations and receptor hill heights were determined from the U.S. Geological Survey (USGS) National Elevation Dataset (NED) using 1-arcsecond (approximately 30-meter) spacing. All coordinates were referenced to Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83), Zone 11. The NED files used with AERMAP extended beyond the receptor grid boundaries as appropriate for calculating the hill slope factors.

A total of 7,905 receptors were included in one combined AERMOD run. Figures 5.1-3 and 5.1-4 in Section 5.1, Air Quality display the receptor grids used in the modeling assessment within a 10km radius of the site. All receptors included in this analysis are presented in Appendix 5.1F.

## 2.6 Modeled Sources

### 2.6.1 Construction

Vehicle traffic on unpaved roads was modeled as line sources represented by a series of volume sources. For the construction model, two road sections were created within the GESC property boundary. Based on guidance from EPA, the plume height was set to 4.76 which is 1.7 times the truck height of 2.8 meters. The initial vertical dimension was set to 2.21 meters (plume height divided by 2.15), and the release height was set to 2.38 meters (half of the plume height). The road width was estimated to be 10 meters with plume width to account for a turbulent mixing zone of 3 meters on each side.

Emissions due to material handling, bulldozing, grading operations, and wind erosion of the active storage piles and open areas were modeled as volume sources. Surface operations were represented by four-volume sources and cavern operations were represented by five-volume sources. Source parameter detail is attached to this Appendix.

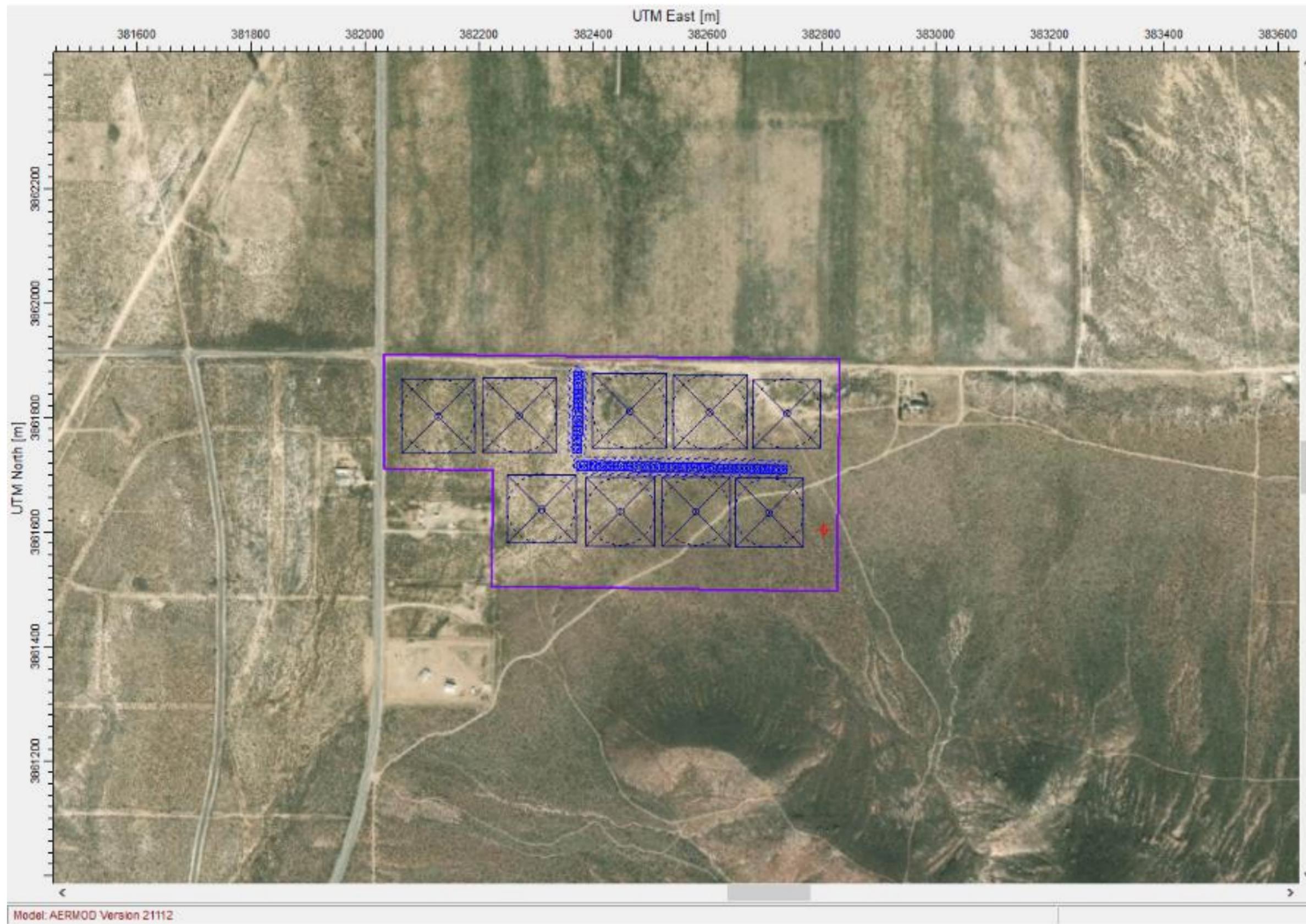
One point source was created to represent the ventilation of underground emissions. The point source is not operational in month 18 and not included in month 18 short-term models but is operational in month 26 and included in month 26 short term models.

Construction activities in each area described above are expected to generate fugitive dust emissions due to material handling activities such as excavation, bulldozing, grading, hauling, and wind erosion. Particulate matter emissions will also be generated from the combustion of diesel fuel in engines associated with the construction equipment.

Figure 2 shows the location of the line volume, volume and point sources that represent construction emission sources.

### 2.6.2 Operation

During the operation phase, two emergency diesel generators are assumed to operate 200 hours each. The generators will not operate at the same time. Therefore, one generator is assumed to operate for short-term averaging periods (1-hour, 3-hour, 8-hour, and 24-hour) and two generators are assumed to operate for 200 hours each for the annual averaging period. Table 2 provides the location and source characteristics for each generator stack and emission rates. Figure 5.1-2 of Section 5.1 Air Quality shows the site property boundary and location of the two emission sources.



**Table 2: Point Emission Sources – Operation Phase**

Source	Stack Height (m)	Exhaust Gas Temperature (°K)	Exhaust Velocity (m/s)	Stack Inside Diameter (m)	Emission Rates (g/s)			
					PM10/PM2.5	NOx	SO2	CO
Each Emergency Diesel Generator 5MW	6.096	654.550	123.315	0.457	0.0416	1.0393	0.0114	5.4043
					0.00095 (annual emissions)	0.02373 (annual emissions)		

### 3.0 MODELING RESULTS

The modeling analysis results are summarized in Tables 3 and 4 for construction and operation, respectively.

**Table 3: Construction Air Quality Modeling Results**

Pollutant	Averaging Time	Month	Maximum Concentration (µg/m <sup>3</sup> )	Ambient Air Quality Standards (µg/m <sup>3</sup> )	
				CAAQS	NAAQS
NO <sub>2</sub>	1-hr (highest)	18	219.2	339	-
	1-hr (highest)	26	135.4	339	-
	1-hr (98th percentile)	18	108.1	-	188
	1-hr (98th percentile)	26	83.7	-	188
	Annual maximum	Year	12.7	57	100
CO <sup>a</sup>	1-hr (highest)	18	325.0	23,000	40,000
	1-hr (highest)	26	222.0	23,000	40,000
	8-hr (highest)	18	91.6	10,000	10,000
	8-hr (highest)	26	96.3	10,000	10,000
SO <sub>2</sub> <sup>a</sup>	1-hr (highest)	18	7.9	655	-
	1-hr (highest)	26	3.0	655	-
	1-hr (99th percentile)	18	6.5	-	196
	1-hr (99th percentile)	26	2.9	-	196
	3-hr (highest)	18	2.8	-	1,300
	3-hr (highest)	26	2.1	-	1,300
	24-hr (highest)	18	1.2	105	-
	24-hr (highest)	26	0.5	105	-
PM10	24-hr (highest)	18	40.6	50	--
	24-hr (highest)	26	49.4	50	-

Pollutant	Averaging Time	Month	Maximum Concentration ( $\mu\text{g}/\text{m}^3$ )	Ambient Air Quality Standards ( $\mu\text{g}/\text{m}^3$ )	
				CAAQS	NAAQS
	24-hr (6th highest)	18	31.8	-	150
	24-hr (6th highest)	26	37.4	-	150
	Annual maximum	Year	18.9	20	-
PM2.5	24-hr (98th percentile)	18	3.7	-	35
	24-hr (98th percentile)	26	2.4	-	35
	Annual maximum	Year	3.1	12	-
	5-year average annual	Year	2.2	-	12

<sup>a</sup> Results for CO are reported as the H1H even though the NAAQS allows other forms of compliance. Using the H1H is more conservative.

**Table 4: Operation Air Quality Modeling Results**

Pollutant	Averaging Time	Maximum Concentration ( $\mu\text{g}/\text{m}^3$ )	Ambient Air Quality Standards ( $\mu\text{g}/\text{m}^3$ )	
			CAAQS	NAAQS
NO <sub>2</sub>	1-hr (highest)	71.82	339	-
	1-hr (98th percentile) <sup>a</sup>	-	-	188
	Annual Maximum	0.28	57	100
CO <sup>b</sup>	1-hr (highest)	414.93	23,000	40,000
	8-hr (highest)	307.86	10,000	10,000
SO <sub>2</sub> <sup>b</sup>	1-hr (highest)	0.88	655	--
	1-hr (99th percentile)	0.79	--	196
	3-hr (highest)	0.78	--	1,300
	24-hr (highest)	0.41	105	--
PM10	24-hr (highest)	1.48	50	--
	24-hr (6th highest)	1.21	-	150
	Annual maximum	0.012	20	-
PM2.5	24-hr (98th percentile)	0.76	-	35
	Annual maximum	0.012	12	-
	5-year average annual	0.009	-	12

<sup>a</sup> Modeling for 1-hr NO<sub>2</sub> NAAQS is not required because these units are emergency generators and are therefore classified as "intermittent", EPA Memorandum, March 1, 2011.

<sup>b</sup> Results for CO are reported as the H1H even though the NAAQS allows other forms of compliance. Using the H1H is more conservative.

## Modeling Tables for Construction (On-Site) for Annual Dispersion Modeling

**TABLE M-1  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)	
					Section A	Section B					
					Section Length (mi)	0.09	0.23				
					Control Efficiency (%)	0	0				
<b>Road Fugitive Dust Emissions - PM<sub>10</sub></b>											
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.1	0.2	A+B	0.01	0.04	0.1	Haul Road 1	0.32		
Haul Road 2	Equipment mobilization - Cavern Works	0.0	0.1	A+B	0.01	0.02	0.0	Haul Road 2	0.32		
Haul Road 3	Equipment demobilization - Cavern Works	0.0	0.1	A+B	0.01	0.02	0.0	Haul Road 3	0.32		
Haul Road 4	Fuel delivery - Cavern Works	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 4	0.32		
Haul Road 5	Fencing delivery - Cavern Works	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 5	0.32		
Haul Road 6	Concrete trucks - Cavern Works	0.0	0.1	A+B	0.01	0.02	0.0	Haul Road 6	0.32		
Haul Road 7	Gravel delivery - Cavern Works	0.8	2.4	A+B	0.22	0.55	0.8	Haul Road 7	0.32		
Haul Road 8	Trailer delivery - Cavern Works	0.0	0.1	A+B	0.01	0.02	0.0	Haul Road 8	0.32		
Haul Road 9	Workforce (Shaft) - Cavern Works	0.1	0.2	A+B	0.02	0.05	0.1	Haul Road 9	0.32		
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.1	0.2	A+B	0.02	0.05	0.1	Haul Road 10	0.32		
Haul Road 11	Workforce (Mining) - Cavern Works	0.2	0.7	A+B	0.07	0.16	0.2	Haul Road 11	0.32		
Haul Road 12	Surface equipment (mobilization) - Cavern Works	0.0	0.1	A+B	0.01	0.02	0.0	Haul Road 12	0.32		
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	0.0	0.1	A+B	0.01	0.02	0.0	Haul Road 13	0.32		
Haul Road 14	Ground support - Cavern Works	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 14	0.32		
Haul Road 15	Explosives - Cavern Works	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 15	0.32		
Haul Road 16	Transportation of waste rock - Cavern Works	1.2	3.6	A+B	0.33	0.83	1.2	Haul Road 16	0.32		
Haul Road 17	Workforce - Surface Works	0.5	5.0	A	0.46	--	0.5	Haul Road 17	0.09		
Haul Road 18	Site clearing (overburden) - Surface Works	0.3	3.7	A	0.34	--	0.3	Haul Road 18	0.09		
Haul Road 19	Civil foundation excavation Surface Works	0.2	2.2	A	0.21	--	0.2	Haul Road 19	0.09		
Haul Road 20	Cement Trucks Surface Works	0.4	3.9	A	0.36	--	0.4	Haul Road 20	0.09		
Haul Road 21	Equipment and material delivery Surface Works	0.0	0.1	A	0.01	--	0.0	Haul Road 21	0.09		
Haul Road 22	Potable Water - Surface and Cavern	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 22	0.32		
Haul Road 23	Non Potable Water - Surface and Cavern	0.1	0.2	A+B	0.02	0.05	0.1	Haul Road 23	0.32		
Haul Road 24	Non Potable Water - Reservoir Fill	0.5	1.5	A+B	0.14	0.35	0.5	Haul Road 24	0.32		
<b>Vehicle Exhaust &amp; Tire and Brake Wear - PM<sub>10</sub></b>											
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	Haul Road 1	0.32		
Haul Road 2	Equipment mobilization - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 2	0.32		
Haul Road 3	Equipment demobilization - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 3	0.32		
Haul Road 4	Fuel delivery - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 4	0.32		
Haul Road 5	Fencing delivery - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 5	0.32		
Haul Road 6	Concrete trucks - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 6	0.32		
Haul Road 7	Gravel delivery - Cavern Works	0.0004	0.0012	A+B	0.0001	0.0003	0.0004	Haul Road 7	0.32		
Haul Road 8	Trailer delivery - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 8	0.32		
Haul Road 9	Workforce (Shaft) - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	Haul Road 9	0.32		
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	Haul Road 10	0.32		
Haul Road 11	Workforce (Mining) - Cavern Works	0.0001	0.0003	A+B	0.0000	0.0001	0.0001	Haul Road 11	0.32		
Haul Road 12	Surface equipment (mobilization) - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 12	0.32		
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 13	0.32		
Haul Road 14	Ground support - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 14	0.32		
Haul Road 15	Explosives - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 15	0.32		
Haul Road 16	Transportation of waste rock - Cavern Works	0.0005	0.0016	A+B	0.0001	0.0004	0.0005	Haul Road 16	0.32		
Haul Road 17	Workforce - Surface Works	0.0002	0.0018	A	0.0002	--	0.0002	Haul Road 17	0.09		
Haul Road 18	Site clearing (overburden) - Surface Works	0.0002	0.0016	A	0.0002	--	0.0002	Haul Road 18	0.09		
Haul Road 19	Civil foundation excavation Surface Works	0.0001	0.0010	A	0.0001	--	0.0001	Haul Road 19	0.09		
Haul Road 20	Cement Trucks Surface Works	0.0002	0.0017	A	0.0002	--	0.0002	Haul Road 20	0.09		
Haul Road 21	Equipment and material delivery Surface Works	0.0000	0.0001	A	0.0000	--	0.0000	Haul Road 21	0.09		
Haul Road 22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 22	0.32		
Haul Road 23	Non Potable Water - Surface and Cavern	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	Haul Road 23	0.32		
Haul Road 24	Non Potable Water - Reservoir Fill	0.0002	0.0007	A+B	0.0001	0.0002	0.0002	Haul Road 24	0.32		
					<b>Total Emissions (lb/hr)</b>	2.3	2.2	4.5			
					<b>Total Emissions (g/s)</b>	0.2872	0.2812	0.6			
<b>Emission Source Information</b>											
Modeled Source Type					Volume	Volume					
Vertical Dimension											
Truck Height					m	2.8	2.8				
Source Height					m	4.8	4.8				
Emission Height for Modeling					m	2.4	2.4				
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2				
Horizontal Dimension											
Road Width					m	10.0	10.0				
Source Width					m	16.0	16.0				
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4				
<b>Modeled Emissions Information</b>											
Section ID					Section A	Section B					
Section Length					mi	0.1	0.2				
Number of Volume Sources						9	23				
Modeled Emission Rate, PM <sub>10</sub>					g/s/volume	0.0319	0.0122				

**TABLE M-2  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)
					Section A	Section B				
					Section Length (mi)	0.09	0.23			
					Control Efficiency (%)	0	0			
<b>Road Fugitive Dust Emissions - PM-2.5</b>										
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 1	0.32
Haul Road 2	Equipment mobilization - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 2	0.32
Haul Road 3	Equipment demobilization - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 3	0.32
Haul Road 4	Fuel delivery - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 4	0.32
Haul Road 5	Fencing delivery - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 5	0.32
Haul Road 6	Concrete trucks - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 6	0.32
Haul Road 7	Gravel delivery - Cavern Works	0.1	0.2	A+B		0.02	0.06	0.1	Haul Road 7	0.32
Haul Road 8	Trailer delivery - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 8	0.32
Haul Road 9	Workforce (Shaft) - Cavern Works	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 9	0.32
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 10	0.32
Haul Road 11	Workforce (Mining) - Cavern Works	0.0	0.1	A+B		0.01	0.02	0.0	Haul Road 11	0.32
Haul Road 12	Surface equipment (mobilization) - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 12	0.32
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 13	0.32
Haul Road 14	Ground support - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 14	0.32
Haul Road 15	Explosives - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 15	0.32
Haul Road 16	Transportation of waste rock - Cavern Works	0.1	0.4	A+B		0.03	0.08	0.1	Haul Road 16	0.32
Haul Road 17	Workforce - Surface Works	0.0	0.5	A		0.05	--	0.0	Haul Road 17	0.09
Haul Road 18	Site clearing (overburden) - Surface Works	0.0	0.4	A		0.03	--	0.0	Haul Road 18	0.09
Haul Road 19	Civil foundation excavation Surface Works	0.0	0.2	A		0.02	--	0.0	Haul Road 19	0.09
Haul Road 20	Cement Trucks Surface Works	0.0	0.4	A		0.04	--	0.0	Haul Road 20	0.09
Haul Road 21	Equipment and material delivery Surface Works	0.0	0.0	A		0.00	--	0.0	Haul Road 21	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 23	0.32
Haul Road 24	Non Potable Water - Reservoir Fill	0.0	0.2	A+B		0.01	0.04	0.0	Haul Road 24	0.32
<b>Vehicle Exhaust &amp; Tire and Brake Wear - PM2.5</b>										
Haul Road 1	Workforce (Site Clearing) - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 1	0.32
Haul Road 2	Equipment mobilization - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 2	0.32
Haul Road 3	Equipment demobilization - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 3	0.32
Haul Road 4	Fuel delivery - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 4	0.32
Haul Road 5	Fencing delivery - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 5	0.32
Haul Road 6	Concrete trucks - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 6	0.32
Haul Road 7	Gravel delivery - Cavern Works	0.0002	0.0005	A+B		0.0000	0.0001	0.0002	Haul Road 7	0.32
Haul Road 8	Trailer delivery - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 8	0.32
Haul Road 9	Workforce (Shaft) - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 9	0.32
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 10	0.32
Haul Road 11	Workforce (Mining) - Cavern Works	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	Haul Road 11	0.32
Haul Road 12	Surface equipment (mobilization) - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 12	0.32
Haul Road 13	Subsurface equipment (mobilization) - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 13	0.32
Haul Road 14	Ground support - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 14	0.32
Haul Road 15	Explosives - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 15	0.32
Haul Road 16	Transportation of waste rock - Cavern Works	0.0002	0.0007	A+B		0.0001	0.0002	0.0002	Haul Road 16	0.32
Haul Road 17	Workforce - Surface Works	0.0001	0.0008	A		0.0001	--	0.0001	Haul Road 17	0.09
Haul Road 18	Site clearing (overburden) - Surface Works	0.0001	0.0007	A		0.0001	--	0.0001	Haul Road 18	0.09
Haul Road 19	Civil foundation excavation Surface Works	0.0000	0.0004	A		0.0000	--	0.0000	Haul Road 19	0.09
Haul Road 20	Cement Trucks Surface Works	0.0001	0.0008	A		0.0001	--	0.0001	Haul Road 20	0.09
Haul Road 21	Equipment and material delivery Surface Works	0.0000	0.0000	A		0.0000	--	0.0000	Haul Road 21	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 23	0.32
Haul Road 24	Non Potable Water - Reservoir Fill	0.0001	0.0003	A+B		0.0000	0.0001	0.0001	Haul Road 24	0.32
					<b>Total Emissions (lb/hr)</b>	0.2	0.2	0.5		
					<b>Total Emissions (g/s)</b>	0.0288	0.0282	0.1		
<b>Emission Source Information</b>										
Modeled Source Type										
Vertical Dimension										
Truck Height										
Source Height										
Emission Height for Modeling										
Initial Vertical Dimension (sz <sub>0</sub> )										
Horizontal Dimension										
Road Width										
Source Width										
Initial Horizontal Dimension (sy <sub>0</sub> )										
<b>Modeled Emissions Information</b>										
Section ID										
Section Length										
Number of Volume Sources										
Modeled Emission Rate, PM2.5										
						<b>Section A</b>	<b>Section B</b>			
						0.1	0.2			
						9	23			
						0.0032	0.0012			

**TABLE M-3  
MODELED GASES EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)
					Section A	Section B				
					<b>Section Length (mi)</b>	0.09	0.23			
					<b>Control Efficiency (%)</b>	0	0			
<b>Vehicle Exhaust &amp; Tire and Brake Wear - NOx</b>										
UP1	Workforce (Site Clearing) - Cavern Works	0.0010	0.0032	A+B	0.0003	0.0007	0.0010	UP1	0.32	
UP2	Equipment mobilization - Cavern Works	0.0034	0.0105	A+B	0.0010	0.0024	0.0034	UP2	0.32	
UP3	Equipment demobilization - Cavern Works	0.0034	0.0105	A+B	0.0010	0.0024	0.0034	UP3	0.32	
UP4	Fuel delivery - Cavern Works	0.0017	0.0052	A+B	0.0005	0.0012	0.0017	UP4	0.32	
UP5	Fencing delivery - Cavern Works	0.0017	0.0052	A+B	0.0005	0.0012	0.0017	UP5	0.32	
UP6	Concrete trucks - Cavern Works	0.0007	0.0021	A+B	0.0002	0.0005	0.0007	UP6	0.32	
UP7	Gravel delivery - Cavern Works	0.0212	0.0659	A+B	0.0061	0.0151	0.0212	UP7	0.32	
UP8	Trailer delivery - Cavern Works	0.0034	0.0105	A+B	0.0010	0.0024	0.0034	UP8	0.32	
UP9	Workforce (Shaft) - Cavern Works	0.0015	0.0048	A+B	0.0004	0.0011	0.0015	UP9	0.32	
UP10	Shaft cuttings for disposal - Cavern Works	0.0014	0.0044	A+B	0.0004	0.0010	0.0014	UP10	0.32	
UP11	Workforce (Mining) - Cavern Works	0.0047	0.0146	A+B	0.0014	0.0034	0.0047	UP11	0.32	
UP12	Surface equipment (mobilization) - Cavern Works	0.0034	0.0105	A+B	0.0010	0.0024	0.0034	UP12	0.32	
UP13	Subsurface equipment (mobilization) - Cavern Works	0.0034	0.0105	A+B	0.0010	0.0024	0.0034	UP13	0.32	
UP14	Ground support - Cavern Works	0.0017	0.0052	A+B	0.0005	0.0012	0.0017	UP14	0.32	
UP15	Explosives - Cavern Works	0.0017	0.0052	A+B	0.0005	0.0012	0.0017	UP15	0.32	
UP16	Transportation of waste rock - Cavern Works	0.0122	0.0379	A+B	0.0035	0.0087	0.0122	UP16	0.32	
UP17	Workforce - Surface Works	0.0095	0.1020	A	0.0095	--	0.0095	UP17	0.09	
UP18	Site clearing (overburden) - Surface Works	0.0071	0.0767	A	0.0071	--	0.0071	UP18	0.09	
UP19	Civil foundation excavation Surface Works	0.0044	0.0470	A	0.0044	--	0.0044	UP19	0.09	
UP20	Cement Trucks Surface Works	0.0075	0.0810	A	0.0075	--	0.0075	UP20	0.09	
UP21	Equipment and material delivery Surface Works	0.0015	0.0157	A	0.0015	--	0.0015	UP21	0.09	
UP22	Potable Water - Surface and Cavern	0.0001	0.0004	A+B	0.0000	0.0001	0.0001	UP22	0.32	
UP23	Non Potable Water - Surface and Cavern	0.0008	0.0026	A+B	0.0002	0.0006	0.0008	UP23	0.32	
UP24	Non Potable Water - Reservoir Fill	0.0056	0.0174	A+B	0.0016	0.0040	0.0056	UP24	0.32	
					<b>Total NOx Emissions (lb/hr)</b>	0.1	0.1	0.1		
					<b>Total NOx Emissions (g/s)</b>	0.0064	0.0065	0.0		
<b>Vehicle Exhaust &amp; Tire and Brake Wear - CO</b>										
UP1	Workforce (Site Clearing) - Cavern Works	0.0244	0.0758	A+B	0.0070	0.0174	0.0244	UP1	0.32	
UP2	Equipment mobilization - Cavern Works	0.0015	0.0046	A+B	0.0004	0.0010	0.0015	UP2	0.32	
UP3	Equipment demobilization - Cavern Works	0.0015	0.0046	A+B	0.0004	0.0010	0.0015	UP3	0.32	
UP4	Fuel delivery - Cavern Works	0.0007	0.0023	A+B	0.0002	0.0005	0.0007	UP4	0.32	
UP5	Fencing delivery - Cavern Works	0.0007	0.0023	A+B	0.0002	0.0005	0.0007	UP5	0.32	
UP6	Concrete trucks - Cavern Works	0.0003	0.0009	A+B	0.0001	0.0002	0.0003	UP6	0.32	
UP7	Gravel delivery - Cavern Works	0.0093	0.0287	A+B	0.0027	0.0066	0.0093	UP7	0.32	
UP8	Trailer delivery - Cavern Works	0.0015	0.0046	A+B	0.0004	0.0010	0.0015	UP8	0.32	
UP9	Workforce (Shaft) - Cavern Works	0.0366	0.1137	A+B	0.0105	0.0261	0.0366	UP9	0.32	
UP10	Shaft cuttings for disposal - Cavern Works	0.0006	0.0019	A+B	0.0002	0.0004	0.0006	UP10	0.32	
UP11	Workforce (Mining) - Cavern Works	0.1119	0.3475	A+B	0.0322	0.0797	0.1119	UP11	0.32	
UP12	Surface equipment (mobilization) - Cavern Works	0.0015	0.0046	A+B	0.0004	0.0010	0.0015	UP12	0.32	
UP13	Subsurface equipment (mobilization) - Cavern Works	0.0015	0.0046	A+B	0.0004	0.0010	0.0015	UP13	0.32	
UP14	Ground support - Cavern Works	0.0007	0.0023	A+B	0.0002	0.0005	0.0007	UP14	0.32	
UP15	Explosives - Cavern Works	0.0007	0.0023	A+B	0.0002	0.0005	0.0007	UP15	0.32	
UP16	Transportation of waste rock - Cavern Works	0.0053	0.0165	A+B	0.0015	0.0038	0.0053	UP16	0.32	
UP17	Workforce - Surface Works	0.2248	2.4259	A	0.2248	--	0.2248	UP17	0.09	
UP18	Site clearing (overburden) - Surface Works	0.0031	0.0334	A	0.0031	--	0.0031	UP18	0.09	
UP19	Civil foundation excavation Surface Works	0.0019	0.0205	A	0.0019	--	0.0019	UP19	0.09	
UP20	Cement Trucks Surface Works	0.0033	0.0353	A	0.0033	--	0.0033	UP20	0.09	
UP21	Equipment and material delivery Surface Works	0.0006	0.0068	A	0.0006	--	0.0006	UP21	0.09	
UP22	Potable Water - Surface and Cavern	0.0001	0.0002	A+B	0.0000	0.0000	0.0001	UP22	0.32	
UP23	Non Potable Water - Surface and Cavern	0.0004	0.0011	A+B	0.0001	0.0003	0.0004	UP23	0.32	
UP24	Non Potable Water - Reservoir Fill	0.0024	0.0076	A+B	0.0007	0.0017	0.0024	UP24	0.32	
					<b>Total CO Emissions (lb/hr)</b>	0.3	0.1	0.4		
					<b>Total CO Emissions (g/s)</b>	0.0	0.0	0.1		
<b>Vehicle Exhaust &amp; Tire and Brake Wear - SO2</b>										
UP1	Workforce (Site Clearing) - Cavern Works	0.0004	0.0013	A+B	0.0001	0.0003	0.0004	UP1	0.32	
UP2	Equipment mobilization - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	UP2	0.32	
UP3	Equipment demobilization - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	UP3	0.32	
UP4	Fuel delivery - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP4	0.32	
UP5	Fencing delivery - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP5	0.32	
UP6	Concrete trucks - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP6	0.32	
UP7	Gravel delivery - Cavern Works	0.0001	0.0004	A+B	0.0000	0.0001	0.0001	UP7	0.32	
UP8	Trailer delivery - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	UP8	0.32	
UP9	Workforce (Shaft) - Cavern Works	0.0006	0.0020	A+B	0.0002	0.0005	0.0006	UP9	0.32	
UP10	Shaft cuttings for disposal - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP10	0.32	
UP11	Workforce (Mining) - Cavern Works	0.0020	0.0061	A+B	0.0006	0.0014	0.0020	UP11	0.32	
UP12	Surface equipment (mobilization) - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	UP12	0.32	
UP13	Subsurface equipment (mobilization) - Cavern Works	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	UP13	0.32	
UP14	Ground support - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP14	0.32	
UP15	Explosives - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP15	0.32	
UP16	Transportation of waste rock - Cavern Works	0.0001	0.0002	A+B	0.0000	0.0000	0.0001	UP16	0.32	
UP17	Workforce - Surface Works	0.0039	0.0426	A	0.0039	--	0.0039	UP17	0.09	
UP18	Site clearing (overburden) - Surface Works	0.0000	0.0004	A	0.0000	--	0.0000	UP18	0.09	
UP19	Civil foundation excavation Surface Works	0.0000	0.0003	A	0.0000	--	0.0000	UP19	0.09	
UP20	Cement Trucks Surface Works	0.0000	0.0004	A	0.0000	--	0.0000	UP20	0.09	
UP21	Equipment and material delivery Surface Works	0.0000	0.0001	A	0.0000	--	0.0000	UP21	0.09	
UP22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP22	0.32	
UP23	Non Potable Water - Surface and Cavern	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	UP23	0.32	
UP24	Non Potable Water - Reservoir Fill	0.0000	0.0001	A+B	0.0000	0.0000	0.0000	UP24	0.32	
					<b>Total SO2 Emissions (lb/hr)</b>	0.0	0.0	0.0		
					<b>Total SO2 Emissions (g/s)</b>	0.001	0.0003	0.0		
<b>Emission Source Information</b>										
Modeled Source Type					Volume	Volume				
Vertical Dimension										
Truck Height					m	2.8	2.8			
Source Height					m	4.7	4.7			
Emission Height for Modeling					m	2.4	2.4			
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2			
Horizontal Dimension										
Road Width					m	10.0	10.0			
Source Width					m	16.0	16.0			
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4			
<b>Modeled Emissions Information</b>										
Section ID					Section A	Section B				
Section Length					mi	0.1	0.2			
Number of Volume Sources						9	23			
Modeled Emission Rate, NOx					g/s/volume	0.0007	0.0003			
Modeled Emission Rate, CO					g/s/volume	0.0041	0.0008			
Modeled Emission Rate, SO2					g/s/volume	0.0001	0.0000			

**TABLE M-4  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - PM10</b>					
<b>Emissions from Non-Road Engines</b>					
EXH-1	Indirect Equipment	lb/h	0.023	--	
EXH-2	Foundation and Compaction	lb/h	0.182	--	
EXH-3	Turbine Hall	lb/h	0.019	--	
EXH-4	Spheres	lb/h	0.016	--	
EXH-5	Primary Equipment	lb/h	0.030	--	
EXH-6	Structural	lb/h	0.021	--	
EXH-7	Piping	lb/h	0.039	--	
EXH-8	Mechanical	lb/h	0.016	--	
EXH-9	Primary Equipment	lb/h	--	0.020	
EXH-10	Mining Surface Equipment	lb/h	--	0.019	
#REF!	#REF!	lb/h	--	--	
<b>Transfer Operations</b>					
TA1	Clearing and Stripping -Truck unloading	lb/h	--	0.657	
TA2	Shaft cuttings for disposal - Truck loading	lb/h	--	0.003	
TA3	Mining Activities -Truck loading	lb/h	--	0.067	
TA4	Site clearing - Truck loading	lb/h	0.060	--	
TA5	Excavations Activities - Truck loading	lb/h	0.028	--	
<b>Bulldozing</b>					
BD 1	Foundation and Compaction - Surface Works	lb/h	0.222	--	
BD 2	Mining Surface	lb/h	--	0.333	
<b>Grading</b>					
GD1	Foundation and Compaction	lb/h	0.192	--	
<b>Wind Erosion of Exposed Surface Areas</b>					
WE1	Clearing & Stripping	lb/h	0.229	0.229	
<b>Wind Erosion of Stock Piles</b>					
WS1	Shaft Cutting	lb/h	--	0.054	
WS2	Waste Rock - Mining	lb/h	--	0.399	
WS3	Site Clearing	lb/h	0.402	--	
WS4	Excavations	lb/h	0.243	--	
	<b>Total PM10 Emission</b>	lb/h	1.72	1.78	
	<b>Total PM10 Emission</b>	g/s	0.22	0.22	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
<b>Vertical dimension</b>					
Volume height		m	2.8	2.8	Representative volume height
Volume Base/Building height		m	0.0	0.0	Representative volume height
Modeled release height		m	1.4	1.4	Height of middle of volume above ground
Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )		m	1.30	1.30	Volume or building height/2, 15
<b>Horizontal dimension</b>					
Volume width		m	130	120	Building width or representative volume width
Initial Horizontal dimension (sy <sub>0</sub> )		m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N <sup>o</sup> of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, PM10			g/s/volume	0.0543	0.0449

**TABLE M-5  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - PM2.5</b>					
<b>Emissions from Non-Road Engines</b>					
EXH-1	Indirect Equipment	lb/h	0.023	--	
EXH-2	Foundation and Compaction	lb/h	0.182	--	
EXH-3	Turbine Hall	lb/h	0.019	--	
EXH-4	Spheres	lb/h	0.016	--	
EXH-5	Primary Equipment	lb/h	0.030	--	
EXH-6	Structural	lb/h	0.021	--	
EXH-7	Piping	lb/h	0.039	--	
EXH-8	Mechanical	lb/h	0.016	--	
EXH-9	Primary Equipment	lb/h	--	0.020	
EXH-10	Mining Surface Equipment	lb/h	--	0.019	
#REF!	#REF!	lb/h	--	--	
<b>Transfer Operations</b>					
TA1	Clearing and Stripping -Truck unloading	lb/h	--	0.099	
TA2	Shaft cuttings for disposal - Truck loading	lb/h	--	0.001	
TA3	Mining Activities -Truck loading	lb/h	--	0.010	
TA4	Site clearing - Truck loading	lb/h	0.009	--	
TA5	Excavations Activities - Truck loading	lb/h	0.004	--	
<b>Bulldozing</b>					
BD 1	Foundation and Compaction - Surface Works	lb/h	0.109	--	
BD 2	Mining Surface	lb/h	--	0.164	
<b>Grading</b>					
GD1	Foundation and Compaction	lb/h	0.014	--	
<b>Wind Erosion of Exposed Surface Areas</b>					
WE1	Clearing & Stripping	lb/h	0.115	0.115	
<b>Wind Erosion of Stock Piles</b>					
WS1	Shaft Cutting	lb/h	--	0.008	
WS2	Waste Rock - Mining	lb/h	--	0.060	
WS3	Site Clearing	lb/h	0.060	--	
WS4	Excavations	lb/h	0.037	--	
	<b>Total PM2.5 Emission</b>	lb/h	0.69	0.50	
	<b>Total PM2.5 Emission</b>	g/s	0.09	0.06	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
<b>Vertical dimension</b>					
Volume height		m	2.8	2.8	Representative volume height
Volume Base/Building height		m	0.0	0.0	Representative volume height
Modeled release height		m	1.4	1.4	Height of middle of volume above ground
Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )		m	1.30	1.30	Volume or building height/2,15
<b>Horizontal dimension</b>					
Volume width		m	130	120	Building width or representative volume width
Initial Horizontal dimension (sy <sub>0</sub> )		m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N <sup>o</sup> of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, PM2.5			g/s/volume	0.0219	0.0125

**TABLE M-6  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - NOx</b>					
<i>Emissions from Non-Road Engines</i>					
EXH-1	Indirect Equipment	lb/h	0.471	--	
EXH-2	Foundation and Compaction	lb/h	2.492	--	
EXH-3	Turbine Hall	lb/h	0.172	--	
EXH-4	Spheres	lb/h	0.158	--	
EXH-5	Primary Equipment	lb/h	0.266	--	
EXH-6	Structural	lb/h	0.256	--	
EXH-7	Piping	lb/h	0.276	--	
EXH-8	Mechanical	lb/h	0.158	--	
EXH-9	Primary Equipment	lb/h	--	0.312	
EXH-10	Mining Surface Equipment	lb/h	--	0.281	
	<b>Total NOx Emissions</b>	lb/h	4.25	0.59	
	<b>Total NOx Emissions</b>	g/s	0.54	0.07	
<b>Emissions Basis - CO</b>					
<i>Emissions from Non-Road Engines</i>					
EXH-1	Indirect Equipment	lb/h	0.462	--	
EXH-2	Foundation and Compaction	lb/h	1.610	--	
EXH-3	Turbine Hall	lb/h	0.130	--	
EXH-4	Spheres	lb/h	0.110	--	
EXH-5	Primary Equipment	lb/h	0.205	--	
EXH-6	Structural	lb/h	0.141	--	
EXH-7	Piping	lb/h	0.270	--	
EXH-8	Mechanical	lb/h	0.110	--	
EXH-9	Primary Equipment	lb/h	--	0.153	
EXH-10	Mining Surface Equipment	lb/h	--	0.130	
	<b>Total CO Emissions</b>	lb/h	3.04	0.28	
	<b>Total CO Emissions</b>	g/s	0.38	0.04	
<b>Emissions Basis - SO2</b>					
<i>Emissions from Non-Road Engines</i>					
EXH-1	Indirect Equipment	lb/h	0.009	--	
EXH-2	Foundation and Compaction	lb/h	0.043	--	
EXH-3	Turbine Hall	lb/h	0.003	--	
EXH-4	Spheres	lb/h	0.003	--	
EXH-5	Primary Equipment	lb/h	0.005	--	
EXH-6	Structural	lb/h	0.005	--	
EXH-7	Piping	lb/h	0.005	--	
EXH-8	Mechanical	lb/h	0.003	--	
EXH-9	Primary Equipment	lb/h	--	0.005	
EXH-10	Mining Surface Equipment	lb/h	--	0.005	
	<b>Total SO2 Emissions</b>	lb/h	0.08	0.01	
	<b>Total SO2 Emissions</b>	g/s	0.01	0.00	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
<b>Vertical dimension</b>					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
<b>Horizontal dimension</b>					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N° of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, NOx			g/s/volume 0.1338	0.0149	
Modeled Emission Rate, CO			g/s/volume 0.0957	0.0071	
Modeled Emission Rate, SO2			g/s/volume 0.0024	0.0003	

**TABLE M-7  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR POINT SOURCES  
CONSTRUCTION PHASE  
Gem Site - Hydrostor**

Description	Units	Point #1	Assumption/Comment
		Shaft 1	
<b>Total PM-10</b>	lb/hr	0.044	
	g/s	0.0055	
<b>Total PM-2.5</b>	lb/hr	0.044	
	g/s	0.0055	
<b>Total NOx</b>	lb/hr	0.458	
	g/s	0.0577	
<b>Total CO</b>	lb/hr	0.488	
	g/s	0.061	
<b>Total SO<sub>2</sub></b>	lb/hr	0.006	
	g/s	0.001	
<b><u>Emission Source Information</u></b>			
Modeled source type		Point	reversing flow in 1 point
Stack Parameters			
Release height	ft	17.0	Stack height in the range of 10 ft to 20 ft
Stack diameter	ft	6.0	Provided information (email 08/04/2021)
Stack exhaust temperature	F	55	Assumed
Stack exhaust flow rate	ft <sup>3</sup> /min	200,000	Provided information (email 08/04/2021)
<b><u>Modeled Emissions Information</u></b>			
Source ID		<b>Point #1</b>	
Stack Parameters			
Release height	m	5.2	
Stack diameter	m	1.8	
Stack exhaust temperature	K	285.9	
Stack exhaust velocity	m/s	35.9	Calculated

Modeling Tables for Construction  
(On-Site, Month 18) for Annual  
Dispersion Modeling

**TABLE M-1  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)
					Section A	Section B				
					<b>Section Length (mi)</b>	0.09	0.23			
					<b>Control Efficiency (%)</b>	0	0			
<b>Road Fugitive Dust Emissions - PM<sub>10</sub></b>										
Haul Road 9	Workforce (Shaft) - Cavern Works	0.1	0.2	A+B		0.02	0.05	0.1	Haul Road 9	0.32
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.1	0.2	A+B		0.02	0.05	0.1	Haul Road 10	0.32
Haul Road 17	Workforce - Surface Works	0.5	5.0	A		0.46	--	0.5	Haul Road 17	0.09
Haul Road 20	Cement Trucks Surface Works	0.4	3.9	A		0.36	--	0.4	Haul Road 20	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.1	0.2	A+B		0.02	0.05	0.1	Haul Road 23	0.32
<b>Vehicle Exhaust &amp; Tire and Brake Wear - PM<sub>10</sub></b>										
Haul Road 9	Workforce (Shaft) - Cavern Works	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	Haul Road 9	0.32
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	Haul Road 10	0.32
Haul Road 17	Workforce - Surface Works	0.0002	0.0018	A		0.0002	--	0.0002	Haul Road 17	0.09
Haul Road 20	Cement Trucks Surface Works	0.0002	0.0017	A		0.0002	--	0.0002	Haul Road 20	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	Haul Road 23	0.32
					<b>Total Emissions (lb/hr)</b>	0.9	0.2	1.0		
					<b>Total Emissions (g/s)</b>	0.1117	0.0205	0.1		
<b>Emission Source Information</b>										
Modeled Source Type						Volume	Volume			
Vertical Dimension										
Truck Height					m	2.8	2.8			
Source Height					m	4.8	4.8			
Emission Height for Modeling					m	2.4	2.4			
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2			
Horizontal Dimension										
Road Width					m	10.0	10.0			
Source Width					m	16.0	16.0			
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4			
<b>Modeled Emissions Information</b>										
Section ID						<b>Section A</b>	<b>Section B</b>			
Section Length					mi	0.1	0.2			
Number of Volume Sources						9	23			
Modeled Emission Rate, PM <sub>10</sub>					g/s/volume	0.0124	0.0009			

**TABLE M-2  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)	
					Section A	Section B					
					<b>Section Length (mi)</b>	0.09	0.23				
					<b>Control Efficiency (%)</b>	0	0				
<b>Road Fugitive Dust Emissions - PM-2.5</b>											
Haul Road 9	Workforce (Shaft) - Cavern Works	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 9	0.32		
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.0	0.0	A+B	0.00	0.00	0.0	Haul Road 10	0.32		
Haul Road 17	Workforce - Surface Works	0.0	0.5	A	0.05	--	0.0	Haul Road 17	0.09		
Haul Road 20	Cement Trucks Surface Works	0.0	0.4	A	0.04	--	0.0	Haul Road 20	0.09		
Haul Road 22	Potable Water - Surface and Cavern	0.0	0.0	A+B	0.00	0.00	0.0	Haul Road 22	0.32		
Haul Road 23	Non Potable Water - Surface and Cavern	0.0	0.0	A+B	0.00	0.01	0.0	Haul Road 23	0.32		
<b>Vehicle Exhaust &amp; Tire and Brake Wear - PM2.5</b>											
Haul Road 9	Workforce (Shaft) - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 9	0.32		
Haul Road 10	Shaft cuttings for disposal - Cavern Works	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 10	0.32		
Haul Road 17	Workforce - Surface Works	0.0001	0.0008	A	0.0001	--	0.0001	Haul Road 17	0.09		
Haul Road 20	Cement Trucks Surface Works	0.0001	0.0008	A	0.0001	--	0.0001	Haul Road 20	0.09		
Haul Road 22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 22	0.32		
Haul Road 23	Non Potable Water - Surface and Cavern	0.0000	0.0000	A+B	0.0000	0.0000	0.0000	Haul Road 23	0.32		
					<b>Total Emissions (lb/hr)</b>	0.1	0.0	0.1			
					<b>Total Emissions (g/s)</b>	0.0112	0.0021	0.0			
<b>Emission Source Information</b>											
Modeled Source Type					Volume	Volume					
Vertical Dimension											
Truck Height					m	2.8	2.8				
Source Height					m	4.7	4.7				
Emission Height for Modeling					m	2.4	2.4				
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2				
Horizontal Dimension											
Road Width					m	10.0	10.0				
Source Width					m	16.0	16.0				
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4				
<b>Modeled Emissions Information</b>											
Section ID						<b>Section A</b>	<b>Section B</b>				
Section Length					mi	0.1	0.2				
Number of Volume Sources						9	23				
Modeled Emission Rate, PM2.5					g/s/volume	0.0012	0.0001				

**TABLE M-3  
MODELED GASES EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)
					Section A	Section B				
					<b>Section Length (mi)</b>	0.09	0.23			
					<b>Control Efficiency (%)</b>	0	0			
<b>Vehicle Exhaust &amp; Tire and Brake Wear - NOx</b>										
UP9	Workforce (Shaft) - Cavern Works	0.0015	0.0048	A+B		0.0004	0.0011	0.0015	UP9	0.32
UP10	Shaft cuttings for disposal - Cavern Works	0.0014	0.0044	A+B		0.0004	0.0010	0.0014	UP10	0.32
UP17	Workforce - Surface Works	0.0095	0.1020	A		0.0095	--	0.0095	UP17	0.09
UP20	Cement Trucks Surface Works	0.0075	0.0810	A		0.0075	--	0.0075	UP20	0.09
UP22	Potable Water - Surface and Cavern	0.0001	0.0004	A+B		0.0000	0.0001	0.0001	UP22	0.32
UP23	Non Potable Water - Surface and Cavern	0.0008	0.0026	A+B		0.0002	0.0006	0.0008	UP23	0.32
					<b>Total NOx Emissions (lb/hr)</b>	0.0	0.0	0.0		
					<b>Total NOx Emissions (g/s)</b>	0.0023	0.0004	0.0		
<b>Vehicle Exhaust &amp; Tire and Brake Wear - CO</b>										
UP9	Workforce (Shaft) - Cavern Works	0.0366	0.1137	A+B		0.0105	0.0261	0.0366	UP9	0.32
UP10	Shaft cuttings for disposal - Cavern Works	0.0006	0.0019	A+B		0.0002	0.0004	0.0006	UP10	0.32
UP17	Workforce - Surface Works	0.2248	2.4259	A		0.2248	--	0.2248	UP17	0.09
UP20	Cement Trucks Surface Works	0.0033	0.0353	A		0.0033	--	0.0033	UP20	0.09
UP22	Potable Water - Surface and Cavern	0.0001	0.0002	A+B		0.0000	0.0000	0.0001	UP22	0.32
UP23	Non Potable Water - Surface and Cavern	0.0004	0.0011	A+B		0.0001	0.0003	0.0004	UP23	0.32
					<b>Total CO Emissions (lb/hr)</b>	0.2	0.0	0.3		
					<b>Total CO Emissions (g/s)</b>	0.0301	0.0034	0.0		
<b>Vehicle Exhaust &amp; Tire and Brake Wear - SO2</b>										
UP9	Workforce (Shaft) - Cavern Works	0.0006	0.0020	A+B		0.0002	0.0005	0.0006	UP9	0.32
UP10	Shaft cuttings for disposal - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP10	0.32
UP17	Workforce - Surface Works	0.0039	0.0426	A		0.0039	--	0.0039	UP17	0.09
UP20	Cement Trucks Surface Works	0.0000	0.0004	A		0.0000	--	0.0000	UP20	0.09
UP22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP22	0.32
UP23	Non Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP23	0.32
					<b>Total SO2 Emissions (lb/hr)</b>	0.0	0.0	0.0		
					<b>Total SO2 Emissions (g/s)</b>	0.0005	0.0001	0.0		
<b>Emission Source Information</b>										
Modeled Source Type						Volume	Volume			
Vertical Dimension										
Truck Height					m	2.8	2.8			
Source Height					m	4.7	4.7			
Emission Height for Modeling					m	2.4	2.4			
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2			
Horizontal Dimension										
Road Width					m	10.0	10.0			
Source Width					m	16.0	16.0			
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4			
<b>Modeled Emissions Information</b>										
Section ID						<b>Section A</b>	<b>Section B</b>			
Section Length					mi	0.1	0.2			
Number of Volume Sources						9	23			
Modeled Emission Rate, NOx					g/s/volume	0.0003	0.0000			
Modeled Emission Rate, CO					g/s/volume	0.0033	0.0001			
Modeled Emission Rate, SO2					g/s/volume	0.0001	0.0000			

**TABLE M-4  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - PM10</b>					
<b>Emissions from Non-Road Engines</b>					
EXH-1	Indirect Equipment	lb/h	0.023	--	
EXH-2	Foundation and Compaction	lb/h	0.182	--	
EXH-3	Turbine Hall	lb/h	0.019	--	
EXH-4	Spheres	lb/h	0.016	--	
EXH-9	Primary Equipment	lb/h	--	0.020	
<b>Transfer Operations</b>					
TA2	Shaft cuttings for disposal - Truck loading	lb/h	--	0.003	
<b>Bulldozing</b>					
BD 1	Foundation and Compaction - Surface Works	lb/h	0.222	--	
<b>Grading</b>					
GD1	Foundation and Compaction	lb/h	0.192	--	
<b>Wind Erosion of Exposed Surface Areas</b>					
WE1	Clearing & Stripping	lb/h	0.229	0.229	
<b>Wind Erosion of Stock Piles</b>					
WS1	Shaft Cutting	lb/h	--	0.054	
	<b>Total PM10 Emission</b>	lb/h	0.88	0.31	
	<b>Total PM10 Emission</b>	g/s	0.11	0.04	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
Vertical dimension					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
Horizontal dimension					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N° of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, PM10			g/s/volume	0.0278	0.0077

**TABLE M-5  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - PM2.5</b>					
<b>Emissions from Non-Road Engines</b>					
EXH-1	Indirect Equipment	lb/h	0.023	--	
EXH-2	Foundation and Compaction	lb/h	0.182	--	
EXH-3	Turbine Hall	lb/h	0.019	--	
EXH-4	Spheres	lb/h	0.016	--	
EXH-9	Primary Equipment	lb/h	--	0.020	
<b>Transfer Operations</b>					
TA2	Shaft cuttings for disposal - Truck loading	lb/h	--	0.001	
<b>Bulldozing</b>					
BD 1	Foundation and Compaction - Surface Works	lb/h	0.109	--	
<b>Grading</b>					
GD1	Foundation and Compaction	lb/h	0.014	--	
<b>Wind Erosion of Exposed Surface Areas</b>					
WE1	Clearing & Stripping	lb/h	0.115	0.115	
<b>Wind Erosion of Stock Piles</b>					
WS1	Shaft Cutting	lb/h	--	0.008	
	<b>Total PM2.5 Emission</b>	lb/h	0.48	0.14	
	<b>Total PM2.5 Emission</b>	g/s	0.06	0.02	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
Vertical dimension					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
Horizontal dimension					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N° of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, PM2.5			g/s/volume	0.0151	0.0036

**TABLE M-6  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 18  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b><u>Emissions Basis - NOx</u></b>					
<b><i>Emissions from Non-Road Engines</i></b>					
EXH-1	Indirect Equipment	lb/h	0.471	--	
EXH-2	Foundation and Compaction	lb/h	2.492	--	
EXH-3	Turbine Hall	lb/h	0.172	--	
EXH-4	Spheres	lb/h	0.158	--	
EXH-9	Primary Equipment	lb/h	--	0.312	
	<b>Total NOx Emissions</b>	lb/h	3.29	0.31	
	<b>Total NOx Emissions</b>	g/s	0.41	0.04	
<b><u>Emissions Basis - CO</u></b>					
<b><i>Emissions from Non-Road Engines</i></b>					
EXH-1	Indirect Equipment	lb/h	0.462	--	
EXH-2	Foundation and Compaction	lb/h	1.610	--	
EXH-3	Turbine Hall	lb/h	0.130	--	
EXH-4	Spheres	lb/h	0.110	--	
EXH-9	Primary Equipment	lb/h	--	0.153	
	<b>Total CO Emissions</b>	lb/h	2.31	0.15	
	<b>Total CO Emissions</b>	g/s	0.29	0.02	
<b><u>Emissions Basis - SO2</u></b>					
<b><i>Emissions from Non-Road Engines</i></b>					
EXH-1	Indirect Equipment	lb/h	0.009	--	
EXH-2	Foundation and Compaction	lb/h	0.043	--	
EXH-3	Turbine Hall	lb/h	0.003	--	
EXH-4	Spheres	lb/h	0.003	--	
EXH-9	Primary Equipment	lb/h	--	0.005	
	<b>Total SO2 Emissions</b>	lb/h	0.06	0.01	
	<b>Total SO2 Emissions</b>	g/s	0.01	0.00	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
Vertical dimension					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
Horizontal dimension					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N° of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, NOx		g/s/volume	0.1037	0.0079	
Modeled Emission Rate, CO		g/s/volume	0.0729	0.0038	
Modeled Emission Rate, SO2		g/s/volume	0.0018	0.0001	

Modeling Tables for Construction  
(On-Site, Month 26) for Annual  
Dispersion Modeling

**TABLE M-1  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 26  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)
						Section A	Section B			
					<b>Section Length (mi)</b>	0.09	0.23			
					<b>Control Efficiency (%)</b>	0	0			
<b>Road Fugitive Dust Emissions - PM<sub>10</sub></b>										
Haul Road 11	Workforce (Mining) - Cavern Works	0.2	0.7	A+B		0.07	0.16	0.2	Haul Road 11	0.32
Haul Road 14	Ground support - Cavern Works	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 14	0.32
Haul Road 15	Explosives - Cavern Works	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 15	0.32
Haul Road 16	Transportation of waste rock - Cavern Works	1.2	3.6	A+B		0.33	0.83	1.2	Haul Road 16	0.32
Haul Road 17	Workforce - Surface Works	0.5	5.0	A		0.46	--	0.5	Haul Road 17	0.09
Haul Road 21	Equipment and material delivery Surface Works	0.0	0.1	A		0.01	--	0.0	Haul Road 21	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.1	0.2	A+B		0.02	0.05	0.1	Haul Road 23	0.32
Haul Road 24	Non Potable Water - Reservoir Fill	0.5	1.5	A+B		0.14	0.35	0.5	Haul Road 24	0.32
<b>Vehicle Exhaust &amp; Tire and Brake Wear - PM<sub>10</sub></b>										
Haul Road 11	Workforce (Mining) - Cavern Works	0.0001	0.0003	A+B		0.0000	0.0001	0.0001	Haul Road 11	0.32
Haul Road 14	Ground support - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 14	0.32
Haul Road 15	Explosives - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 15	0.32
Haul Road 16	Transportation of waste rock - Cavern Works	0.0005	0.0016	A+B		0.0001	0.0004	0.0005	Haul Road 16	0.32
Haul Road 17	Workforce - Surface Works	0.0002	0.0018	A		0.0002	--	0.0002	Haul Road 17	0.09
Haul Road 21	Equipment and material delivery Surface Works	0.0000	0.0001	A		0.0000	--	0.0000	Haul Road 21	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	Haul Road 23	0.32
Haul Road 24	Non Potable Water - Reservoir Fill	0.0002	0.0007	A+B		0.0001	0.0002	0.0002	Haul Road 24	0.32
					<b>Total Emissions (lb/hr)</b>	1.0	1.4	2.5		
					<b>Total Emissions (g/s)</b>	0.1321	0.1794	0.3		
<b>Emission Source Information</b>										
Modeled Source Type						Volume	Volume			
Vertical Dimension										
Truck Height					m	2.8	2.8			
Source Height					m	4.8	4.8			
Emission Height for Modeling					m	2.4	2.4			
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2			
Horizontal Dimension										
Road Width					m	10.0	10.0			
Source Width					m	16.0	16.0			
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4			
<b>Modeled Emissions Information</b>										
Section ID						<b>Section A</b>	<b>Section B</b>			
Section Length					mi	0.1	0.2			
Number of Volume Sources						9	23			
Modeled Emission Rate, PM <sub>10</sub>					g/s/volume	0.0147	0.0078			

**TABLE M-2  
MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 26  
Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)
					Section A	Section B				
					<b>Section Length (mi)</b>	0.09	0.23			
					<b>Control Efficiency (%)</b>	0	0			
<b>Road Fugitive Dust Emissions - PM-2.5</b>										
Haul Road 11	Workforce (Mining) - Cavern Works	0.0	0.1	A+B		0.01	0.02	0.0	Haul Road 11	0.32
Haul Road 14	Ground support - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 14	0.32
Haul Road 15	Explosives - Cavern Works	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 15	0.32
Haul Road 16	Transportation of waste rock - Cavern Works	0.1	0.4	A+B		0.03	0.08	0.1	Haul Road 16	0.32
Haul Road 17	Workforce - Surface Works	0.0	0.5	A		0.05	--	0.0	Haul Road 17	0.09
Haul Road 21	Equipment and material delivery Surface Works	0.0	0.0	A		0.00	--	0.0	Haul Road 21	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0	0.0	A+B		0.00	0.00	0.0	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.0	0.0	A+B		0.00	0.01	0.0	Haul Road 23	0.32
Haul Road 24	Non Potable Water - Reservoir Fill	0.0	0.2	A+B		0.01	0.04	0.0	Haul Road 24	0.32
<b>Vehicle Exhaust &amp; Tire and Brake Wear - PM2.5</b>										
Haul Road 11	Workforce (Mining) - Cavern Works	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	Haul Road 11	0.32
Haul Road 14	Ground support - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 14	0.32
Haul Road 15	Explosives - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 15	0.32
Haul Road 16	Transportation of waste rock - Cavern Works	0.0002	0.0007	A+B		0.0001	0.0002	0.0002	Haul Road 16	0.32
Haul Road 17	Workforce - Surface Works	0.0001	0.0008	A		0.0001	--	0.0001	Haul Road 17	0.09
Haul Road 21	Equipment and material delivery Surface Works	0.0000	0.0000	A		0.0000	--	0.0000	Haul Road 21	0.09
Haul Road 22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 22	0.32
Haul Road 23	Non Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	Haul Road 23	0.32
Haul Road 24	Non Potable Water - Reservoir Fill	0.0001	0.0003	A+B		0.0000	0.0001	0.0001	Haul Road 24	0.32
					<b>Total Emissions (lb/hr)</b>	0.1	0.1	0.2		
					<b>Total Emissions (g/s)</b>	0.0132	0.0180	0.0		
<b>Emission Source Information</b>										
Modeled Source Type						Volume	Volume			
Vertical Dimension										
Truck Height					m	2.8	2.8			
Source Height					m	4.7	4.7			
Emission Height for Modeling					m	2.4	2.4			
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2			
Horizontal Dimension										
Road Width					m	10.0	10.0			
Source Width					m	16.0	16.0			
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4			
<b>Modeled Emissions Information</b>										
Section ID						<b>Section A</b>	<b>Section B</b>			
Section Length					mi	0.1	0.2			
Number of Volume Sources						9	23			
Modeled Emission Rate, PM2.5					g/s/volume	0.0015	0.0008			

**TABLE M-3**  
**MODELED GASES EMISSIONS AND SOURCE DIMENSIONS FOR LINE-VOLUME SOURCES**  
**CONSTRUCTION PHASE - MONTH 26**  
**Gem Site - Hydrostor**

Road ID	Description	Emission Rate (lb/hr)	Emission Factor (lb/hr/mi)	Road Sections	Emissions of Modeled Haul Road Sections (lb/hr)			Total Emissions (lb/hr)	Road ID	Road Length (mi)	
					Section A	Section B					
					<b>Section Length (mi)</b>	0.09	0.23				
					<b>Control Efficiency (%)</b>	0	0				
<b>Vehicle Exhaust &amp; Tire and Brake Wear - NOx</b>											
UP11	Workforce (Mining) - Cavern Works	0.0047	0.0146	A+B		0.0014	0.0034	0.0047	UP11	0.32	
UP14	Ground support - Cavern Works	0.0017	0.0052	A+B		0.0005	0.0012	0.0017	UP14	0.32	
UP15	Explosives - Cavern Works	0.0017	0.0052	A+B		0.0005	0.0012	0.0017	UP15	0.32	
UP16	Transportation of waste rock - Cavern Works	0.0122	0.0379	A+B		0.0035	0.0087	0.0122	UP16	0.32	
UP17	Workforce - Surface Works	0.0095	0.1020	A		0.0095	--	0.0095	UP17	0.09	
UP21	Equipment and material delivery Surface Works	0.0015	0.0157	A		0.0015	--	0.0015	UP21	0.09	
UP22	Potable Water - Surface and Cavern	0.0001	0.0004	A+B		0.0000	0.0001	0.0001	UP22	0.32	
UP23	Non Potable Water - Surface and Cavern	0.0008	0.0026	A+B		0.0002	0.0006	0.0008	UP23	0.32	
UP24	Non Potable Water - Reservoir Fill	0.0056	0.0174	A+B		0.0016	0.0040	0.0056	UP24	0.32	
					<b>Total NOx Emissions (lb/hr)</b>	0.0	0.0	0.0			
					<b>Total NOx Emissions (g/s)</b>	0.0023	0.0024	0.0			
<b>Vehicle Exhaust &amp; Tire and Brake Wear - CO</b>											
UP11	Workforce (Mining) - Cavern Works	0.1119	0.3475	A+B		0.0322	0.0797	0.1119	UP11	0.32	
UP14	Ground support - Cavern Works	0.0007	0.0023	A+B		0.0002	0.0005	0.0007	UP14	0.32	
UP15	Explosives - Cavern Works	0.0007	0.0023	A+B		0.0002	0.0005	0.0007	UP15	0.32	
UP16	Transportation of waste rock - Cavern Works	0.0053	0.0165	A+B		0.0015	0.0038	0.0053	UP16	0.32	
UP17	Workforce - Surface Works	0.2248	2.4259	A		0.2248	--	0.2248	UP17	0.09	
UP21	Equipment and material delivery Surface Works	0.0006	0.0068	A		0.0006	--	0.0006	UP21	0.09	
UP22	Potable Water - Surface and Cavern	0.0001	0.0002	A+B		0.0000	0.0000	0.0001	UP22	0.32	
UP23	Non Potable Water - Surface and Cavern	0.0004	0.0011	A+B		0.0001	0.0003	0.0004	UP23	0.32	
UP24	Non Potable Water - Reservoir Fill	0.0024	0.0076	A+B		0.0007	0.0017	0.0024	UP24	0.32	
					<b>Total CO Emissions (lb/hr)</b>	0.3	0.1	0.3			
					<b>Total CO Emissions (g/s)</b>	0.0328	0.0109	0.0			
<b>Vehicle Exhaust &amp; Tire and Brake Wear - SO2</b>											
UP11	Workforce (Mining) - Cavern Works	0.0020	0.0061	A+B		0.0006	0.0014	0.0020	UP11	0.32	
UP14	Ground support - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP14	0.32	
UP15	Explosives - Cavern Works	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP15	0.32	
UP16	Transportation of waste rock - Cavern Works	0.0001	0.0002	A+B		0.0000	0.0000	0.0001	UP16	0.32	
UP17	Workforce - Surface Works	0.0039	0.0426	A		0.0039	--	0.0039	UP17	0.09	
UP21	Equipment and material delivery Surface Works	0.0000	0.0001	A		0.0000	--	0.0000	UP21	0.09	
UP22	Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP22	0.32	
UP23	Non Potable Water - Surface and Cavern	0.0000	0.0000	A+B		0.0000	0.0000	0.0000	UP23	0.32	
UP24	Non Potable Water - Reservoir Fill	0.0000	0.0001	A+B		0.0000	0.0000	0.0000	UP24	0.32	
					<b>Total SO2 Emissions (lb/hr)</b>	0.0	0.0	0.0			
					<b>Total SO2 Emissions (g/s)</b>	0.0006	0.0002	0.0			
<b>Emission Source Information</b>											
Modeled Source Type					Volume	Volume					
Vertical Dimension											
Truck Height					m	2.8	2.8				
Source Height					m	4.7	4.7				
Emission Height for Modeling					m	2.4	2.4				
Initial Vertical Dimension (sz <sub>0</sub> )					m	2.2	2.2				
Horizontal Dimension											
Road Width					m	10.0	10.0				
Source Width					m	16.0	16.0				
Initial Horizontal Dimension (sy <sub>0</sub> )					m	7.4	7.4				
<b>Modeled Emissions Information</b>											
Section ID						<b>Section A</b>	<b>Section B</b>				
Section Length					mi	0.1	0.2				
Number of Volume Sources						9	23				
Modeled Emission Rate, NOx					g/s/volume	0.0003	0.0001				
Modeled Emission Rate, CO					g/s/volume	0.0036	0.0005				
Modeled Emission Rate, SO2					g/s/volume	0.0001	0.0000				

**TABLE M-4  
MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
CONSTRUCTION PHASE - MONTH 26  
Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - PM10</b>					
<b>Emissions from Non-Road Engines</b>					
EXH-1	Indirect Equipment	lb/h	0.023	--	
EXH-4	Spheres	lb/h	0.016	--	
EXH-7	Piping	lb/h	0.039	--	
EXH-8	Mechanical	lb/h	0.016	--	
EXH-10	Mining Surface Equipment	lb/h	--	0.019	
<b>Transfer Operations</b>					
TA1	Clearing and Stripping -Truck unloading	lb/h	--		
TA2	Shaft cuttings for disposal - Truck loading	lb/h	--		
TA3	Mining Activities -Truck loading	lb/h	--	0.067	
<b>Bulldozing</b>					
BD 2	Mining Surface	lb/h	--	0.208	
<b>Wind Erosion of Exposed Surface Areas</b>					
WE1	Clearing & Stripping	lb/h	0.054	0.054	
<b>Wind Erosion of Stock Piles</b>					
WS2	Waste Rock - Mining	lb/h	--	0.399	
<b>Total PM10 Emission</b>			lb/h	0.15	0.75
<b>Total PM10 Emission</b>			g/s	0.02	0.09
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
Vertical dimension					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
Horizontal dimension					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N° of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, PM10			g/s/volume	0.0047	0.0188

**TABLE M-5  
 MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
 CONSTRUCTION PHASE - MONTH 26  
 Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - PM2.5</b>					
<b>Emissions from Non-Road Engines</b>					
EXH-1	Indirect Equipment	lb/h	0.023	--	
EXH-4	Spheres	lb/h	0.016	--	
EXH-7	Piping	lb/h	0.039	--	
EXH-8	Mechanical	lb/h	0.016	--	
EXH-10	Mining Surface Equipment	lb/h	--	0.019	
<b>Transfer Operations</b>					
TA1	Clearing and Stripping -Truck unloading	lb/h	--		
TA2	Shaft cuttings for disposal - Truck loading	lb/h	--		
TA3	Mining Activities -Truck loading	lb/h	--	0.010	
<b>Bulldozing</b>					
BD 2	Mining Surface	lb/h	--	0.103	
<b>Wind Erosion of Exposed Surface Areas</b>					
WE1	Clearing & Stripping	lb/h	0.027	0.027	
<b>Wind Erosion of Stock Piles</b>					
WS2	Waste Rock - Mining	lb/h	--	0.060	
		<b>Total PM2.5 Emission</b>	lb/h	0.12	0.22
		<b>Total PM2.5 Emission</b>	g/s	0.02	0.03
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
Vertical dimension					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
Horizontal dimension					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N° of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, PM2.5			g/s/volume	0.0038	0.0055

**TABLE M-6  
 MODELED PM-2.5 EMISSIONS AND SOURCE DIMENSIONS FOR VOLUME SOURCES  
 CONSTRUCTION PHASE - MONTH 26  
 Gem Site - Hydrostor**

Volume ID	Description	Units	Emissions of Modeled Volume (lb/hr)		Assumption/Comment
			VOL1 Surface Works	VOL2 Cavern Works	
<b>Emissions Basis - NOx</b>					
<i>Emissions from Non-Road Engines</i>					
EXH-1	Indirect Equipment	lb/h	0.471	--	
EXH-4	Spheres	lb/h	0.158	--	
EXH-7	Piping	lb/h	0.276	--	
EXH-8	Mechanical	lb/h	0.158	--	
EXH-10	Mining Surface Equipment	lb/h	--	0.281	
	<b>Total NOx Emissions</b>	lb/h	1.06	0.28	
	<b>Total NOx Emissions</b>	g/s	0.13	0.04	
<b>Emissions Basis - CO</b>					
<i>Emissions from Non-Road Engines</i>					
EXH-1	Indirect Equipment	lb/h	0.462	--	
EXH-4	Spheres	lb/h	0.110	--	
EXH-7	Piping	lb/h	0.270	--	
EXH-8	Mechanical	lb/h	0.110	--	
EXH-10	Mining Surface Equipment	lb/h	--	0.130	
	<b>Total CO Emissions</b>	lb/h	0.95	0.13	
	<b>Total CO Emissions</b>	g/s	0.12	0.02	
<b>Emissions Basis - SO2</b>					
<i>Emissions from Non-Road Engines</i>					
EXH-1	Indirect Equipment	lb/h	0.009	--	
EXH-4	Spheres	lb/h	0.003	--	
EXH-7	Piping	lb/h	0.005	--	
EXH-8	Mechanical	lb/h	0.003	--	
EXH-10	Mining Surface Equipment	lb/h	--	0.005	
	<b>Total SO2 Emissions</b>	lb/h	0.02	0.00	
	<b>Total SO2 Emissions</b>	g/s	0.00	0.00	
<b>Emission Source Information</b>					
Modeled source type			Volume	Volume	
Surface-Based/Elevated			Surface	Surface	
<b>Vertical dimension</b>					
	Volume height	m	2.8	2.8	Representative volume height
	Volume Base/Building height	m	0.0	0.0	Representative volume height
	Modeled release height	m	1.4	1.4	Height of middle of volume above ground
	Initial vertical dimension <sup>b</sup> (sz <sub>0</sub> )	m	1.30	1.30	Volume or building height/2,15
<b>Horizontal dimension</b>					
	Volume width	m	130	120	Building width or representative volume width
	Initial Horizontal dimension (sy <sub>0</sub> )	m	30.2	27.9	Volume width / 4,3
<b>Modeled Emissions Information</b>					
Model ID			<b>VOL1</b>	<b>VOL2</b>	
N <sup>o</sup> of volume sources			4	5	Based on modeling setup in Lakes
Modeled Emission Rate, NOx		g/s/volume	0.0335	0.0071	
Modeled Emission Rate, CO		g/s/volume	0.0300	0.0033	
Modeled Emission Rate, SO2		g/s/volume	0.0006	0.0001	

**TABLE M-7**  
**MODELED PM-10 EMISSIONS AND SOURCE DIMENSIONS FOR POINT SOURCES**  
**CONSTRUCCION PHASE - MONTH 26**  
**Gem Site - Hydrostor**

Description	Units	Point #1	Assumption/Comment
		Shaft 1	
<b>Total PM-10</b>	lb/hr	0.044	
	g/s	0.0055	
<b>Total PM-2.5</b>	lb/hr	0.044	
	g/s	0.0055	
<b>Total NOx</b>	lb/hr	0.4582	
	g/s	0.0577	
<b>Total CO</b>	lb/hr	0.488	
	g/s	0.0614	
<b>Total SO<sub>2</sub></b>	lb/hr	0.006	
	g/s	0.0008	
<b><u>Emission Source Information</u></b>			
Modeled source type		Point	reversing flow in 1 point
Stack Parameters			
Release height	ft	4.0	Provided information (email 08/04/2021)
Stack diameter	ft	6.0	Provided information (email 08/04/2021)
Stack exhaust temperature	F	55	Assumed
Stack exhaust flow rate	ft <sup>3</sup> /min	200,000	Provided information (email 08/04/2021)
<b><u>Modeled Emissions Information</u></b>			
Source ID		<b>Point #1</b>	
Stack Parameters			
Release height	m	1.2	
Stack diameter	m	1.8	
Stack exhaust temperature	K	285.9	
Stack exhaust velocity	m/s	35.9	Calculated

**APPENDIX 5.1E**

**Electronic Modeling Files  
(Submitted electronically)**

## Air Dispersion Modeling Electronic Modeling Files (submitted electronically)

AERMOD Input file

AERMOD Output files

AERMOD Plotfiles

Met Data

BPIP Input

Receptors (ROU files)

**APPENDIX 5.1F**

**List of Receptors used in Air Dispersion Modeling**

**Appendix 5.1F - Table 1**  
**List of Receptors used in the Air Dispersion Modeling - Gem Site**

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
1	SR-GEM-01	391,139.8	3,858,346.9	718.6	Sensitive	Kids 1st Academy WeeCare
2	SR-GEM-02	392,327.7	3,858,642.6	713.4	Sensitive	Rosamond Urgent Care
3	SR-GEM-03	392,731.6	3,858,335.5	710.1	Sensitive	Watch This! Child Care
4	SR-GEM-04	391,204.3	3,857,573.9	714.7	Sensitive	A Genuine Start WeeCare
5	SR-GEM-05	387,690.6	3,858,940.3	736.0	Sensitive	Southern Kern Unified School
6	SR-GEM-06	387,743.3	3,858,937.5	736.1	Sensitive	Tropico Middle School
7	SR-GEM-07	391,901.6	3,858,705.8	716.7	Sensitive	Rosamond High School
8	SR-GEM-08	392,039.9	3,858,653.4	715.5	Sensitive	Rare Earth High School
9	SR-GEM-09	392,297.9	3,859,019.3	714.0	Sensitive	Southern Kern Unified School
10	SR-GEM-10	392,206.5	3,858,663.7	714.3	Sensitive	Southern Kern Unified School
11	SR-GEM-11	393,080.1	3,859,057.0	716.5	Sensitive	Rosamond Christian School
12	SR-GEM-12	393,137.1	3,858,793.9	714.9	Sensitive	Rosamond Elementary School
13	SR-GEM-13	390,764.1	3,857,098.0	714.6	Sensitive	Westpark Elementary
14	SR-GEM-14	393,344.0	3,857,872.5	708.1	Sensitive	Rosamond Senior Citizens Inc.
15	SR-GEM-15	390,608.4	3,857,356.7	716.1	Sensitive	Perfect Start Learning
16	SR-GEM-16	391,983.1	3,859,510.0	728.7	Sensitive	Training Station Day Care
17	SR-GEM-17	395,638.4	3,859,118.3	715.4	Sensitive	Lukenbill, Kathryn Family Child Care
18	SR-GEM-18	392,402.7	3,859,337.2	724.0	Sensitive	Community Action Partnership
19	SR-GEM-19	392,479.2	3,858,740.9	712.5	Sensitive	Pacific Dental Care
20	SR-GEM-20	393,235.7	3,858,912.7	716.0	Sensitive	Rosamond Park
21	SR-GEM-21	385,087.8	3,860,105.1	748.4	Sensitive	Walt James Stadium
22	SR-GEM-22	390,760.0	3,858,642.7	723.5	Sensitive	Rosamond Public Library
23	RD-GEM-01	382,133.8	3,862,674.6	807.9	Residential	Residence North of Site
24	RD-GEM-02	381,795.3	3,862,677.9	809.2	Residential	Residence Northwest of Site
25	RD-GEM-03	382,488.1	3,862,757.8	807.8	Residential	Residence North of Site
26	RD-GEM-04	382,960.8	3,861,824.0	799.6	Residential	Residence East of Site
27	RD-GEM-05	382,087.6	3,861,630.8	797.9	Residential	Residence West of Site
28	RD-GEM-06	381,963.7	3,861,691.6	798.1	Residential	Residence West of Site
29	RD-GEM-07	382,105.1	3,861,348.4	797.0	Residential	Residence South of Site
30	RD-GEM-08	382,068.1	3,860,826.4	805.7	Residential	Residence South of Site
31	RD-GEM-09	381,968.1	3,860,753.4	800.8	Residential	Residence South of Site
32	RD-GEM-10	381,699.1	3,860,399.4	778.9	Residential	Residence South of Site
33	RD-GEM-11	381,927.1	3,860,282.4	776.4	Residential	Residence South of Site
34	RD-GEM-12	382,075.1	3,859,813.4	762.4	Residential	Residence South of Site
35	RD-GEM-13	382,115.1	3,859,534.4	758.8	Residential	Residence South of Site
36	RD-GEM-14	381,519.1	3,859,816.4	763.3	Residential	Residence South of Site
37	RD-GEM-15	383,652.7	3,861,829.7	794.2	Residential	Residence East of Site
38	RD-GEM-16	383,698.9	3,861,529.9	812.0	Residential	Residence East of Site
39	RD-GEM-17	382,105.5	3,863,176.3	813.4	Residential	Residence North of Site
40	RD-GEM-18	381,683.1	3,863,166.9	814.8	Residential	Residence Northwest of Site
41	RD-GEM-19	382,859.3	3,863,433.7	814.5	Residential	Residence North of Site
42	RD-GEM-20	384,828.8	3,863,438.7	806.5	Residential	Residence Northeast of Site
43	RD-GEM-21	385,017.5	3,863,362.2	804.6	Residential	Residence Northeast of Site
44	RD-GEM-22	384,989.8	3,863,122.9	802.0	Residential	Residence Northeast of Site
45	RD-GEM-23	382,078.4	3,865,031.2	838.2	Residential	Residence North of Site
46	RD-GEM-24	382,308.4	3,865,886.6	849.4	Residential	Residence North of Site
47	RD-GEM-25	380,452.7	3,864,387.6	843.2	Residential	Residence Northwest of Site
48	RD-GEM-26	379,632.2	3,864,907.1	864.4	Residential	Residence Northwest of Site
49	RD-GEM-27	379,242.4	3,864,591.7	864.0	Residential	Residence Northwest of Site
50	RD-GEM-28	379,484.9	3,864,538.4	859.2	Residential	Residence Northwest of Site
51	RD-GEM-29	379,338.8	3,864,405.0	859.4	Residential	Residence Northwest of Site
52	RD-GEM-30	379,319.8	3,864,302.6	857.7	Residential	Residence Northwest of Site
53	RD-GEM-31	379,140.5	3,864,200.0	857.1	Residential	Residence Northwest of Site
54	RD-GEM-32	379,241.6	3,864,126.1	854.4	Residential	Residence Northwest of Site
55	RD-GEM-33	379,152.0	3,864,123.6	855.2	Residential	Residence Northwest of Site
56	RD-GEM-34	379,417.6	3,864,139.0	853.1	Residential	Residence Northwest of Site
57	RD-GEM-35	379,431.8	3,864,078.1	851.8	Residential	Residence Northwest of Site
58	RD-GEM-36	379,414.5	3,864,025.7	851.1	Residential	Residence Northwest of Site
59	RD-GEM-37	379,420.8	3,863,976.8	849.9	Residential	Residence Northwest of Site
60	RD-GEM-38	379,448.9	3,863,865.2	847.5	Residential	Residence Northwest of Site
61	RD-GEM-39	379,653.2	3,864,002.3	847.7	Residential	Residence Northwest of Site
62	RD-GEM-40	379,750.0	3,864,007.3	846.0	Residential	Residence Northwest of Site
63	RD-GEM-41	379,824.4	3,864,086.4	845.9	Residential	Residence Northwest of Site
64	RD-GEM-42	379,268.7	3,863,172.5	836.5	Residential	Residence Northwest of Site
65	RD-GEM-43	379,543.6	3,862,874.1	827.2	Residential	Residence Northwest of Site
66	RD-GEM-44	379,535.6	3,862,795.0	825.6	Residential	Residence Northwest of Site
67	RD-GEM-45	380,919.4	3,863,425.4	823.9	Residential	Residence Northwest of Site
68	RD-GEM-46	378,910.5	3,862,463.2	827.2	Residential	Residence Northwest of Site
69	RD-GEM-47	376,855.7	3,862,015.4	835.5	Residential	Residence West of Site
70	RD-GEM-48	378,859.9	3,862,078.0	821.4	Residential	Residence West of Site
71	RD-GEM-49	379,023.5	3,861,979.3	816.5	Residential	Residence West of Site
72	RD-GEM-50	379,512.9	3,861,965.7	812.2	Residential	Residence West of Site
73	RD-GEM-51	380,245.1	3,862,113.6	807.8	Residential	Residence West of Site
74	RD-GEM-52	380,745.9	3,861,962.9	802.6	Residential	Residence West of Site
75	RD-GEM-53	377,022.9	3,862,602.2	843.2	Residential	Residence West of Site
76	RD-GEM-54	373,886.3	3,860,982.6	838.3	Residential	Residence West of future Transmission Line
77	RD-GEM-55	373,741.4	3,860,993.9	839.4	Residential	Residence West of future Transmission Line
78	RD-GEM-56	373,805.3	3,860,967.9	838.2	Residential	Residence West of future Transmission Line
79	RD-GEM-57	373,311.5	3,861,079.6	846.2	Residential	Residence West of future Transmission Line
80	RD-GEM-58	373,204.0	3,861,069.4	846.7	Residential	Residence West of future Transmission Line
81	RD-GEM-59	373,298.4	3,860,952.5	843.1	Residential	Residence West of future Transmission Line
82	RD-GEM-60	373,292.5	3,860,760.7	838.6	Residential	Residence West of future Transmission Line
83	RD-GEM-61	373,633.1	3,860,777.2	835.5	Residential	Residence West of future Transmission Line

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
84	RD-GEM-62	373,718.9	3,860,771.9	834.2	Residential	Residence West of future Transmission Line
85	RD-GEM-63	373,883.2	3,860,818.6	833.9	Residential	Residence West of future Transmission Line
86	RD-GEM-64	373,629.5	3,860,682.5	833.6	Residential	Residence West of future Transmission Line
87	RD-GEM-65	373,821.9	3,860,671.1	830.3	Residential	Residence West of future Transmission Line
88	RD-GEM-66	373,400.9	3,860,456.6	829.8	Residential	Residence West of future Transmission Line
89	RD-GEM-67	373,613.0	3,860,365.4	826.5	Residential	Residence West of future Transmission Line
90	RD-GEM-68	373,770.6	3,860,360.4	825.1	Residential	Residence West of future Transmission Line
91	RD-GEM-69	373,845.8	3,859,884.9	814.6	Residential	Residence West of future Transmission Line
92	RD-GEM-70	373,275.1	3,859,824.0	819.3	Residential	Residence West of future Transmission Line
93	RD-GEM-71	373,436.5	3,858,875.9	807.7	Residential	Residence in Rosamond Blvd
94	RD-GEM-72	373,531.1	3,858,636.8	805.3	Residential	Residence in Rosamond Blvd
95	RD-GEM-73	374,004.0	3,858,651.6	799.4	Residential	Residence in Rosamond Blvd
96	RD-GEM-74	376,154.3	3,858,536.2	780.2	Residential	Residence in Rosamond Blvd
97	RD-GEM-75	375,481.4	3,856,936.3	783.0	Residential	Residence South of future Transmission Line
98	RD-GEM-76	375,348.2	3,855,945.0	777.8	Residential	Residence South of future Transmission Line
99	RD-GEM-77	375,971.3	3,856,097.4	774.7	Residential	Residence South of future Transmission Line
100	RD-GEM-78	376,090.6	3,856,126.9	773.8	Residential	Residence South of future Transmission Line
101	RD-GEM-79	375,676.2	3,855,424.0	776.4	Residential	Residence South of future Transmission Line
102	RD-GEM-80	375,834.0	3,855,402.9	774.9	Residential	Residence South of future Transmission Line
103	RD-GEM-81	376,156.3	3,855,517.4	772.6	Residential	Residence South of future Transmission Line
104	RD-GEM-82	376,195.9	3,855,712.8	772.2	Residential	Residence South of future Transmission Line
105	RD-GEM-83	377,469.1	3,855,957.6	764.5	Residential	Residence South of future Transmission Line
106	RD-GEM-84	377,209.3	3,855,503.0	766.0	Residential	Residence South of future Transmission Line
107	RD-GEM-85	378,766.9	3,855,533.6	756.3	Residential	Residence South of future Transmission Line
108	RD-GEM-86	380,546.2	3,855,983.4	747.9	Residential	Residence South Proposed LADWP Sub-Station
109	RD-GEM-87	380,446.2	3,856,578.1	749.0	Residential	Residence South Proposed LADWP Sub-Station
110	RD-GEM-88	380,284.7	3,857,155.1	750.2	Residential	Residence South Proposed LADWP Sub-Station
111	RD-GEM-89	380,286.1	3,857,412.9	750.1	Residential	Residence South Proposed LADWP Sub-Station
112	RD-GEM-90	380,385.5	3,857,837.9	750.4	Residential	Residence East Proposed LADWP Sub-Station
113	RD-GEM-91	380,120.0	3,857,985.9	751.8	Residential	Residence East Proposed LADWP Sub-Station
114	RD-GEM-92	380,961.4	3,858,572.9	750.6	Residential	Residence East Proposed LADWP Sub-Station
115	RD-GEM-93	380,419.0	3,858,759.2	753.0	Residential	Residence Northeast Proposed LADWP Sub-Station
116	RD-GEM-94	380,417.5	3,858,950.9	754.5	Residential	Residence Northeast Proposed LADWP Sub-Station
117	RD-GEM-95	381,851.8	3,858,759.7	749.1	Residential	Residence East Proposed LADWP Sub-Station
118	RD-GEM-96	381,134.4	3,858,129.7	747.8	Residential	Residence East Proposed LADWP Sub-Station
119	RD-GEM-97	380,424.8	3,858,440.3	751.5	Residential	Residence East Proposed LADWP Sub-Station
120	RD-GEM-98	380,596.5	3,858,569.7	751.3	Residential	Residence East Proposed LADWP Sub-Station
121	RD-GEM-99	382,873.5	3,855,516.5	738.7	Residential	Residence Southeast Proposed LADWP Sub-Station
122	RD-GEM-100	384,297.3	3,855,475.7	733.4	Residential	Residence Southeast Proposed LADWP Sub-Station
123	RD-GEM-101	384,961.9	3,855,519.0	730.6	Residential	Residence Southeast Proposed LADWP Sub-Station
124	RD-GEM-102	384,952.3	3,855,739.5	730.7	Residential	Residence Southeast Proposed LADWP Sub-Station
125	RD-GEM-103	384,357.0	3,856,307.9	732.6	Residential	Residence Southeast Proposed LADWP Sub-Station
126	RD-GEM-104	383,831.2	3,856,288.4	734.4	Residential	Residence Southeast Proposed LADWP Sub-Station
127	RD-GEM-105	383,763.6	3,856,783.4	734.1	Residential	Residence Southeast Proposed LADWP Sub-Station
128	RD-GEM-106	384,063.3	3,856,939.6	732.8	Residential	Residence Southeast Proposed LADWP Sub-Station
129	RD-GEM-107	385,591.5	3,855,477.1	728.3	Residential	Residence Southeast Proposed LADWP Sub-Station
130	RD-GEM-108	386,068.5	3,855,485.7	727.2	Residential	Residence Southeast Proposed LADWP Sub-Station
131	RD-GEM-109	385,970.2	3,855,879.9	726.6	Residential	Residence Southeast Proposed LADWP Sub-Station
132	RD-GEM-110	385,681.7	3,857,550.8	727.4	Residential	Residence Southeast Proposed LADWP Sub-Station
133	RD-GEM-111	386,010.3	3,858,672.2	731.6	Residential	Residence Southeast of Site
134	RD-GEM-112	385,195.1	3,858,972.5	734.0	Residential	Residence Southeast of Site
135	RD-GEM-113	384,378.3	3,858,998.6	734.1	Residential	Residence Southeast of Site
136	RD-GEM-114	384,383.1	3,859,201.1	734.3	Residential	Residence Southeast of Site
137	RD-GEM-115	384,368.7	3,859,308.5	734.7	Residential	Residence Southeast of Site
138	RD-GEM-116	383,900.2	3,858,861.7	740.1	Residential	Residence Southeast of Site
139	RD-GEM-117	383,862.4	3,859,174.2	740.9	Residential	Residence Southeast of Site
140	RD-GEM-118	383,644.4	3,859,430.3	748.2	Residential	Residence Southeast of Site
141	RD-GEM-119	383,500.0	3,859,192.2	746.6	Residential	Residence Southeast of Site
142	RD-GEM-120	383,269.9	3,859,104.4	748.7	Residential	Residence Southeast of Site
143	RD-GEM-121	382,724.7	3,858,789.0	748.4	Residential	Residence South of Site
144	RD-GEM-122	382,440.7	3,858,565.5	744.9	Residential	Residence South of Site
145	RD-GEM-123	382,705.2	3,858,433.1	742.9	Residential	Residence South of Site
146	RD-GEM-124	382,163.3	3,858,307.8	743.7	Residential	Residence South of Site
147	RD-GEM-125	383,102.3	3,858,086.8	738.0	Residential	Residence South of Site
148	RD-GEM-126	383,343.8	3,858,585.0	743.5	Residential	Residence South of Site
149	RD-GEM-127	383,524.2	3,858,395.5	740.0	Residential	Residence South of Site
150	RD-GEM-128	384,638.0	3,858,703.6	732.8	Residential	Residence Southeast of Site
151	RD-GEM-129	387,189.5	3,858,267.1	726.7	Residential	Residence Southeast of Site
152	RD-GEM-130	387,018.7	3,859,245.0	733.2	Residential	Residence Southeast of Site
153	RD-GEM-131	387,585.4	3,859,532.7	741.0	Residential	Residence Southeast of Site
154	RD-GEM-132	386,919.0	3,859,774.1	738.0	Residential	Residence Southeast of Site
155	RD-GEM-133	387,858.1	3,859,775.0	745.2	Residential	Residence Southeast of Site
156	RD-GEM-134	385,843.3	3,861,383.5	778.6	Residential	Residence East of Site
157	RD-GEM-135	386,495.5	3,862,294.5	780.3	Residential	Residence East of Site
158	FC-GEM-01	382,032.9	3,861,911.5	800.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
159	FC-GEM-02	382,639.2	3,861,903.0	800.3	Fenceline	Receptors were placed 10 meters apart along the fenceline.
160	FC-GEM-03	382,832.7	3,861,900.2	800.1	Fenceline	Receptors were placed 10 meters apart along the fenceline.
161	FC-GEM-04	382,827.1	3,861,495.4	815.6	Fenceline	Receptors were placed 10 meters apart along the fenceline.
162	FC-GEM-05	382,219.9	3,861,505.2	796.9	Fenceline	Receptors were placed 10 meters apart along the fenceline.
163	FC-GEM-06	382,224.5	3,861,708.1	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
164	FC-GEM-07	382,032.4	3,861,710.9	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
165	FC-GEM-08	382,042.8	3,861,911.3	800.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
166	FC-GEM-09	382,052.7	3,861,911.2	800.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
167	FC-GEM-10	382,062.7	3,861,911.0	800.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
168	FC-GEM-11	382,072.6	3,861,910.9	800.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
169	FC-GEM-12	382,082.6	3,861,910.8	800.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
170	FC-GEM-13	382,092.5	3,861,910.6	800.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.





Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
345	FC-GEM-188	382,220.3	3,861,524.6	796.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
346	FC-GEM-189	382,220.5	3,861,534.2	796.9	Fenceline	Receptors were placed 10 meters apart along the fenceline.
347	FC-GEM-190	382,220.7	3,861,543.9	797.1	Fenceline	Receptors were placed 10 meters apart along the fenceline.
348	FC-GEM-191	382,221.0	3,861,553.5	797.3	Fenceline	Receptors were placed 10 meters apart along the fenceline.
349	FC-GEM-192	382,221.2	3,861,563.2	797.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
350	FC-GEM-193	382,221.4	3,861,572.9	797.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
351	FC-GEM-194	382,221.6	3,861,582.5	797.6	Fenceline	Receptors were placed 10 meters apart along the fenceline.
352	FC-GEM-195	382,221.9	3,861,592.2	797.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
353	FC-GEM-196	382,222.1	3,861,601.8	797.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
354	FC-GEM-197	382,222.3	3,861,611.5	797.9	Fenceline	Receptors were placed 10 meters apart along the fenceline.
355	FC-GEM-198	382,222.5	3,861,621.2	798.0	Fenceline	Receptors were placed 10 meters apart along the fenceline.
356	FC-GEM-199	382,222.8	3,861,630.8	798.1	Fenceline	Receptors were placed 10 meters apart along the fenceline.
357	FC-GEM-200	382,223.0	3,861,640.5	798.2	Fenceline	Receptors were placed 10 meters apart along the fenceline.
358	FC-GEM-201	382,223.2	3,861,650.1	798.2	Fenceline	Receptors were placed 10 meters apart along the fenceline.
359	FC-GEM-202	382,223.4	3,861,659.8	798.3	Fenceline	Receptors were placed 10 meters apart along the fenceline.
360	FC-GEM-203	382,223.6	3,861,669.5	798.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
361	FC-GEM-204	382,223.9	3,861,679.1	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
362	FC-GEM-205	382,224.1	3,861,688.8	798.6	Fenceline	Receptors were placed 10 meters apart along the fenceline.
363	FC-GEM-206	382,224.3	3,861,698.4	798.7	Fenceline	Receptors were placed 10 meters apart along the fenceline.
364	FC-GEM-207	382,214.9	3,861,708.2	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
365	FC-GEM-208	382,205.3	3,861,708.4	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
366	FC-GEM-209	382,195.7	3,861,708.5	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
367	FC-GEM-210	382,186.1	3,861,708.7	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
368	FC-GEM-211	382,176.5	3,861,708.8	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
369	FC-GEM-212	382,166.9	3,861,708.9	798.7	Fenceline	Receptors were placed 10 meters apart along the fenceline.
370	FC-GEM-213	382,157.3	3,861,709.1	798.7	Fenceline	Receptors were placed 10 meters apart along the fenceline.
371	FC-GEM-214	382,147.7	3,861,709.2	798.6	Fenceline	Receptors were placed 10 meters apart along the fenceline.
372	FC-GEM-215	382,138.1	3,861,709.4	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
373	FC-GEM-216	382,128.5	3,861,709.5	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
374	FC-GEM-217	382,118.9	3,861,709.6	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
375	FC-GEM-218	382,109.3	3,861,709.8	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
376	FC-GEM-219	382,099.7	3,861,709.9	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
377	FC-GEM-220	382,090.0	3,861,710.1	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
378	FC-GEM-221	382,080.4	3,861,710.2	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
379	FC-GEM-222	382,070.8	3,861,710.3	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
380	FC-GEM-223	382,061.2	3,861,710.5	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
381	FC-GEM-224	382,051.6	3,861,710.6	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
382	FC-GEM-225	382,042.0	3,861,710.8	798.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
383	FC-GEM-226	382,032.4	3,861,720.5	798.6	Fenceline	Receptors were placed 10 meters apart along the fenceline.
384	FC-GEM-227	382,032.5	3,861,730.0	798.7	Fenceline	Receptors were placed 10 meters apart along the fenceline.
385	FC-GEM-228	382,032.5	3,861,739.6	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
386	FC-GEM-229	382,032.5	3,861,749.1	798.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
387	FC-GEM-230	382,032.5	3,861,758.7	798.9	Fenceline	Receptors were placed 10 meters apart along the fenceline.
388	FC-GEM-231	382,032.5	3,861,768.2	799.0	Fenceline	Receptors were placed 10 meters apart along the fenceline.
389	FC-GEM-232	382,032.6	3,861,777.8	799.1	Fenceline	Receptors were placed 10 meters apart along the fenceline.
390	FC-GEM-233	382,032.6	3,861,787.3	799.2	Fenceline	Receptors were placed 10 meters apart along the fenceline.
391	FC-GEM-234	382,032.6	3,861,796.9	799.3	Fenceline	Receptors were placed 10 meters apart along the fenceline.
392	FC-GEM-235	382,032.6	3,861,806.4	799.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
393	FC-GEM-236	382,032.7	3,861,816.0	799.5	Fenceline	Receptors were placed 10 meters apart along the fenceline.
394	FC-GEM-237	382,032.7	3,861,825.5	799.6	Fenceline	Receptors were placed 10 meters apart along the fenceline.
395	FC-GEM-238	382,032.7	3,861,835.1	799.7	Fenceline	Receptors were placed 10 meters apart along the fenceline.
396	FC-GEM-239	382,032.7	3,861,844.6	799.8	Fenceline	Receptors were placed 10 meters apart along the fenceline.
397	FC-GEM-240	382,032.7	3,861,854.2	799.9	Fenceline	Receptors were placed 10 meters apart along the fenceline.
398	FC-GEM-241	382,032.8	3,861,863.7	800.0	Fenceline	Receptors were placed 10 meters apart along the fenceline.
399	FC-GEM-242	382,032.8	3,861,873.3	800.1	Fenceline	Receptors were placed 10 meters apart along the fenceline.
400	FC-GEM-243	382,032.8	3,861,882.8	800.2	Fenceline	Receptors were placed 10 meters apart along the fenceline.
401	FC-GEM-244	382,032.8	3,861,892.4	800.3	Fenceline	Receptors were placed 10 meters apart along the fenceline.
402	FC-GEM-245	382,032.8	3,861,901.9	800.4	Fenceline	Receptors were placed 10 meters apart along the fenceline.
403	GR-GEM-01	381,400.0	3,860,700.0	792.4	Grid	Grid receptors were located from fenceline out to 10km.
404	GR-GEM-02	381,400.0	3,860,750.0	792.7	Grid	Grid receptors were located from fenceline out to 10km.
405	GR-GEM-03	381,400.0	3,860,800.0	795.9	Grid	Grid receptors were located from fenceline out to 10km.
406	GR-GEM-04	381,400.0	3,860,850.0	796.0	Grid	Grid receptors were located from fenceline out to 10km.
407	GR-GEM-05	381,400.0	3,860,900.0	795.8	Grid	Grid receptors were located from fenceline out to 10km.
408	GR-GEM-06	381,400.0	3,860,950.0	796.1	Grid	Grid receptors were located from fenceline out to 10km.
409	GR-GEM-07	381,400.0	3,861,000.0	796.0	Grid	Grid receptors were located from fenceline out to 10km.
410	GR-GEM-08	381,400.0	3,861,050.0	796.2	Grid	Grid receptors were located from fenceline out to 10km.
411	GR-GEM-09	381,400.0	3,861,100.0	796.6	Grid	Grid receptors were located from fenceline out to 10km.
412	GR-GEM-10	381,400.0	3,861,150.0	796.3	Grid	Grid receptors were located from fenceline out to 10km.
413	GR-GEM-11	381,400.0	3,861,200.0	795.3	Grid	Grid receptors were located from fenceline out to 10km.
414	GR-GEM-12	381,400.0	3,861,250.0	795.8	Grid	Grid receptors were located from fenceline out to 10km.
415	GR-GEM-13	381,400.0	3,861,300.0	796.8	Grid	Grid receptors were located from fenceline out to 10km.
416	GR-GEM-14	381,400.0	3,861,350.0	796.6	Grid	Grid receptors were located from fenceline out to 10km.
417	GR-GEM-15	381,400.0	3,861,400.0	797.1	Grid	Grid receptors were located from fenceline out to 10km.
418	GR-GEM-16	381,400.0	3,861,450.0	797.3	Grid	Grid receptors were located from fenceline out to 10km.
419	GR-GEM-17	381,400.0	3,861,500.0	797.3	Grid	Grid receptors were located from fenceline out to 10km.
420	GR-GEM-18	381,400.0	3,861,550.0	797.7	Grid	Grid receptors were located from fenceline out to 10km.
421	GR-GEM-19	381,400.0	3,861,600.0	798.3	Grid	Grid receptors were located from fenceline out to 10km.
422	GR-GEM-20	381,400.0	3,861,650.0	798.6	Grid	Grid receptors were located from fenceline out to 10km.
423	GR-GEM-21	381,400.0	3,861,700.0	798.8	Grid	Grid receptors were located from fenceline out to 10km.
424	GR-GEM-22	381,400.0	3,861,750.0	799.2	Grid	Grid receptors were located from fenceline out to 10km.
425	GR-GEM-23	381,400.0	3,861,800.0	799.4	Grid	Grid receptors were located from fenceline out to 10km.
426	GR-GEM-24	381,400.0	3,861,850.0	799.7	Grid	Grid receptors were located from fenceline out to 10km.
427	GR-GEM-25	381,400.0	3,861,900.0	800.2	Grid	Grid receptors were located from fenceline out to 10km.
428	GR-GEM-26	381,400.0	3,861,950.0	800.7	Grid	Grid receptors were located from fenceline out to 10km.
429	GR-GEM-27	381,400.0	3,862,000.0	801.2	Grid	Grid receptors were located from fenceline out to 10km.
430	GR-GEM-28	381,400.0	3,862,050.0	801.6	Grid	Grid receptors were located from fenceline out to 10km.
431	GR-GEM-29	381,400.0	3,862,100.0	802.1	Grid	Grid receptors were located from fenceline out to 10km.























Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
1389	GR-GEM-987	382,700.0	3,861,250.0	848.1	Grid	Grid receptors were located from fenceline out to 10km.
1390	GR-GEM-988	382,700.0	3,861,300.0	833.7	Grid	Grid receptors were located from fenceline out to 10km.
1391	GR-GEM-989	382,700.0	3,861,350.0	824.6	Grid	Grid receptors were located from fenceline out to 10km.
1392	GR-GEM-990	382,700.0	3,861,400.0	818.3	Grid	Grid receptors were located from fenceline out to 10km.
1393	GR-GEM-991	382,700.0	3,861,450.0	814.5	Grid	Grid receptors were located from fenceline out to 10km.
1394	GR-GEM-992	382,700.0	3,861,950.0	800.6	Grid	Grid receptors were located from fenceline out to 10km.
1395	GR-GEM-993	382,700.0	3,862,000.0	800.8	Grid	Grid receptors were located from fenceline out to 10km.
1396	GR-GEM-994	382,700.0	3,862,050.0	800.9	Grid	Grid receptors were located from fenceline out to 10km.
1397	GR-GEM-995	382,700.0	3,862,100.0	801.1	Grid	Grid receptors were located from fenceline out to 10km.
1398	GR-GEM-996	382,700.0	3,862,150.0	801.4	Grid	Grid receptors were located from fenceline out to 10km.
1399	GR-GEM-997	382,700.0	3,862,200.0	801.8	Grid	Grid receptors were located from fenceline out to 10km.
1400	GR-GEM-998	382,700.0	3,862,250.0	802.2	Grid	Grid receptors were located from fenceline out to 10km.
1401	GR-GEM-999	382,700.0	3,862,300.0	802.6	Grid	Grid receptors were located from fenceline out to 10km.
1402	GR-GEM-1000	382,700.0	3,862,350.0	802.9	Grid	Grid receptors were located from fenceline out to 10km.
1403	GR-GEM-1001	382,700.0	3,862,400.0	803.4	Grid	Grid receptors were located from fenceline out to 10km.
1404	GR-GEM-1002	382,700.0	3,862,450.0	803.8	Grid	Grid receptors were located from fenceline out to 10km.
1405	GR-GEM-1003	382,700.0	3,862,500.0	804.2	Grid	Grid receptors were located from fenceline out to 10km.
1406	GR-GEM-1004	382,700.0	3,862,550.0	804.7	Grid	Grid receptors were located from fenceline out to 10km.
1407	GR-GEM-1005	382,700.0	3,862,600.0	805.1	Grid	Grid receptors were located from fenceline out to 10km.
1408	GR-GEM-1006	382,700.0	3,862,650.0	805.6	Grid	Grid receptors were located from fenceline out to 10km.
1409	GR-GEM-1007	382,700.0	3,862,700.0	805.9	Grid	Grid receptors were located from fenceline out to 10km.
1410	GR-GEM-1008	382,750.0	3,860,700.0	915.3	Grid	Grid receptors were located from fenceline out to 10km.
1411	GR-GEM-1009	382,750.0	3,860,750.0	896.6	Grid	Grid receptors were located from fenceline out to 10km.
1412	GR-GEM-1010	382,750.0	3,860,800.0	885.5	Grid	Grid receptors were located from fenceline out to 10km.
1413	GR-GEM-1011	382,750.0	3,860,850.0	872.0	Grid	Grid receptors were located from fenceline out to 10km.
1414	GR-GEM-1012	382,750.0	3,860,900.0	860.9	Grid	Grid receptors were located from fenceline out to 10km.
1415	GR-GEM-1013	382,750.0	3,860,950.0	864.2	Grid	Grid receptors were located from fenceline out to 10km.
1416	GR-GEM-1014	382,750.0	3,861,000.0	874.2	Grid	Grid receptors were located from fenceline out to 10km.
1417	GR-GEM-1015	382,750.0	3,861,050.0	885.6	Grid	Grid receptors were located from fenceline out to 10km.
1418	GR-GEM-1016	382,750.0	3,861,100.0	879.7	Grid	Grid receptors were located from fenceline out to 10km.
1419	GR-GEM-1017	382,750.0	3,861,150.0	870.5	Grid	Grid receptors were located from fenceline out to 10km.
1420	GR-GEM-1018	382,750.0	3,861,200.0	860.2	Grid	Grid receptors were located from fenceline out to 10km.
1421	GR-GEM-1019	382,750.0	3,861,250.0	844.4	Grid	Grid receptors were located from fenceline out to 10km.
1422	GR-GEM-1020	382,750.0	3,861,300.0	833.2	Grid	Grid receptors were located from fenceline out to 10km.
1423	GR-GEM-1021	382,750.0	3,861,350.0	825.9	Grid	Grid receptors were located from fenceline out to 10km.
1424	GR-GEM-1022	382,750.0	3,861,400.0	820.1	Grid	Grid receptors were located from fenceline out to 10km.
1425	GR-GEM-1023	382,750.0	3,861,450.0	816.7	Grid	Grid receptors were located from fenceline out to 10km.
1426	GR-GEM-1024	382,750.0	3,861,950.0	800.5	Grid	Grid receptors were located from fenceline out to 10km.
1427	GR-GEM-1025	382,750.0	3,862,000.0	800.7	Grid	Grid receptors were located from fenceline out to 10km.
1428	GR-GEM-1026	382,750.0	3,862,050.0	800.8	Grid	Grid receptors were located from fenceline out to 10km.
1429	GR-GEM-1027	382,750.0	3,862,100.0	801.0	Grid	Grid receptors were located from fenceline out to 10km.
1430	GR-GEM-1028	382,750.0	3,862,150.0	801.2	Grid	Grid receptors were located from fenceline out to 10km.
1431	GR-GEM-1029	382,750.0	3,862,200.0	801.6	Grid	Grid receptors were located from fenceline out to 10km.
1432	GR-GEM-1030	382,750.0	3,862,250.0	802.0	Grid	Grid receptors were located from fenceline out to 10km.
1433	GR-GEM-1031	382,750.0	3,862,300.0	802.4	Grid	Grid receptors were located from fenceline out to 10km.
1434	GR-GEM-1032	382,750.0	3,862,350.0	802.7	Grid	Grid receptors were located from fenceline out to 10km.
1435	GR-GEM-1033	382,750.0	3,862,400.0	803.2	Grid	Grid receptors were located from fenceline out to 10km.
1436	GR-GEM-1034	382,750.0	3,862,450.0	803.5	Grid	Grid receptors were located from fenceline out to 10km.
1437	GR-GEM-1035	382,750.0	3,862,500.0	803.8	Grid	Grid receptors were located from fenceline out to 10km.
1438	GR-GEM-1036	382,750.0	3,862,550.0	804.3	Grid	Grid receptors were located from fenceline out to 10km.
1439	GR-GEM-1037	382,750.0	3,862,600.0	804.8	Grid	Grid receptors were located from fenceline out to 10km.
1440	GR-GEM-1038	382,750.0	3,862,650.0	805.3	Grid	Grid receptors were located from fenceline out to 10km.
1441	GR-GEM-1039	382,750.0	3,862,700.0	805.7	Grid	Grid receptors were located from fenceline out to 10km.
1442	GR-GEM-1040	382,800.0	3,860,700.0	918.7	Grid	Grid receptors were located from fenceline out to 10km.
1443	GR-GEM-1041	382,800.0	3,860,750.0	896.0	Grid	Grid receptors were located from fenceline out to 10km.
1444	GR-GEM-1042	382,800.0	3,860,800.0	881.1	Grid	Grid receptors were located from fenceline out to 10km.
1445	GR-GEM-1043	382,800.0	3,860,850.0	872.5	Grid	Grid receptors were located from fenceline out to 10km.
1446	GR-GEM-1044	382,800.0	3,860,900.0	868.1	Grid	Grid receptors were located from fenceline out to 10km.
1447	GR-GEM-1045	382,800.0	3,860,950.0	877.2	Grid	Grid receptors were located from fenceline out to 10km.
1448	GR-GEM-1046	382,800.0	3,861,000.0	885.0	Grid	Grid receptors were located from fenceline out to 10km.
1449	GR-GEM-1047	382,800.0	3,861,050.0	891.0	Grid	Grid receptors were located from fenceline out to 10km.
1450	GR-GEM-1048	382,800.0	3,861,100.0	877.4	Grid	Grid receptors were located from fenceline out to 10km.
1451	GR-GEM-1049	382,800.0	3,861,150.0	861.2	Grid	Grid receptors were located from fenceline out to 10km.
1452	GR-GEM-1050	382,800.0	3,861,200.0	853.1	Grid	Grid receptors were located from fenceline out to 10km.
1453	GR-GEM-1051	382,800.0	3,861,250.0	843.6	Grid	Grid receptors were located from fenceline out to 10km.
1454	GR-GEM-1052	382,800.0	3,861,300.0	833.9	Grid	Grid receptors were located from fenceline out to 10km.
1455	GR-GEM-1053	382,800.0	3,861,350.0	826.2	Grid	Grid receptors were located from fenceline out to 10km.
1456	GR-GEM-1054	382,800.0	3,861,400.0	822.0	Grid	Grid receptors were located from fenceline out to 10km.
1457	GR-GEM-1055	382,800.0	3,861,450.0	818.3	Grid	Grid receptors were located from fenceline out to 10km.
1458	GR-GEM-1056	382,800.0	3,861,950.0	800.4	Grid	Grid receptors were located from fenceline out to 10km.
1459	GR-GEM-1057	382,800.0	3,862,000.0	800.5	Grid	Grid receptors were located from fenceline out to 10km.
1460	GR-GEM-1058	382,800.0	3,862,050.0	800.6	Grid	Grid receptors were located from fenceline out to 10km.
1461	GR-GEM-1059	382,800.0	3,862,100.0	800.8	Grid	Grid receptors were located from fenceline out to 10km.
1462	GR-GEM-1060	382,800.0	3,862,150.0	801.1	Grid	Grid receptors were located from fenceline out to 10km.
1463	GR-GEM-1061	382,800.0	3,862,200.0	801.4	Grid	Grid receptors were located from fenceline out to 10km.
1464	GR-GEM-1062	382,800.0	3,862,250.0	801.8	Grid	Grid receptors were located from fenceline out to 10km.
1465	GR-GEM-1063	382,800.0	3,862,300.0	802.1	Grid	Grid receptors were located from fenceline out to 10km.
1466	GR-GEM-1064	382,800.0	3,862,350.0	802.5	Grid	Grid receptors were located from fenceline out to 10km.
1467	GR-GEM-1065	382,800.0	3,862,400.0	802.9	Grid	Grid receptors were located from fenceline out to 10km.
1468	GR-GEM-1066	382,800.0	3,862,450.0	803.1	Grid	Grid receptors were located from fenceline out to 10km.
1469	GR-GEM-1067	382,800.0	3,862,500.0	803.4	Grid	Grid receptors were located from fenceline out to 10km.
1470	GR-GEM-1068	382,800.0	3,862,550.0	803.9	Grid	Grid receptors were located from fenceline out to 10km.
1471	GR-GEM-1069	382,800.0	3,862,600.0	804.4	Grid	Grid receptors were located from fenceline out to 10km.
1472	GR-GEM-1070	382,800.0	3,862,650.0	804.9	Grid	Grid receptors were located from fenceline out to 10km.
1473	GR-GEM-1071	382,800.0	3,862,700.0	805.3	Grid	Grid receptors were located from fenceline out to 10km.
1474	GR-GEM-1072	382,850.0	3,860,700.0	920.5	Grid	Grid receptors were located from fenceline out to 10km.
1475	GR-GEM-1073	382,850.0	3,860,750.0	899.4	Grid	Grid receptors were located from fenceline out to 10km.





















































































































Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
6522	GR-GEM-6120	377,100.0	3,862,800.0	847.1	Grid	Grid receptors were located from fence line out to 10km.
6523	GR-GEM-6121	377,100.0	3,863,000.0	851.6	Grid	Grid receptors were located from fence line out to 10km.
6524	GR-GEM-6122	377,100.0	3,863,200.0	856.2	Grid	Grid receptors were located from fence line out to 10km.
6525	GR-GEM-6123	377,100.0	3,863,400.0	860.9	Grid	Grid receptors were located from fence line out to 10km.
6526	GR-GEM-6124	377,100.0	3,863,600.0	865.9	Grid	Grid receptors were located from fence line out to 10km.
6527	GR-GEM-6125	377,100.0	3,863,800.0	870.8	Grid	Grid receptors were located from fence line out to 10km.
6528	GR-GEM-6126	377,100.0	3,864,000.0	875.7	Grid	Grid receptors were located from fence line out to 10km.
6529	GR-GEM-6127	377,100.0	3,864,200.0	881.0	Grid	Grid receptors were located from fence line out to 10km.
6530	GR-GEM-6128	377,100.0	3,864,400.0	885.9	Grid	Grid receptors were located from fence line out to 10km.
6531	GR-GEM-6129	377,100.0	3,864,600.0	891.0	Grid	Grid receptors were located from fence line out to 10km.
6532	GR-GEM-6130	377,100.0	3,864,800.0	896.8	Grid	Grid receptors were located from fence line out to 10km.
6533	GR-GEM-6131	377,100.0	3,865,000.0	902.1	Grid	Grid receptors were located from fence line out to 10km.
6534	GR-GEM-6132	377,100.0	3,865,200.0	907.8	Grid	Grid receptors were located from fence line out to 10km.
6535	GR-GEM-6133	377,100.0	3,865,400.0	914.3	Grid	Grid receptors were located from fence line out to 10km.
6536	GR-GEM-6134	377,100.0	3,865,600.0	920.2	Grid	Grid receptors were located from fence line out to 10km.
6537	GR-GEM-6135	377,100.0	3,865,800.0	926.5	Grid	Grid receptors were located from fence line out to 10km.
6538	GR-GEM-6136	377,100.0	3,866,000.0	933.3	Grid	Grid receptors were located from fence line out to 10km.
6539	GR-GEM-6137	377,100.0	3,866,200.0	941.2	Grid	Grid receptors were located from fence line out to 10km.
6540	GR-GEM-6138	377,100.0	3,866,400.0	947.7	Grid	Grid receptors were located from fence line out to 10km.
6541	GR-GEM-6139	377,100.0	3,866,600.0	951.9	Grid	Grid receptors were located from fence line out to 10km.
6542	GR-GEM-6140	377,100.0	3,866,800.0	958.4	Grid	Grid receptors were located from fence line out to 10km.
6543	GR-GEM-6141	377,100.0	3,867,000.0	963.0	Grid	Grid receptors were located from fence line out to 10km.
6544	GR-GEM-6142	377,100.0	3,867,200.0	970.2	Grid	Grid receptors were located from fence line out to 10km.
6545	GR-GEM-6143	376,900.0	3,859,200.0	777.4	Grid	Grid receptors were located from fence line out to 10km.
6546	GR-GEM-6144	376,900.0	3,859,400.0	779.2	Grid	Grid receptors were located from fence line out to 10km.
6547	GR-GEM-6145	376,900.0	3,859,600.0	781.9	Grid	Grid receptors were located from fence line out to 10km.
6548	GR-GEM-6146	376,900.0	3,859,800.0	785.6	Grid	Grid receptors were located from fence line out to 10km.
6549	GR-GEM-6147	376,900.0	3,860,000.0	789.3	Grid	Grid receptors were located from fence line out to 10km.
6550	GR-GEM-6148	376,900.0	3,860,200.0	793.2	Grid	Grid receptors were located from fence line out to 10km.
6551	GR-GEM-6149	376,900.0	3,860,400.0	796.2	Grid	Grid receptors were located from fence line out to 10km.
6552	GR-GEM-6150	376,900.0	3,860,600.0	799.8	Grid	Grid receptors were located from fence line out to 10km.
6553	GR-GEM-6151	376,900.0	3,860,800.0	802.1	Grid	Grid receptors were located from fence line out to 10km.
6554	GR-GEM-6152	376,900.0	3,861,000.0	807.5	Grid	Grid receptors were located from fence line out to 10km.
6555	GR-GEM-6153	376,900.0	3,861,200.0	810.1	Grid	Grid receptors were located from fence line out to 10km.
6556	GR-GEM-6154	376,900.0	3,861,400.0	813.5	Grid	Grid receptors were located from fence line out to 10km.
6557	GR-GEM-6155	376,900.0	3,861,600.0	821.1	Grid	Grid receptors were located from fence line out to 10km.
6558	GR-GEM-6156	376,900.0	3,861,800.0	832.6	Grid	Grid receptors were located from fence line out to 10km.
6559	GR-GEM-6157	376,900.0	3,862,000.0	834.8	Grid	Grid receptors were located from fence line out to 10km.
6560	GR-GEM-6158	376,900.0	3,862,200.0	837.5	Grid	Grid receptors were located from fence line out to 10km.
6561	GR-GEM-6159	376,900.0	3,862,400.0	840.6	Grid	Grid receptors were located from fence line out to 10km.
6562	GR-GEM-6160	376,900.0	3,862,600.0	844.7	Grid	Grid receptors were located from fence line out to 10km.
6563	GR-GEM-6161	376,900.0	3,862,800.0	848.5	Grid	Grid receptors were located from fence line out to 10km.
6564	GR-GEM-6162	376,900.0	3,863,000.0	852.7	Grid	Grid receptors were located from fence line out to 10km.
6565	GR-GEM-6163	376,900.0	3,863,200.0	857.3	Grid	Grid receptors were located from fence line out to 10km.
6566	GR-GEM-6164	376,900.0	3,863,400.0	862.3	Grid	Grid receptors were located from fence line out to 10km.
6567	GR-GEM-6165	376,900.0	3,863,600.0	867.6	Grid	Grid receptors were located from fence line out to 10km.
6568	GR-GEM-6166	376,900.0	3,863,800.0	873.0	Grid	Grid receptors were located from fence line out to 10km.
6569	GR-GEM-6167	376,900.0	3,864,000.0	878.3	Grid	Grid receptors were located from fence line out to 10km.
6570	GR-GEM-6168	376,900.0	3,864,200.0	882.2	Grid	Grid receptors were located from fence line out to 10km.
6571	GR-GEM-6169	376,900.0	3,864,400.0	887.2	Grid	Grid receptors were located from fence line out to 10km.
6572	GR-GEM-6170	376,900.0	3,864,600.0	892.6	Grid	Grid receptors were located from fence line out to 10km.
6573	GR-GEM-6171	376,900.0	3,864,800.0	898.2	Grid	Grid receptors were located from fence line out to 10km.
6574	GR-GEM-6172	376,900.0	3,865,000.0	903.7	Grid	Grid receptors were located from fence line out to 10km.
6575	GR-GEM-6173	376,900.0	3,865,200.0	909.5	Grid	Grid receptors were located from fence line out to 10km.
6576	GR-GEM-6174	376,900.0	3,865,400.0	915.5	Grid	Grid receptors were located from fence line out to 10km.
6577	GR-GEM-6175	376,900.0	3,865,600.0	920.7	Grid	Grid receptors were located from fence line out to 10km.
6578	GR-GEM-6176	376,900.0	3,865,800.0	927.8	Grid	Grid receptors were located from fence line out to 10km.
6579	GR-GEM-6177	376,900.0	3,866,000.0	935.2	Grid	Grid receptors were located from fence line out to 10km.
6580	GR-GEM-6178	376,900.0	3,866,200.0	942.1	Grid	Grid receptors were located from fence line out to 10km.
6581	GR-GEM-6179	376,900.0	3,866,400.0	948.4	Grid	Grid receptors were located from fence line out to 10km.
6582	GR-GEM-6180	376,900.0	3,866,600.0	954.2	Grid	Grid receptors were located from fence line out to 10km.
6583	GR-GEM-6181	376,900.0	3,866,800.0	962.1	Grid	Grid receptors were located from fence line out to 10km.
6584	GR-GEM-6182	376,900.0	3,867,000.0	968.1	Grid	Grid receptors were located from fence line out to 10km.
6585	GR-GEM-6183	376,900.0	3,867,200.0	974.5	Grid	Grid receptors were located from fence line out to 10km.
6586	GR-GEM-6184	376,900.0	3,867,400.0	987.7	Grid	Grid receptors were located from fence line out to 10km.
6587	GR-GEM-6185	376,900.0	3,868,200.0	0.0	Grid	Grid receptors were located from fence line out to 10km.
6588	GR-GEM-6186	376,900.0	3,868,700.0	17.9	Grid	Grid receptors were located from fence line out to 10km.
6589	GR-GEM-6187	376,900.0	3,869,200.0	28.9	Grid	Grid receptors were located from fence line out to 10km.
6590	GR-GEM-6188	376,900.0	3,869,700.0	43.7	Grid	Grid receptors were located from fence line out to 10km.
6591	GR-GEM-6189	376,900.0	3,870,200.0	58.0	Grid	Grid receptors were located from fence line out to 10km.
6592	GR-GEM-6190	376,900.0	3,870,700.0	75.2	Grid	Grid receptors were located from fence line out to 10km.
6593	GR-GEM-6191	376,900.0	3,871,200.0	94.2	Grid	Grid receptors were located from fence line out to 10km.
6594	GR-GEM-6192	376,900.0	3,871,700.0	110.8	Grid	Grid receptors were located from fence line out to 10km.
6595	GR-GEM-6193	376,900.0	3,872,200.0	132.1	Grid	Grid receptors were located from fence line out to 10km.
6596	GR-GEM-6194	377,400.0	3,867,700.0	970.1	Grid	Grid receptors were located from fence line out to 10km.
6597	GR-GEM-6195	377,400.0	3,868,200.0	982.6	Grid	Grid receptors were located from fence line out to 10km.
6598	GR-GEM-6196	377,400.0	3,868,700.0	998.8	Grid	Grid receptors were located from fence line out to 10km.
6599	GR-GEM-6197	377,400.0	3,869,200.0	9.8	Grid	Grid receptors were located from fence line out to 10km.
6600	GR-GEM-6198	377,400.0	3,869,700.0	23.7	Grid	Grid receptors were located from fence line out to 10km.
6601	GR-GEM-6199	377,400.0	3,870,200.0	37.0	Grid	Grid receptors were located from fence line out to 10km.
6602	GR-GEM-6200	377,400.0	3,870,700.0	53.1	Grid	Grid receptors were located from fence line out to 10km.
6603	GR-GEM-6201	377,400.0	3,871,200.0	68.0	Grid	Grid receptors were located from fence line out to 10km.
6604	GR-GEM-6202	377,400.0	3,871,700.0	84.2	Grid	Grid receptors were located from fence line out to 10km.
6605	GR-GEM-6203	377,400.0	3,872,200.0	106.4	Grid	Grid receptors were located from fence line out to 10km.
6606	GR-GEM-6204	377,900.0	3,867,700.0	956.4	Grid	Grid receptors were located from fence line out to 10km.
6607	GR-GEM-6205	377,900.0	3,868,200.0	968.8	Grid	Grid receptors were located from fence line out to 10km.
6608	GR-GEM-6206	377,900.0	3,868,700.0	980.0	Grid	Grid receptors were located from fence line out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
6609	GR-GEM-6207	377,900.0	3,869,200.0	993.4	Grid	Grid receptors were located from fence line out to 10km.
6610	GR-GEM-6208	377,900.0	3,869,700.0	3.5	Grid	Grid receptors were located from fence line out to 10km.
6611	GR-GEM-6209	377,900.0	3,870,200.0	17.3	Grid	Grid receptors were located from fence line out to 10km.
6612	GR-GEM-6210	377,900.0	3,870,700.0	33.1	Grid	Grid receptors were located from fence line out to 10km.
6613	GR-GEM-6211	377,900.0	3,871,200.0	48.6	Grid	Grid receptors were located from fence line out to 10km.
6614	GR-GEM-6212	377,900.0	3,871,700.0	60.0	Grid	Grid receptors were located from fence line out to 10km.
6615	GR-GEM-6213	377,900.0	3,872,200.0	78.4	Grid	Grid receptors were located from fence line out to 10km.
6616	GR-GEM-6214	378,400.0	3,867,700.0	944.6	Grid	Grid receptors were located from fence line out to 10km.
6617	GR-GEM-6215	378,400.0	3,868,200.0	955.0	Grid	Grid receptors were located from fence line out to 10km.
6618	GR-GEM-6216	378,400.0	3,868,700.0	966.6	Grid	Grid receptors were located from fence line out to 10km.
6619	GR-GEM-6217	378,400.0	3,869,200.0	976.5	Grid	Grid receptors were located from fence line out to 10km.
6620	GR-GEM-6218	378,400.0	3,869,700.0	986.2	Grid	Grid receptors were located from fence line out to 10km.
6621	GR-GEM-6219	378,400.0	3,870,200.0	999.4	Grid	Grid receptors were located from fence line out to 10km.
6622	GR-GEM-6220	378,400.0	3,870,700.0	13.4	Grid	Grid receptors were located from fence line out to 10km.
6623	GR-GEM-6221	378,400.0	3,871,200.0	26.3	Grid	Grid receptors were located from fence line out to 10km.
6624	GR-GEM-6222	378,400.0	3,871,700.0	38.9	Grid	Grid receptors were located from fence line out to 10km.
6625	GR-GEM-6223	378,400.0	3,872,200.0	51.7	Grid	Grid receptors were located from fence line out to 10km.
6626	GR-GEM-6224	378,900.0	3,867,700.0	932.0	Grid	Grid receptors were located from fence line out to 10km.
6627	GR-GEM-6225	378,900.0	3,868,200.0	941.5	Grid	Grid receptors were located from fence line out to 10km.
6628	GR-GEM-6226	378,900.0	3,868,700.0	952.6	Grid	Grid receptors were located from fence line out to 10km.
6629	GR-GEM-6227	378,900.0	3,869,200.0	960.6	Grid	Grid receptors were located from fence line out to 10km.
6630	GR-GEM-6228	378,900.0	3,869,700.0	970.1	Grid	Grid receptors were located from fence line out to 10km.
6631	GR-GEM-6229	378,900.0	3,870,200.0	982.8	Grid	Grid receptors were located from fence line out to 10km.
6632	GR-GEM-6230	378,900.0	3,870,700.0	995.2	Grid	Grid receptors were located from fence line out to 10km.
6633	GR-GEM-6231	378,900.0	3,871,200.0	10.3	Grid	Grid receptors were located from fence line out to 10km.
6634	GR-GEM-6232	378,900.0	3,871,700.0	18.1	Grid	Grid receptors were located from fence line out to 10km.
6635	GR-GEM-6233	378,900.0	3,872,200.0	34.4	Grid	Grid receptors were located from fence line out to 10km.
6636	GR-GEM-6234	379,400.0	3,867,700.0	918.1	Grid	Grid receptors were located from fence line out to 10km.
6637	GR-GEM-6235	379,400.0	3,868,200.0	927.4	Grid	Grid receptors were located from fence line out to 10km.
6638	GR-GEM-6236	379,400.0	3,868,700.0	934.7	Grid	Grid receptors were located from fence line out to 10km.
6639	GR-GEM-6237	379,400.0	3,869,200.0	943.6	Grid	Grid receptors were located from fence line out to 10km.
6640	GR-GEM-6238	379,400.0	3,869,700.0	956.7	Grid	Grid receptors were located from fence line out to 10km.
6641	GR-GEM-6239	379,400.0	3,870,200.0	969.8	Grid	Grid receptors were located from fence line out to 10km.
6642	GR-GEM-6240	379,400.0	3,870,700.0	979.7	Grid	Grid receptors were located from fence line out to 10km.
6643	GR-GEM-6241	379,400.0	3,871,200.0	991.0	Grid	Grid receptors were located from fence line out to 10km.
6644	GR-GEM-6242	379,400.0	3,871,700.0	3.7	Grid	Grid receptors were located from fence line out to 10km.
6645	GR-GEM-6243	379,400.0	3,872,200.0	18.9	Grid	Grid receptors were located from fence line out to 10km.
6646	GR-GEM-6244	379,900.0	3,867,700.0	906.3	Grid	Grid receptors were located from fence line out to 10km.
6647	GR-GEM-6245	379,900.0	3,868,200.0	913.5	Grid	Grid receptors were located from fence line out to 10km.
6648	GR-GEM-6246	379,900.0	3,868,700.0	920.6	Grid	Grid receptors were located from fence line out to 10km.
6649	GR-GEM-6247	379,900.0	3,869,200.0	931.8	Grid	Grid receptors were located from fence line out to 10km.
6650	GR-GEM-6248	379,900.0	3,869,700.0	943.1	Grid	Grid receptors were located from fence line out to 10km.
6651	GR-GEM-6249	379,900.0	3,870,200.0	952.7	Grid	Grid receptors were located from fence line out to 10km.
6652	GR-GEM-6250	379,900.0	3,870,700.0	964.4	Grid	Grid receptors were located from fence line out to 10km.
6653	GR-GEM-6251	379,900.0	3,871,200.0	977.8	Grid	Grid receptors were located from fence line out to 10km.
6654	GR-GEM-6252	379,900.0	3,871,700.0	993.1	Grid	Grid receptors were located from fence line out to 10km.
6655	GR-GEM-6253	379,900.0	3,872,200.0	5.4	Grid	Grid receptors were located from fence line out to 10km.
6656	GR-GEM-6254	380,400.0	3,867,700.0	894.2	Grid	Grid receptors were located from fence line out to 10km.
6657	GR-GEM-6255	380,400.0	3,868,200.0	902.3	Grid	Grid receptors were located from fence line out to 10km.
6658	GR-GEM-6256	380,400.0	3,868,700.0	909.9	Grid	Grid receptors were located from fence line out to 10km.
6659	GR-GEM-6257	380,400.0	3,869,200.0	920.2	Grid	Grid receptors were located from fence line out to 10km.
6660	GR-GEM-6258	380,400.0	3,869,700.0	930.2	Grid	Grid receptors were located from fence line out to 10km.
6661	GR-GEM-6259	380,400.0	3,870,200.0	942.4	Grid	Grid receptors were located from fence line out to 10km.
6662	GR-GEM-6260	380,400.0	3,870,700.0	954.0	Grid	Grid receptors were located from fence line out to 10km.
6663	GR-GEM-6261	380,400.0	3,871,200.0	968.8	Grid	Grid receptors were located from fence line out to 10km.
6664	GR-GEM-6262	380,400.0	3,871,700.0	980.7	Grid	Grid receptors were located from fence line out to 10km.
6665	GR-GEM-6263	380,400.0	3,872,200.0	992.9	Grid	Grid receptors were located from fence line out to 10km.
6666	GR-GEM-6264	380,900.0	3,867,700.0	885.5	Grid	Grid receptors were located from fence line out to 10km.
6667	GR-GEM-6265	380,900.0	3,868,200.0	891.4	Grid	Grid receptors were located from fence line out to 10km.
6668	GR-GEM-6266	380,900.0	3,868,700.0	900.6	Grid	Grid receptors were located from fence line out to 10km.
6669	GR-GEM-6267	380,900.0	3,869,200.0	910.6	Grid	Grid receptors were located from fence line out to 10km.
6670	GR-GEM-6268	380,900.0	3,869,700.0	922.1	Grid	Grid receptors were located from fence line out to 10km.
6671	GR-GEM-6269	380,900.0	3,870,200.0	933.5	Grid	Grid receptors were located from fence line out to 10km.
6672	GR-GEM-6270	380,900.0	3,870,700.0	947.4	Grid	Grid receptors were located from fence line out to 10km.
6673	GR-GEM-6271	380,900.0	3,871,200.0	961.2	Grid	Grid receptors were located from fence line out to 10km.
6674	GR-GEM-6272	380,900.0	3,871,700.0	971.8	Grid	Grid receptors were located from fence line out to 10km.
6675	GR-GEM-6273	380,900.0	3,872,200.0	981.8	Grid	Grid receptors were located from fence line out to 10km.
6676	GR-GEM-6274	381,400.0	3,867,700.0	878.5	Grid	Grid receptors were located from fence line out to 10km.
6677	GR-GEM-6275	381,400.0	3,868,200.0	887.9	Grid	Grid receptors were located from fence line out to 10km.
6678	GR-GEM-6276	381,400.0	3,868,700.0	898.4	Grid	Grid receptors were located from fence line out to 10km.
6679	GR-GEM-6277	381,400.0	3,869,200.0	907.2	Grid	Grid receptors were located from fence line out to 10km.
6680	GR-GEM-6278	381,400.0	3,869,700.0	917.2	Grid	Grid receptors were located from fence line out to 10km.
6681	GR-GEM-6279	381,400.0	3,870,200.0	929.7	Grid	Grid receptors were located from fence line out to 10km.
6682	GR-GEM-6280	381,400.0	3,870,700.0	940.8	Grid	Grid receptors were located from fence line out to 10km.
6683	GR-GEM-6281	381,400.0	3,871,200.0	951.5	Grid	Grid receptors were located from fence line out to 10km.
6684	GR-GEM-6282	381,400.0	3,871,700.0	961.4	Grid	Grid receptors were located from fence line out to 10km.
6685	GR-GEM-6283	381,400.0	3,872,200.0	969.6	Grid	Grid receptors were located from fence line out to 10km.
6686	GR-GEM-6284	381,900.0	3,867,700.0	877.2	Grid	Grid receptors were located from fence line out to 10km.
6687	GR-GEM-6285	381,900.0	3,868,200.0	884.9	Grid	Grid receptors were located from fence line out to 10km.
6688	GR-GEM-6286	381,900.0	3,868,700.0	895.4	Grid	Grid receptors were located from fence line out to 10km.
6689	GR-GEM-6287	381,900.0	3,869,200.0	905.1	Grid	Grid receptors were located from fence line out to 10km.
6690	GR-GEM-6288	381,900.0	3,869,700.0	912.4	Grid	Grid receptors were located from fence line out to 10km.
6691	GR-GEM-6289	381,900.0	3,870,200.0	922.8	Grid	Grid receptors were located from fence line out to 10km.
6692	GR-GEM-6290	381,900.0	3,870,700.0	933.4	Grid	Grid receptors were located from fence line out to 10km.
6693	GR-GEM-6291	381,900.0	3,871,200.0	943.7	Grid	Grid receptors were located from fence line out to 10km.
6694	GR-GEM-6292	381,900.0	3,871,700.0	951.7	Grid	Grid receptors were located from fence line out to 10km.
6695	GR-GEM-6293	381,900.0	3,872,200.0	959.9	Grid	Grid receptors were located from fence line out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
6696	GR-GEM-6294	382,400.0	3,867,700.0	873.7	Grid	Grid receptors were located from fenceline out to 10km.
6697	GR-GEM-6295	382,400.0	3,868,200.0	883.2	Grid	Grid receptors were located from fenceline out to 10km.
6698	GR-GEM-6296	382,400.0	3,868,700.0	917.1	Grid	Grid receptors were located from fenceline out to 10km.
6699	GR-GEM-6297	382,400.0	3,869,200.0	952.7	Grid	Grid receptors were located from fenceline out to 10km.
6700	GR-GEM-6298	382,400.0	3,869,700.0	936.1	Grid	Grid receptors were located from fenceline out to 10km.
6701	GR-GEM-6299	382,400.0	3,870,200.0	920.1	Grid	Grid receptors were located from fenceline out to 10km.
6702	GR-GEM-6300	382,400.0	3,870,700.0	927.9	Grid	Grid receptors were located from fenceline out to 10km.
6703	GR-GEM-6301	382,400.0	3,871,200.0	935.9	Grid	Grid receptors were located from fenceline out to 10km.
6704	GR-GEM-6302	382,400.0	3,871,700.0	944.7	Grid	Grid receptors were located from fenceline out to 10km.
6705	GR-GEM-6303	382,400.0	3,872,200.0	952.6	Grid	Grid receptors were located from fenceline out to 10km.
6706	GR-GEM-6304	382,900.0	3,867,700.0	868.3	Grid	Grid receptors were located from fenceline out to 10km.
6707	GR-GEM-6305	382,900.0	3,868,200.0	873.8	Grid	Grid receptors were located from fenceline out to 10km.
6708	GR-GEM-6306	382,900.0	3,868,700.0	900.4	Grid	Grid receptors were located from fenceline out to 10km.
6709	GR-GEM-6307	382,900.0	3,869,200.0	4.1	Grid	Grid receptors were located from fenceline out to 10km.
6710	GR-GEM-6308	382,900.0	3,869,700.0	920.3	Grid	Grid receptors were located from fenceline out to 10km.
6711	GR-GEM-6309	382,900.0	3,870,200.0	959.0	Grid	Grid receptors were located from fenceline out to 10km.
6712	GR-GEM-6310	382,900.0	3,870,700.0	928.7	Grid	Grid receptors were located from fenceline out to 10km.
6713	GR-GEM-6311	382,900.0	3,871,200.0	935.5	Grid	Grid receptors were located from fenceline out to 10km.
6714	GR-GEM-6312	382,900.0	3,871,700.0	942.6	Grid	Grid receptors were located from fenceline out to 10km.
6715	GR-GEM-6313	382,900.0	3,872,200.0	949.2	Grid	Grid receptors were located from fenceline out to 10km.
6716	GR-GEM-6314	383,400.0	3,867,700.0	862.6	Grid	Grid receptors were located from fenceline out to 10km.
6717	GR-GEM-6315	383,400.0	3,868,200.0	889.9	Grid	Grid receptors were located from fenceline out to 10km.
6718	GR-GEM-6316	383,400.0	3,868,700.0	913.5	Grid	Grid receptors were located from fenceline out to 10km.
6719	GR-GEM-6317	383,400.0	3,869,200.0	960.9	Grid	Grid receptors were located from fenceline out to 10km.
6720	GR-GEM-6318	383,400.0	3,869,700.0	40.7	Grid	Grid receptors were located from fenceline out to 10km.
6721	GR-GEM-6319	383,400.0	3,870,200.0	988.0	Grid	Grid receptors were located from fenceline out to 10km.
6722	GR-GEM-6320	383,400.0	3,870,700.0	950.0	Grid	Grid receptors were located from fenceline out to 10km.
6723	GR-GEM-6321	383,400.0	3,871,200.0	947.6	Grid	Grid receptors were located from fenceline out to 10km.
6724	GR-GEM-6322	383,400.0	3,871,700.0	940.1	Grid	Grid receptors were located from fenceline out to 10km.
6725	GR-GEM-6323	383,400.0	3,872,200.0	945.2	Grid	Grid receptors were located from fenceline out to 10km.
6726	GR-GEM-6324	383,900.0	3,867,700.0	860.4	Grid	Grid receptors were located from fenceline out to 10km.
6727	GR-GEM-6325	383,900.0	3,868,200.0	867.4	Grid	Grid receptors were located from fenceline out to 10km.
6728	GR-GEM-6326	383,900.0	3,868,700.0	938.8	Grid	Grid receptors were located from fenceline out to 10km.
6729	GR-GEM-6327	383,900.0	3,869,200.0	0.0	Grid	Grid receptors were located from fenceline out to 10km.
6730	GR-GEM-6328	383,900.0	3,869,700.0	911.5	Grid	Grid receptors were located from fenceline out to 10km.
6731	GR-GEM-6329	383,900.0	3,870,200.0	8.7	Grid	Grid receptors were located from fenceline out to 10km.
6732	GR-GEM-6330	383,900.0	3,870,700.0	996.8	Grid	Grid receptors were located from fenceline out to 10km.
6733	GR-GEM-6331	383,900.0	3,871,200.0	950.1	Grid	Grid receptors were located from fenceline out to 10km.
6734	GR-GEM-6332	383,900.0	3,871,700.0	935.6	Grid	Grid receptors were located from fenceline out to 10km.
6735	GR-GEM-6333	383,900.0	3,872,200.0	941.8	Grid	Grid receptors were located from fenceline out to 10km.
6736	GR-GEM-6334	384,400.0	3,867,700.0	862.5	Grid	Grid receptors were located from fenceline out to 10km.
6737	GR-GEM-6335	384,400.0	3,868,200.0	871.0	Grid	Grid receptors were located from fenceline out to 10km.
6738	GR-GEM-6336	384,400.0	3,868,700.0	879.6	Grid	Grid receptors were located from fenceline out to 10km.
6739	GR-GEM-6337	384,400.0	3,869,200.0	919.0	Grid	Grid receptors were located from fenceline out to 10km.
6740	GR-GEM-6338	384,400.0	3,869,700.0	900.4	Grid	Grid receptors were located from fenceline out to 10km.
6741	GR-GEM-6339	384,400.0	3,870,200.0	909.0	Grid	Grid receptors were located from fenceline out to 10km.
6742	GR-GEM-6340	384,400.0	3,870,700.0	917.5	Grid	Grid receptors were located from fenceline out to 10km.
6743	GR-GEM-6341	384,400.0	3,871,200.0	943.0	Grid	Grid receptors were located from fenceline out to 10km.
6744	GR-GEM-6342	384,400.0	3,871,700.0	932.6	Grid	Grid receptors were located from fenceline out to 10km.
6745	GR-GEM-6343	384,400.0	3,872,200.0	936.5	Grid	Grid receptors were located from fenceline out to 10km.
6746	GR-GEM-6344	384,900.0	3,867,700.0	867.2	Grid	Grid receptors were located from fenceline out to 10km.
6747	GR-GEM-6345	384,900.0	3,868,200.0	872.6	Grid	Grid receptors were located from fenceline out to 10km.
6748	GR-GEM-6346	384,900.0	3,868,700.0	881.5	Grid	Grid receptors were located from fenceline out to 10km.
6749	GR-GEM-6347	384,900.0	3,869,200.0	889.9	Grid	Grid receptors were located from fenceline out to 10km.
6750	GR-GEM-6348	384,900.0	3,869,700.0	899.6	Grid	Grid receptors were located from fenceline out to 10km.
6751	GR-GEM-6349	384,900.0	3,870,200.0	906.5	Grid	Grid receptors were located from fenceline out to 10km.
6752	GR-GEM-6350	384,900.0	3,870,700.0	912.7	Grid	Grid receptors were located from fenceline out to 10km.
6753	GR-GEM-6351	384,900.0	3,871,200.0	911.7	Grid	Grid receptors were located from fenceline out to 10km.
6754	GR-GEM-6352	384,900.0	3,871,700.0	924.4	Grid	Grid receptors were located from fenceline out to 10km.
6755	GR-GEM-6353	384,900.0	3,872,200.0	931.6	Grid	Grid receptors were located from fenceline out to 10km.
6756	GR-GEM-6354	385,400.0	3,867,700.0	867.1	Grid	Grid receptors were located from fenceline out to 10km.
6757	GR-GEM-6355	385,400.0	3,868,200.0	874.0	Grid	Grid receptors were located from fenceline out to 10km.
6758	GR-GEM-6356	385,400.0	3,868,700.0	879.3	Grid	Grid receptors were located from fenceline out to 10km.
6759	GR-GEM-6357	385,400.0	3,869,200.0	887.7	Grid	Grid receptors were located from fenceline out to 10km.
6760	GR-GEM-6358	385,400.0	3,869,700.0	893.0	Grid	Grid receptors were located from fenceline out to 10km.
6761	GR-GEM-6359	385,400.0	3,870,200.0	899.4	Grid	Grid receptors were located from fenceline out to 10km.
6762	GR-GEM-6360	385,400.0	3,870,700.0	906.6	Grid	Grid receptors were located from fenceline out to 10km.
6763	GR-GEM-6361	385,400.0	3,871,200.0	912.6	Grid	Grid receptors were located from fenceline out to 10km.
6764	GR-GEM-6362	385,400.0	3,871,700.0	919.5	Grid	Grid receptors were located from fenceline out to 10km.
6765	GR-GEM-6363	385,400.0	3,872,200.0	925.7	Grid	Grid receptors were located from fenceline out to 10km.
6766	GR-GEM-6364	385,900.0	3,867,700.0	868.6	Grid	Grid receptors were located from fenceline out to 10km.
6767	GR-GEM-6365	385,900.0	3,868,200.0	874.0	Grid	Grid receptors were located from fenceline out to 10km.
6768	GR-GEM-6366	385,900.0	3,868,700.0	880.3	Grid	Grid receptors were located from fenceline out to 10km.
6769	GR-GEM-6367	385,900.0	3,869,200.0	886.9	Grid	Grid receptors were located from fenceline out to 10km.
6770	GR-GEM-6368	385,900.0	3,869,700.0	892.0	Grid	Grid receptors were located from fenceline out to 10km.
6771	GR-GEM-6369	385,900.0	3,870,200.0	898.9	Grid	Grid receptors were located from fenceline out to 10km.
6772	GR-GEM-6370	385,900.0	3,870,700.0	908.3	Grid	Grid receptors were located from fenceline out to 10km.
6773	GR-GEM-6371	385,900.0	3,871,200.0	912.4	Grid	Grid receptors were located from fenceline out to 10km.
6774	GR-GEM-6372	385,900.0	3,871,700.0	916.7	Grid	Grid receptors were located from fenceline out to 10km.
6775	GR-GEM-6373	385,900.0	3,872,200.0	921.1	Grid	Grid receptors were located from fenceline out to 10km.
6776	GR-GEM-6374	386,400.0	3,867,700.0	867.9	Grid	Grid receptors were located from fenceline out to 10km.
6777	GR-GEM-6375	386,400.0	3,868,200.0	873.3	Grid	Grid receptors were located from fenceline out to 10km.
6778	GR-GEM-6376	386,400.0	3,868,700.0	879.3	Grid	Grid receptors were located from fenceline out to 10km.
6779	GR-GEM-6377	386,400.0	3,869,200.0	886.3	Grid	Grid receptors were located from fenceline out to 10km.
6780	GR-GEM-6378	386,400.0	3,869,700.0	892.3	Grid	Grid receptors were located from fenceline out to 10km.
6781	GR-GEM-6379	386,400.0	3,870,200.0	897.6	Grid	Grid receptors were located from fenceline out to 10km.
6782	GR-GEM-6380	386,400.0	3,870,700.0	903.8	Grid	Grid receptors were located from fenceline out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
6783	GR-GEM-6381	386,400.0	3,871,200.0	904.8	Grid	Grid receptors were located from fence line out to 10km.
6784	GR-GEM-6382	386,400.0	3,871,700.0	908.7	Grid	Grid receptors were located from fence line out to 10km.
6785	GR-GEM-6383	386,400.0	3,872,200.0	914.1	Grid	Grid receptors were located from fence line out to 10km.
6786	GR-GEM-6384	386,900.0	3,867,700.0	863.5	Grid	Grid receptors were located from fence line out to 10km.
6787	GR-GEM-6385	386,900.0	3,868,200.0	871.9	Grid	Grid receptors were located from fence line out to 10km.
6788	GR-GEM-6386	386,900.0	3,868,700.0	876.9	Grid	Grid receptors were located from fence line out to 10km.
6789	GR-GEM-6387	386,900.0	3,869,200.0	883.8	Grid	Grid receptors were located from fence line out to 10km.
6790	GR-GEM-6388	386,900.0	3,869,700.0	889.1	Grid	Grid receptors were located from fence line out to 10km.
6791	GR-GEM-6389	386,900.0	3,870,200.0	893.8	Grid	Grid receptors were located from fence line out to 10km.
6792	GR-GEM-6390	386,900.0	3,870,700.0	896.0	Grid	Grid receptors were located from fence line out to 10km.
6793	GR-GEM-6391	386,900.0	3,871,200.0	896.7	Grid	Grid receptors were located from fence line out to 10km.
6794	GR-GEM-6392	386,900.0	3,871,700.0	901.8	Grid	Grid receptors were located from fence line out to 10km.
6795	GR-GEM-6393	386,900.0	3,872,200.0	906.6	Grid	Grid receptors were located from fence line out to 10km.
6796	GR-GEM-6394	387,400.0	3,867,700.0	859.8	Grid	Grid receptors were located from fence line out to 10km.
6797	GR-GEM-6395	387,400.0	3,868,200.0	865.9	Grid	Grid receptors were located from fence line out to 10km.
6798	GR-GEM-6396	387,400.0	3,868,700.0	873.2	Grid	Grid receptors were located from fence line out to 10km.
6799	GR-GEM-6397	387,400.0	3,869,200.0	880.5	Grid	Grid receptors were located from fence line out to 10km.
6800	GR-GEM-6398	387,400.0	3,869,700.0	882.3	Grid	Grid receptors were located from fence line out to 10km.
6801	GR-GEM-6399	387,400.0	3,870,200.0	888.4	Grid	Grid receptors were located from fence line out to 10km.
6802	GR-GEM-6400	387,400.0	3,870,700.0	887.9	Grid	Grid receptors were located from fence line out to 10km.
6803	GR-GEM-6401	387,400.0	3,871,200.0	889.5	Grid	Grid receptors were located from fence line out to 10km.
6804	GR-GEM-6402	387,400.0	3,871,700.0	894.6	Grid	Grid receptors were located from fence line out to 10km.
6805	GR-GEM-6403	387,400.0	3,872,200.0	898.5	Grid	Grid receptors were located from fence line out to 10km.
6806	GR-GEM-6404	387,900.0	3,867,700.0	854.7	Grid	Grid receptors were located from fence line out to 10km.
6807	GR-GEM-6405	387,900.0	3,868,200.0	862.2	Grid	Grid receptors were located from fence line out to 10km.
6808	GR-GEM-6406	387,900.0	3,868,700.0	869.8	Grid	Grid receptors were located from fence line out to 10km.
6809	GR-GEM-6407	387,900.0	3,869,200.0	874.1	Grid	Grid receptors were located from fence line out to 10km.
6810	GR-GEM-6408	387,900.0	3,869,700.0	876.5	Grid	Grid receptors were located from fence line out to 10km.
6811	GR-GEM-6409	387,900.0	3,870,200.0	881.5	Grid	Grid receptors were located from fence line out to 10km.
6812	GR-GEM-6410	387,900.0	3,870,700.0	881.1	Grid	Grid receptors were located from fence line out to 10km.
6813	GR-GEM-6411	387,900.0	3,871,200.0	882.8	Grid	Grid receptors were located from fence line out to 10km.
6814	GR-GEM-6412	387,900.0	3,871,700.0	886.0	Grid	Grid receptors were located from fence line out to 10km.
6815	GR-GEM-6413	387,900.0	3,872,200.0	891.1	Grid	Grid receptors were located from fence line out to 10km.
6816	GR-GEM-6414	388,400.0	3,867,700.0	850.7	Grid	Grid receptors were located from fence line out to 10km.
6817	GR-GEM-6415	388,400.0	3,868,200.0	856.4	Grid	Grid receptors were located from fence line out to 10km.
6818	GR-GEM-6416	388,400.0	3,868,700.0	861.4	Grid	Grid receptors were located from fence line out to 10km.
6819	GR-GEM-6417	388,400.0	3,869,200.0	866.8	Grid	Grid receptors were located from fence line out to 10km.
6820	GR-GEM-6418	388,400.0	3,869,700.0	872.7	Grid	Grid receptors were located from fence line out to 10km.
6821	GR-GEM-6419	388,400.0	3,870,200.0	872.9	Grid	Grid receptors were located from fence line out to 10km.
6822	GR-GEM-6420	388,400.0	3,870,700.0	873.2	Grid	Grid receptors were located from fence line out to 10km.
6823	GR-GEM-6421	388,400.0	3,871,200.0	876.3	Grid	Grid receptors were located from fence line out to 10km.
6824	GR-GEM-6422	388,400.0	3,871,700.0	878.9	Grid	Grid receptors were located from fence line out to 10km.
6825	GR-GEM-6423	388,400.0	3,872,200.0	883.9	Grid	Grid receptors were located from fence line out to 10km.
6826	GR-GEM-6424	388,900.0	3,867,700.0	846.3	Grid	Grid receptors were located from fence line out to 10km.
6827	GR-GEM-6425	388,900.0	3,868,200.0	850.1	Grid	Grid receptors were located from fence line out to 10km.
6828	GR-GEM-6426	388,900.0	3,868,700.0	856.9	Grid	Grid receptors were located from fence line out to 10km.
6829	GR-GEM-6427	388,900.0	3,869,200.0	862.5	Grid	Grid receptors were located from fence line out to 10km.
6830	GR-GEM-6428	388,900.0	3,869,700.0	864.5	Grid	Grid receptors were located from fence line out to 10km.
6831	GR-GEM-6429	388,900.0	3,870,200.0	864.6	Grid	Grid receptors were located from fence line out to 10km.
6832	GR-GEM-6430	388,900.0	3,870,700.0	866.7	Grid	Grid receptors were located from fence line out to 10km.
6833	GR-GEM-6431	388,900.0	3,871,200.0	869.0	Grid	Grid receptors were located from fence line out to 10km.
6834	GR-GEM-6432	388,900.0	3,871,700.0	872.4	Grid	Grid receptors were located from fence line out to 10km.
6835	GR-GEM-6433	388,900.0	3,872,200.0	877.7	Grid	Grid receptors were located from fence line out to 10km.
6836	GR-GEM-6434	389,400.0	3,867,700.0	840.1	Grid	Grid receptors were located from fence line out to 10km.
6837	GR-GEM-6435	389,400.0	3,868,200.0	844.5	Grid	Grid receptors were located from fence line out to 10km.
6838	GR-GEM-6436	389,400.0	3,868,700.0	848.8	Grid	Grid receptors were located from fence line out to 10km.
6839	GR-GEM-6437	389,400.0	3,869,200.0	853.2	Grid	Grid receptors were located from fence line out to 10km.
6840	GR-GEM-6438	389,400.0	3,869,700.0	853.3	Grid	Grid receptors were located from fence line out to 10km.
6841	GR-GEM-6439	389,400.0	3,870,200.0	856.9	Grid	Grid receptors were located from fence line out to 10km.
6842	GR-GEM-6440	389,400.0	3,870,700.0	860.5	Grid	Grid receptors were located from fence line out to 10km.
6843	GR-GEM-6441	389,400.0	3,871,200.0	863.3	Grid	Grid receptors were located from fence line out to 10km.
6844	GR-GEM-6442	389,400.0	3,871,700.0	866.4	Grid	Grid receptors were located from fence line out to 10km.
6845	GR-GEM-6443	389,400.0	3,872,200.0	870.1	Grid	Grid receptors were located from fence line out to 10km.
6846	GR-GEM-6444	389,900.0	3,867,700.0	836.4	Grid	Grid receptors were located from fence line out to 10km.
6847	GR-GEM-6445	389,900.0	3,868,200.0	839.1	Grid	Grid receptors were located from fence line out to 10km.
6848	GR-GEM-6446	389,900.0	3,868,700.0	843.6	Grid	Grid receptors were located from fence line out to 10km.
6849	GR-GEM-6447	389,900.0	3,869,200.0	865.8	Grid	Grid receptors were located from fence line out to 10km.
6850	GR-GEM-6448	389,900.0	3,869,700.0	16.8	Grid	Grid receptors were located from fence line out to 10km.
6851	GR-GEM-6449	389,900.0	3,870,200.0	881.4	Grid	Grid receptors were located from fence line out to 10km.
6852	GR-GEM-6450	389,900.0	3,870,700.0	868.6	Grid	Grid receptors were located from fence line out to 10km.
6853	GR-GEM-6451	389,900.0	3,871,200.0	864.7	Grid	Grid receptors were located from fence line out to 10km.
6854	GR-GEM-6452	389,900.0	3,871,700.0	868.9	Grid	Grid receptors were located from fence line out to 10km.
6855	GR-GEM-6453	389,900.0	3,872,200.0	872.6	Grid	Grid receptors were located from fence line out to 10km.
6856	GR-GEM-6454	390,400.0	3,867,700.0	832.1	Grid	Grid receptors were located from fence line out to 10km.
6857	GR-GEM-6455	390,400.0	3,868,200.0	835.6	Grid	Grid receptors were located from fence line out to 10km.
6858	GR-GEM-6456	390,400.0	3,868,700.0	838.0	Grid	Grid receptors were located from fence line out to 10km.
6859	GR-GEM-6457	390,400.0	3,869,200.0	892.7	Grid	Grid receptors were located from fence line out to 10km.
6860	GR-GEM-6458	390,400.0	3,869,700.0	867.6	Grid	Grid receptors were located from fence line out to 10km.
6861	GR-GEM-6459	390,400.0	3,870,200.0	989.2	Grid	Grid receptors were located from fence line out to 10km.
6862	GR-GEM-6460	390,400.0	3,870,700.0	894.9	Grid	Grid receptors were located from fence line out to 10km.
6863	GR-GEM-6461	390,400.0	3,871,200.0	921.1	Grid	Grid receptors were located from fence line out to 10km.
6864	GR-GEM-6462	390,400.0	3,871,700.0	958.0	Grid	Grid receptors were located from fence line out to 10km.
6865	GR-GEM-6463	390,400.0	3,872,200.0	910.1	Grid	Grid receptors were located from fence line out to 10km.
6866	GR-GEM-6464	390,900.0	3,867,700.0	825.9	Grid	Grid receptors were located from fence line out to 10km.
6867	GR-GEM-6465	390,900.0	3,868,200.0	828.5	Grid	Grid receptors were located from fence line out to 10km.
6868	GR-GEM-6466	390,900.0	3,868,700.0	831.5	Grid	Grid receptors were located from fence line out to 10km.
6869	GR-GEM-6467	390,900.0	3,869,200.0	872.6	Grid	Grid receptors were located from fence line out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
6870	GR-GEM-6468	390,900.0	3,869,700.0	940.4	Grid	Grid receptors were located from fence line out to 10km.
6871	GR-GEM-6469	390,900.0	3,870,200.0	942.9	Grid	Grid receptors were located from fence line out to 10km.
6872	GR-GEM-6470	390,900.0	3,870,700.0	931.1	Grid	Grid receptors were located from fence line out to 10km.
6873	GR-GEM-6471	390,900.0	3,871,200.0	34.6	Grid	Grid receptors were located from fence line out to 10km.
6874	GR-GEM-6472	390,900.0	3,871,700.0	100.8	Grid	Grid receptors were located from fence line out to 10km.
6875	GR-GEM-6473	390,900.0	3,872,200.0	19.4	Grid	Grid receptors were located from fence line out to 10km.
6876	GR-GEM-6474	391,400.0	3,867,700.0	819.1	Grid	Grid receptors were located from fence line out to 10km.
6877	GR-GEM-6475	391,400.0	3,868,200.0	822.9	Grid	Grid receptors were located from fence line out to 10km.
6878	GR-GEM-6476	391,400.0	3,868,700.0	825.6	Grid	Grid receptors were located from fence line out to 10km.
6879	GR-GEM-6477	391,400.0	3,869,200.0	827.1	Grid	Grid receptors were located from fence line out to 10km.
6880	GR-GEM-6478	391,400.0	3,869,700.0	882.4	Grid	Grid receptors were located from fence line out to 10km.
6881	GR-GEM-6479	391,400.0	3,870,200.0	879.5	Grid	Grid receptors were located from fence line out to 10km.
6882	GR-GEM-6480	391,400.0	3,870,700.0	921.1	Grid	Grid receptors were located from fence line out to 10km.
6883	GR-GEM-6481	391,400.0	3,871,200.0	99.0	Grid	Grid receptors were located from fence line out to 10km.
6884	GR-GEM-6482	391,400.0	3,871,700.0	242.0	Grid	Grid receptors were located from fence line out to 10km.
6885	GR-GEM-6483	391,400.0	3,872,200.0	58.2	Grid	Grid receptors were located from fence line out to 10km.
6886	GR-GEM-6484	391,900.0	3,867,700.0	814.2	Grid	Grid receptors were located from fence line out to 10km.
6887	GR-GEM-6485	391,900.0	3,868,200.0	815.9	Grid	Grid receptors were located from fence line out to 10km.
6888	GR-GEM-6486	391,900.0	3,868,700.0	816.9	Grid	Grid receptors were located from fence line out to 10km.
6889	GR-GEM-6487	391,900.0	3,869,200.0	813.2	Grid	Grid receptors were located from fence line out to 10km.
6890	GR-GEM-6488	391,900.0	3,869,700.0	826.2	Grid	Grid receptors were located from fence line out to 10km.
6891	GR-GEM-6489	391,900.0	3,870,200.0	871.2	Grid	Grid receptors were located from fence line out to 10km.
6892	GR-GEM-6490	391,900.0	3,870,700.0	996.5	Grid	Grid receptors were located from fence line out to 10km.
6893	GR-GEM-6491	391,900.0	3,871,200.0	137.8	Grid	Grid receptors were located from fence line out to 10km.
6894	GR-GEM-6492	391,900.0	3,871,700.0	62.2	Grid	Grid receptors were located from fence line out to 10km.
6895	GR-GEM-6493	391,900.0	3,872,200.0	31.2	Grid	Grid receptors were located from fence line out to 10km.
6896	GR-GEM-6494	392,400.0	3,867,700.0	807.9	Grid	Grid receptors were located from fence line out to 10km.
6897	GR-GEM-6495	392,400.0	3,868,200.0	809.3	Grid	Grid receptors were located from fence line out to 10km.
6898	GR-GEM-6496	392,400.0	3,868,700.0	809.1	Grid	Grid receptors were located from fence line out to 10km.
6899	GR-GEM-6497	392,400.0	3,869,200.0	809.5	Grid	Grid receptors were located from fence line out to 10km.
6900	GR-GEM-6498	392,400.0	3,869,700.0	820.4	Grid	Grid receptors were located from fence line out to 10km.
6901	GR-GEM-6499	392,400.0	3,870,200.0	868.1	Grid	Grid receptors were located from fence line out to 10km.
6902	GR-GEM-6500	392,400.0	3,870,700.0	15.4	Grid	Grid receptors were located from fence line out to 10km.
6903	GR-GEM-6501	392,400.0	3,871,200.0	2.9	Grid	Grid receptors were located from fence line out to 10km.
6904	GR-GEM-6502	392,400.0	3,871,700.0	923.7	Grid	Grid receptors were located from fence line out to 10km.
6905	GR-GEM-6503	392,400.0	3,872,200.0	898.5	Grid	Grid receptors were located from fence line out to 10km.
6906	GR-GEM-6504	392,900.0	3,867,700.0	802.3	Grid	Grid receptors were located from fence line out to 10km.
6907	GR-GEM-6505	392,900.0	3,868,200.0	803.1	Grid	Grid receptors were located from fence line out to 10km.
6908	GR-GEM-6506	392,900.0	3,868,700.0	801.8	Grid	Grid receptors were located from fence line out to 10km.
6909	GR-GEM-6507	392,900.0	3,869,200.0	800.4	Grid	Grid receptors were located from fence line out to 10km.
6910	GR-GEM-6508	392,900.0	3,869,700.0	814.4	Grid	Grid receptors were located from fence line out to 10km.
6911	GR-GEM-6509	392,900.0	3,870,200.0	932.6	Grid	Grid receptors were located from fence line out to 10km.
6912	GR-GEM-6510	392,900.0	3,870,700.0	941.4	Grid	Grid receptors were located from fence line out to 10km.
6913	GR-GEM-6511	392,900.0	3,871,200.0	903.1	Grid	Grid receptors were located from fence line out to 10km.
6914	GR-GEM-6512	392,900.0	3,871,700.0	881.6	Grid	Grid receptors were located from fence line out to 10km.
6915	GR-GEM-6513	392,900.0	3,872,200.0	841.7	Grid	Grid receptors were located from fence line out to 10km.
6916	GR-GEM-6514	388,400.0	3,867,200.0	844.1	Grid	Grid receptors were located from fence line out to 10km.
6917	GR-GEM-6515	388,400.0	3,866,700.0	842.3	Grid	Grid receptors were located from fence line out to 10km.
6918	GR-GEM-6516	388,400.0	3,866,200.0	837.6	Grid	Grid receptors were located from fence line out to 10km.
6919	GR-GEM-6517	388,400.0	3,865,700.0	840.9	Grid	Grid receptors were located from fence line out to 10km.
6920	GR-GEM-6518	388,400.0	3,865,200.0	877.8	Grid	Grid receptors were located from fence line out to 10km.
6921	GR-GEM-6519	388,400.0	3,864,700.0	839.8	Grid	Grid receptors were located from fence line out to 10km.
6922	GR-GEM-6520	388,400.0	3,864,200.0	816.4	Grid	Grid receptors were located from fence line out to 10km.
6923	GR-GEM-6521	388,400.0	3,863,700.0	786.2	Grid	Grid receptors were located from fence line out to 10km.
6924	GR-GEM-6522	388,400.0	3,863,200.0	792.0	Grid	Grid receptors were located from fence line out to 10km.
6925	GR-GEM-6523	388,400.0	3,862,700.0	768.9	Grid	Grid receptors were located from fence line out to 10km.
6926	GR-GEM-6524	388,400.0	3,862,200.0	760.8	Grid	Grid receptors were located from fence line out to 10km.
6927	GR-GEM-6525	388,400.0	3,861,700.0	760.3	Grid	Grid receptors were located from fence line out to 10km.
6928	GR-GEM-6526	388,400.0	3,861,200.0	757.4	Grid	Grid receptors were located from fence line out to 10km.
6929	GR-GEM-6527	388,400.0	3,860,700.0	753.9	Grid	Grid receptors were located from fence line out to 10km.
6930	GR-GEM-6528	388,400.0	3,860,200.0	749.4	Grid	Grid receptors were located from fence line out to 10km.
6931	GR-GEM-6529	388,400.0	3,859,700.0	744.7	Grid	Grid receptors were located from fence line out to 10km.
6932	GR-GEM-6530	388,400.0	3,859,200.0	739.5	Grid	Grid receptors were located from fence line out to 10km.
6933	GR-GEM-6531	388,400.0	3,858,700.0	733.2	Grid	Grid receptors were located from fence line out to 10km.
6934	GR-GEM-6532	388,400.0	3,858,200.0	728.3	Grid	Grid receptors were located from fence line out to 10km.
6935	GR-GEM-6533	388,400.0	3,857,700.0	723.3	Grid	Grid receptors were located from fence line out to 10km.
6936	GR-GEM-6534	388,400.0	3,857,200.0	720.9	Grid	Grid receptors were located from fence line out to 10km.
6937	GR-GEM-6535	388,400.0	3,856,700.0	720.2	Grid	Grid receptors were located from fence line out to 10km.
6938	GR-GEM-6536	388,400.0	3,856,200.0	720.1	Grid	Grid receptors were located from fence line out to 10km.
6939	GR-GEM-6537	388,400.0	3,855,700.0	719.7	Grid	Grid receptors were located from fence line out to 10km.
6940	GR-GEM-6538	388,400.0	3,855,200.0	720.0	Grid	Grid receptors were located from fence line out to 10km.
6941	GR-GEM-6539	388,400.0	3,854,700.0	720.3	Grid	Grid receptors were located from fence line out to 10km.
6942	GR-GEM-6540	388,400.0	3,854,200.0	720.9	Grid	Grid receptors were located from fence line out to 10km.
6943	GR-GEM-6541	388,400.0	3,853,700.0	720.8	Grid	Grid receptors were located from fence line out to 10km.
6944	GR-GEM-6542	388,400.0	3,853,200.0	720.8	Grid	Grid receptors were located from fence line out to 10km.
6945	GR-GEM-6543	388,400.0	3,852,700.0	720.5	Grid	Grid receptors were located from fence line out to 10km.
6946	GR-GEM-6544	388,400.0	3,852,200.0	720.6	Grid	Grid receptors were located from fence line out to 10km.
6947	GR-GEM-6545	388,400.0	3,851,700.0	720.8	Grid	Grid receptors were located from fence line out to 10km.
6948	GR-GEM-6546	388,400.0	3,851,200.0	720.5	Grid	Grid receptors were located from fence line out to 10km.
6949	GR-GEM-6547	388,900.0	3,867,200.0	840.4	Grid	Grid receptors were located from fence line out to 10km.
6950	GR-GEM-6548	388,900.0	3,866,700.0	837.5	Grid	Grid receptors were located from fence line out to 10km.
6951	GR-GEM-6549	388,900.0	3,866,200.0	834.1	Grid	Grid receptors were located from fence line out to 10km.
6952	GR-GEM-6550	388,900.0	3,865,700.0	832.6	Grid	Grid receptors were located from fence line out to 10km.
6953	GR-GEM-6551	388,900.0	3,865,200.0	844.0	Grid	Grid receptors were located from fence line out to 10km.
6954	GR-GEM-6552	388,900.0	3,864,700.0	816.0	Grid	Grid receptors were located from fence line out to 10km.
6955	GR-GEM-6553	388,900.0	3,864,200.0	797.9	Grid	Grid receptors were located from fence line out to 10km.
6956	GR-GEM-6554	388,900.0	3,863,700.0	790.8	Grid	Grid receptors were located from fence line out to 10km.





Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
7131	GR-GEM-6729	391,400.0	3,858,700.0	718.6	Grid	Grid receptors were located from fence line out to 10km.
7132	GR-GEM-6730	391,400.0	3,858,200.0	716.4	Grid	Grid receptors were located from fence line out to 10km.
7133	GR-GEM-6731	391,400.0	3,857,700.0	714.5	Grid	Grid receptors were located from fence line out to 10km.
7134	GR-GEM-6732	391,400.0	3,857,200.0	712.9	Grid	Grid receptors were located from fence line out to 10km.
7135	GR-GEM-6733	391,400.0	3,856,700.0	712.1	Grid	Grid receptors were located from fence line out to 10km.
7136	GR-GEM-6734	391,400.0	3,856,200.0	711.9	Grid	Grid receptors were located from fence line out to 10km.
7137	GR-GEM-6735	391,400.0	3,855,700.0	712.0	Grid	Grid receptors were located from fence line out to 10km.
7138	GR-GEM-6736	391,400.0	3,855,200.0	711.3	Grid	Grid receptors were located from fence line out to 10km.
7139	GR-GEM-6737	391,400.0	3,854,700.0	712.1	Grid	Grid receptors were located from fence line out to 10km.
7140	GR-GEM-6738	391,400.0	3,854,200.0	711.4	Grid	Grid receptors were located from fence line out to 10km.
7141	GR-GEM-6739	391,400.0	3,853,700.0	711.2	Grid	Grid receptors were located from fence line out to 10km.
7142	GR-GEM-6740	391,400.0	3,853,200.0	710.5	Grid	Grid receptors were located from fence line out to 10km.
7143	GR-GEM-6741	391,400.0	3,852,700.0	710.6	Grid	Grid receptors were located from fence line out to 10km.
7144	GR-GEM-6742	391,400.0	3,852,200.0	711.9	Grid	Grid receptors were located from fence line out to 10km.
7145	GR-GEM-6743	391,400.0	3,851,700.0	711.1	Grid	Grid receptors were located from fence line out to 10km.
7146	GR-GEM-6744	391,400.0	3,851,200.0	710.7	Grid	Grid receptors were located from fence line out to 10km.
7147	GR-GEM-6745	391,900.0	3,867,200.0	810.8	Grid	Grid receptors were located from fence line out to 10km.
7148	GR-GEM-6746	391,900.0	3,866,700.0	811.6	Grid	Grid receptors were located from fence line out to 10km.
7149	GR-GEM-6747	391,900.0	3,866,200.0	808.2	Grid	Grid receptors were located from fence line out to 10km.
7150	GR-GEM-6748	391,900.0	3,865,700.0	808.2	Grid	Grid receptors were located from fence line out to 10km.
7151	GR-GEM-6749	391,900.0	3,865,200.0	807.2	Grid	Grid receptors were located from fence line out to 10km.
7152	GR-GEM-6750	391,900.0	3,864,700.0	818.9	Grid	Grid receptors were located from fence line out to 10km.
7153	GR-GEM-6751	391,900.0	3,864,200.0	816.5	Grid	Grid receptors were located from fence line out to 10km.
7154	GR-GEM-6752	391,900.0	3,863,700.0	807.3	Grid	Grid receptors were located from fence line out to 10km.
7155	GR-GEM-6753	391,900.0	3,863,200.0	810.9	Grid	Grid receptors were located from fence line out to 10km.
7156	GR-GEM-6754	391,900.0	3,862,700.0	788.9	Grid	Grid receptors were located from fence line out to 10km.
7157	GR-GEM-6755	391,900.0	3,862,200.0	780.4	Grid	Grid receptors were located from fence line out to 10km.
7158	GR-GEM-6756	391,900.0	3,861,700.0	790.7	Grid	Grid receptors were located from fence line out to 10km.
7159	GR-GEM-6757	391,900.0	3,861,200.0	801.5	Grid	Grid receptors were located from fence line out to 10km.
7160	GR-GEM-6758	391,900.0	3,860,700.0	859.1	Grid	Grid receptors were located from fence line out to 10km.
7161	GR-GEM-6759	391,900.0	3,860,200.0	810.2	Grid	Grid receptors were located from fence line out to 10km.
7162	GR-GEM-6760	391,900.0	3,859,700.0	749.6	Grid	Grid receptors were located from fence line out to 10km.
7163	GR-GEM-6761	391,900.0	3,859,200.0	717.1	Grid	Grid receptors were located from fence line out to 10km.
7164	GR-GEM-6762	391,900.0	3,858,700.0	716.7	Grid	Grid receptors were located from fence line out to 10km.
7165	GR-GEM-6763	391,900.0	3,858,200.0	713.9	Grid	Grid receptors were located from fence line out to 10km.
7166	GR-GEM-6764	391,900.0	3,857,700.0	711.3	Grid	Grid receptors were located from fence line out to 10km.
7167	GR-GEM-6765	391,900.0	3,857,200.0	710.9	Grid	Grid receptors were located from fence line out to 10km.
7168	GR-GEM-6766	391,900.0	3,856,700.0	710.9	Grid	Grid receptors were located from fence line out to 10km.
7169	GR-GEM-6767	391,900.0	3,856,200.0	710.8	Grid	Grid receptors were located from fence line out to 10km.
7170	GR-GEM-6768	391,900.0	3,855,700.0	710.7	Grid	Grid receptors were located from fence line out to 10km.
7171	GR-GEM-6769	391,900.0	3,855,200.0	710.3	Grid	Grid receptors were located from fence line out to 10km.
7172	GR-GEM-6770	391,900.0	3,854,700.0	710.2	Grid	Grid receptors were located from fence line out to 10km.
7173	GR-GEM-6771	391,900.0	3,854,200.0	709.5	Grid	Grid receptors were located from fence line out to 10km.
7174	GR-GEM-6772	391,900.0	3,853,700.0	709.4	Grid	Grid receptors were located from fence line out to 10km.
7175	GR-GEM-6773	391,900.0	3,853,200.0	706.0	Grid	Grid receptors were located from fence line out to 10km.
7176	GR-GEM-6774	391,900.0	3,852,700.0	709.3	Grid	Grid receptors were located from fence line out to 10km.
7177	GR-GEM-6775	391,900.0	3,852,200.0	709.8	Grid	Grid receptors were located from fence line out to 10km.
7178	GR-GEM-6776	391,900.0	3,851,700.0	709.5	Grid	Grid receptors were located from fence line out to 10km.
7179	GR-GEM-6777	391,900.0	3,851,200.0	709.4	Grid	Grid receptors were located from fence line out to 10km.
7180	GR-GEM-6778	392,400.0	3,867,200.0	805.3	Grid	Grid receptors were located from fence line out to 10km.
7181	GR-GEM-6779	392,400.0	3,866,700.0	805.1	Grid	Grid receptors were located from fence line out to 10km.
7182	GR-GEM-6780	392,400.0	3,866,200.0	802.9	Grid	Grid receptors were located from fence line out to 10km.
7183	GR-GEM-6781	392,400.0	3,865,700.0	801.9	Grid	Grid receptors were located from fence line out to 10km.
7184	GR-GEM-6782	392,400.0	3,865,200.0	803.1	Grid	Grid receptors were located from fence line out to 10km.
7185	GR-GEM-6783	392,400.0	3,864,700.0	814.4	Grid	Grid receptors were located from fence line out to 10km.
7186	GR-GEM-6784	392,400.0	3,864,200.0	838.4	Grid	Grid receptors were located from fence line out to 10km.
7187	GR-GEM-6785	392,400.0	3,863,700.0	829.6	Grid	Grid receptors were located from fence line out to 10km.
7188	GR-GEM-6786	392,400.0	3,863,200.0	812.4	Grid	Grid receptors were located from fence line out to 10km.
7189	GR-GEM-6787	392,400.0	3,862,700.0	793.8	Grid	Grid receptors were located from fence line out to 10km.
7190	GR-GEM-6788	392,400.0	3,862,200.0	782.1	Grid	Grid receptors were located from fence line out to 10km.
7191	GR-GEM-6789	392,400.0	3,861,700.0	773.2	Grid	Grid receptors were located from fence line out to 10km.
7192	GR-GEM-6790	392,400.0	3,861,200.0	784.0	Grid	Grid receptors were located from fence line out to 10km.
7193	GR-GEM-6791	392,400.0	3,860,700.0	860.7	Grid	Grid receptors were located from fence line out to 10km.
7194	GR-GEM-6792	392,400.0	3,860,200.0	821.4	Grid	Grid receptors were located from fence line out to 10km.
7195	GR-GEM-6793	392,400.0	3,859,700.0	755.3	Grid	Grid receptors were located from fence line out to 10km.
7196	GR-GEM-6794	392,400.0	3,859,200.0	716.5	Grid	Grid receptors were located from fence line out to 10km.
7197	GR-GEM-6795	392,400.0	3,858,700.0	712.9	Grid	Grid receptors were located from fence line out to 10km.
7198	GR-GEM-6796	392,400.0	3,858,200.0	711.4	Grid	Grid receptors were located from fence line out to 10km.
7199	GR-GEM-6797	392,400.0	3,857,700.0	709.6	Grid	Grid receptors were located from fence line out to 10km.
7200	GR-GEM-6798	392,400.0	3,857,200.0	709.4	Grid	Grid receptors were located from fence line out to 10km.
7201	GR-GEM-6799	392,400.0	3,856,700.0	709.5	Grid	Grid receptors were located from fence line out to 10km.
7202	GR-GEM-6800	392,400.0	3,856,200.0	709.5	Grid	Grid receptors were located from fence line out to 10km.
7203	GR-GEM-6801	392,400.0	3,855,700.0	709.6	Grid	Grid receptors were located from fence line out to 10km.
7204	GR-GEM-6802	392,400.0	3,855,200.0	709.2	Grid	Grid receptors were located from fence line out to 10km.
7205	GR-GEM-6803	392,400.0	3,854,700.0	709.3	Grid	Grid receptors were located from fence line out to 10km.
7206	GR-GEM-6804	392,400.0	3,854,200.0	706.5	Grid	Grid receptors were located from fence line out to 10km.
7207	GR-GEM-6805	392,400.0	3,853,700.0	707.7	Grid	Grid receptors were located from fence line out to 10km.
7208	GR-GEM-6806	392,400.0	3,853,200.0	707.7	Grid	Grid receptors were located from fence line out to 10km.
7209	GR-GEM-6807	392,400.0	3,852,700.0	708.0	Grid	Grid receptors were located from fence line out to 10km.
7210	GR-GEM-6808	392,400.0	3,852,200.0	708.2	Grid	Grid receptors were located from fence line out to 10km.
7211	GR-GEM-6809	392,400.0	3,851,700.0	708.3	Grid	Grid receptors were located from fence line out to 10km.
7212	GR-GEM-6810	392,400.0	3,851,200.0	707.5	Grid	Grid receptors were located from fence line out to 10km.
7213	GR-GEM-6811	392,900.0	3,867,200.0	800.1	Grid	Grid receptors were located from fence line out to 10km.
7214	GR-GEM-6812	392,900.0	3,866,700.0	798.3	Grid	Grid receptors were located from fence line out to 10km.
7215	GR-GEM-6813	392,900.0	3,866,200.0	798.4	Grid	Grid receptors were located from fence line out to 10km.
7216	GR-GEM-6814	392,900.0	3,865,700.0	796.6	Grid	Grid receptors were located from fence line out to 10km.
7217	GR-GEM-6815	392,900.0	3,865,200.0	799.0	Grid	Grid receptors were located from fence line out to 10km.









Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
7566	GR-GEM-7164	371,900.0	3,855,700.0	798.0	Grid	Grid receptors were located from fence line out to 10km.
7567	GR-GEM-7165	371,900.0	3,855,200.0	796.1	Grid	Grid receptors were located from fence line out to 10km.
7568	GR-GEM-7166	371,900.0	3,854,700.0	793.0	Grid	Grid receptors were located from fence line out to 10km.
7569	GR-GEM-7167	371,900.0	3,854,200.0	791.6	Grid	Grid receptors were located from fence line out to 10km.
7570	GR-GEM-7168	371,900.0	3,853,700.0	789.1	Grid	Grid receptors were located from fence line out to 10km.
7571	GR-GEM-7169	371,900.0	3,853,200.0	787.8	Grid	Grid receptors were located from fence line out to 10km.
7572	GR-GEM-7170	371,900.0	3,852,700.0	787.5	Grid	Grid receptors were located from fence line out to 10km.
7573	GR-GEM-7171	371,900.0	3,852,200.0	785.9	Grid	Grid receptors were located from fence line out to 10km.
7574	GR-GEM-7172	371,900.0	3,851,700.0	788.0	Grid	Grid receptors were located from fence line out to 10km.
7575	GR-GEM-7173	371,900.0	3,851,200.0	788.7	Grid	Grid receptors were located from fence line out to 10km.
7576	GR-GEM-7174	376,400.0	3,856,200.0	771.7	Grid	Grid receptors were located from fence line out to 10km.
7577	GR-GEM-7175	376,400.0	3,856,700.0	774.0	Grid	Grid receptors were located from fence line out to 10km.
7578	GR-GEM-7176	376,400.0	3,857,200.0	776.4	Grid	Grid receptors were located from fence line out to 10km.
7579	GR-GEM-7177	376,400.0	3,857,700.0	776.4	Grid	Grid receptors were located from fence line out to 10km.
7580	GR-GEM-7178	376,400.0	3,858,200.0	777.4	Grid	Grid receptors were located from fence line out to 10km.
7581	GR-GEM-7179	376,400.0	3,858,700.0	778.2	Grid	Grid receptors were located from fence line out to 10km.
7582	GR-GEM-7180	376,400.0	3,859,200.0	781.9	Grid	Grid receptors were located from fence line out to 10km.
7583	GR-GEM-7181	376,400.0	3,859,700.0	787.9	Grid	Grid receptors were located from fence line out to 10km.
7584	GR-GEM-7182	376,400.0	3,860,200.0	796.6	Grid	Grid receptors were located from fence line out to 10km.
7585	GR-GEM-7183	376,400.0	3,860,700.0	807.1	Grid	Grid receptors were located from fence line out to 10km.
7586	GR-GEM-7184	376,400.0	3,861,200.0	816.4	Grid	Grid receptors were located from fence line out to 10km.
7587	GR-GEM-7185	376,400.0	3,861,700.0	825.3	Grid	Grid receptors were located from fence line out to 10km.
7588	GR-GEM-7186	376,400.0	3,862,200.0	840.8	Grid	Grid receptors were located from fence line out to 10km.
7589	GR-GEM-7187	376,400.0	3,862,700.0	851.6	Grid	Grid receptors were located from fence line out to 10km.
7590	GR-GEM-7188	376,400.0	3,863,200.0	863.1	Grid	Grid receptors were located from fence line out to 10km.
7591	GR-GEM-7189	376,400.0	3,863,700.0	875.4	Grid	Grid receptors were located from fence line out to 10km.
7592	GR-GEM-7190	376,400.0	3,864,200.0	889.1	Grid	Grid receptors were located from fence line out to 10km.
7593	GR-GEM-7191	376,400.0	3,864,700.0	903.2	Grid	Grid receptors were located from fence line out to 10km.
7594	GR-GEM-7192	376,400.0	3,865,200.0	916.7	Grid	Grid receptors were located from fence line out to 10km.
7595	GR-GEM-7193	376,400.0	3,865,700.0	930.7	Grid	Grid receptors were located from fence line out to 10km.
7596	GR-GEM-7194	376,400.0	3,866,200.0	945.6	Grid	Grid receptors were located from fence line out to 10km.
7597	GR-GEM-7195	376,400.0	3,866,700.0	964.2	Grid	Grid receptors were located from fence line out to 10km.
7598	GR-GEM-7196	376,400.0	3,867,200.0	981.7	Grid	Grid receptors were located from fence line out to 10km.
7599	GR-GEM-7197	376,400.0	3,867,700.0	0.1	Grid	Grid receptors were located from fence line out to 10km.
7600	GR-GEM-7198	376,400.0	3,868,200.0	17.1	Grid	Grid receptors were located from fence line out to 10km.
7601	GR-GEM-7199	376,400.0	3,868,700.0	37.2	Grid	Grid receptors were located from fence line out to 10km.
7602	GR-GEM-7200	376,400.0	3,869,200.0	51.5	Grid	Grid receptors were located from fence line out to 10km.
7603	GR-GEM-7201	376,400.0	3,869,700.0	68.5	Grid	Grid receptors were located from fence line out to 10km.
7604	GR-GEM-7202	376,400.0	3,870,200.0	87.3	Grid	Grid receptors were located from fence line out to 10km.
7605	GR-GEM-7203	376,400.0	3,870,700.0	101.7	Grid	Grid receptors were located from fence line out to 10km.
7606	GR-GEM-7204	376,400.0	3,871,200.0	117.5	Grid	Grid receptors were located from fence line out to 10km.
7607	GR-GEM-7205	376,400.0	3,871,700.0	133.9	Grid	Grid receptors were located from fence line out to 10km.
7608	GR-GEM-7206	376,400.0	3,872,200.0	172.4	Grid	Grid receptors were located from fence line out to 10km.
7609	GR-GEM-7207	375,900.0	3,856,200.0	775.5	Grid	Grid receptors were located from fence line out to 10km.
7610	GR-GEM-7208	375,900.0	3,856,700.0	777.6	Grid	Grid receptors were located from fence line out to 10km.
7611	GR-GEM-7209	375,900.0	3,857,200.0	780.5	Grid	Grid receptors were located from fence line out to 10km.
7612	GR-GEM-7210	375,900.0	3,857,700.0	780.4	Grid	Grid receptors were located from fence line out to 10km.
7613	GR-GEM-7211	375,900.0	3,858,200.0	781.3	Grid	Grid receptors were located from fence line out to 10km.
7614	GR-GEM-7212	375,900.0	3,858,700.0	782.0	Grid	Grid receptors were located from fence line out to 10km.
7615	GR-GEM-7213	375,900.0	3,859,200.0	786.8	Grid	Grid receptors were located from fence line out to 10km.
7616	GR-GEM-7214	375,900.0	3,859,700.0	794.7	Grid	Grid receptors were located from fence line out to 10km.
7617	GR-GEM-7215	375,900.0	3,860,200.0	802.1	Grid	Grid receptors were located from fence line out to 10km.
7618	GR-GEM-7216	375,900.0	3,860,700.0	812.0	Grid	Grid receptors were located from fence line out to 10km.
7619	GR-GEM-7217	375,900.0	3,861,200.0	822.7	Grid	Grid receptors were located from fence line out to 10km.
7620	GR-GEM-7218	375,900.0	3,861,700.0	833.4	Grid	Grid receptors were located from fence line out to 10km.
7621	GR-GEM-7219	375,900.0	3,862,200.0	843.0	Grid	Grid receptors were located from fence line out to 10km.
7622	GR-GEM-7220	375,900.0	3,862,700.0	857.2	Grid	Grid receptors were located from fence line out to 10km.
7623	GR-GEM-7221	375,900.0	3,863,200.0	868.3	Grid	Grid receptors were located from fence line out to 10km.
7624	GR-GEM-7222	375,900.0	3,863,700.0	880.3	Grid	Grid receptors were located from fence line out to 10km.
7625	GR-GEM-7223	375,900.0	3,864,200.0	892.6	Grid	Grid receptors were located from fence line out to 10km.
7626	GR-GEM-7224	375,900.0	3,864,700.0	909.6	Grid	Grid receptors were located from fence line out to 10km.
7627	GR-GEM-7225	375,900.0	3,865,200.0	925.0	Grid	Grid receptors were located from fence line out to 10km.
7628	GR-GEM-7226	375,900.0	3,865,700.0	940.6	Grid	Grid receptors were located from fence line out to 10km.
7629	GR-GEM-7227	375,900.0	3,866,200.0	955.3	Grid	Grid receptors were located from fence line out to 10km.
7630	GR-GEM-7228	375,900.0	3,866,700.0	965.7	Grid	Grid receptors were located from fence line out to 10km.
7631	GR-GEM-7229	375,900.0	3,867,200.0	987.2	Grid	Grid receptors were located from fence line out to 10km.
7632	GR-GEM-7230	375,900.0	3,867,700.0	9.1	Grid	Grid receptors were located from fence line out to 10km.
7633	GR-GEM-7231	375,900.0	3,868,200.0	29.6	Grid	Grid receptors were located from fence line out to 10km.
7634	GR-GEM-7232	375,900.0	3,868,700.0	41.7	Grid	Grid receptors were located from fence line out to 10km.
7635	GR-GEM-7233	375,900.0	3,869,200.0	74.6	Grid	Grid receptors were located from fence line out to 10km.
7636	GR-GEM-7234	375,900.0	3,869,700.0	99.2	Grid	Grid receptors were located from fence line out to 10km.
7637	GR-GEM-7235	375,900.0	3,870,200.0	124.4	Grid	Grid receptors were located from fence line out to 10km.
7638	GR-GEM-7236	375,900.0	3,870,700.0	134.0	Grid	Grid receptors were located from fence line out to 10km.
7639	GR-GEM-7237	375,900.0	3,871,200.0	157.5	Grid	Grid receptors were located from fence line out to 10km.
7640	GR-GEM-7238	375,900.0	3,871,700.0	171.1	Grid	Grid receptors were located from fence line out to 10km.
7641	GR-GEM-7239	375,900.0	3,872,200.0	192.2	Grid	Grid receptors were located from fence line out to 10km.
7642	GR-GEM-7240	375,400.0	3,856,200.0	778.7	Grid	Grid receptors were located from fence line out to 10km.
7643	GR-GEM-7241	375,400.0	3,856,700.0	782.0	Grid	Grid receptors were located from fence line out to 10km.
7644	GR-GEM-7242	375,400.0	3,857,200.0	784.9	Grid	Grid receptors were located from fence line out to 10km.
7645	GR-GEM-7243	375,400.0	3,857,700.0	784.7	Grid	Grid receptors were located from fence line out to 10km.
7646	GR-GEM-7244	375,400.0	3,858,200.0	785.1	Grid	Grid receptors were located from fence line out to 10km.
7647	GR-GEM-7245	375,400.0	3,858,700.0	786.7	Grid	Grid receptors were located from fence line out to 10km.
7648	GR-GEM-7246	375,400.0	3,859,200.0	790.9	Grid	Grid receptors were located from fence line out to 10km.
7649	GR-GEM-7247	375,400.0	3,859,700.0	799.2	Grid	Grid receptors were located from fence line out to 10km.
7650	GR-GEM-7248	375,400.0	3,860,200.0	808.4	Grid	Grid receptors were located from fence line out to 10km.
7651	GR-GEM-7249	375,400.0	3,860,700.0	817.7	Grid	Grid receptors were located from fence line out to 10km.
7652	GR-GEM-7250	375,400.0	3,861,200.0	829.2	Grid	Grid receptors were located from fence line out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
7653	GR-GEM-7251	375,400.0	3,861,700.0	840.0	Grid	Grid receptors were located from fenceline out to 10km.
7654	GR-GEM-7252	375,400.0	3,862,200.0	852.1	Grid	Grid receptors were located from fenceline out to 10km.
7655	GR-GEM-7253	375,400.0	3,862,700.0	863.3	Grid	Grid receptors were located from fenceline out to 10km.
7656	GR-GEM-7254	375,400.0	3,863,200.0	874.2	Grid	Grid receptors were located from fenceline out to 10km.
7657	GR-GEM-7255	375,400.0	3,863,700.0	884.6	Grid	Grid receptors were located from fenceline out to 10km.
7658	GR-GEM-7256	375,400.0	3,864,200.0	898.9	Grid	Grid receptors were located from fenceline out to 10km.
7659	GR-GEM-7257	375,400.0	3,864,700.0	915.3	Grid	Grid receptors were located from fenceline out to 10km.
7660	GR-GEM-7258	375,400.0	3,865,200.0	932.2	Grid	Grid receptors were located from fenceline out to 10km.
7661	GR-GEM-7259	375,400.0	3,865,700.0	949.7	Grid	Grid receptors were located from fenceline out to 10km.
7662	GR-GEM-7260	375,400.0	3,866,200.0	967.7	Grid	Grid receptors were located from fenceline out to 10km.
7663	GR-GEM-7261	375,400.0	3,866,700.0	980.3	Grid	Grid receptors were located from fenceline out to 10km.
7664	GR-GEM-7262	375,400.0	3,867,200.0	2.3	Grid	Grid receptors were located from fenceline out to 10km.
7665	GR-GEM-7263	375,400.0	3,867,700.0	25.9	Grid	Grid receptors were located from fenceline out to 10km.
7666	GR-GEM-7264	375,400.0	3,868,200.0	48.6	Grid	Grid receptors were located from fenceline out to 10km.
7667	GR-GEM-7265	375,400.0	3,868,700.0	71.3	Grid	Grid receptors were located from fenceline out to 10km.
7668	GR-GEM-7266	375,400.0	3,869,200.0	80.6	Grid	Grid receptors were located from fenceline out to 10km.
7669	GR-GEM-7267	375,400.0	3,869,700.0	107.1	Grid	Grid receptors were located from fenceline out to 10km.
7670	GR-GEM-7268	375,400.0	3,870,200.0	167.3	Grid	Grid receptors were located from fenceline out to 10km.
7671	GR-GEM-7269	375,400.0	3,870,700.0	179.0	Grid	Grid receptors were located from fenceline out to 10km.
7672	GR-GEM-7270	375,400.0	3,871,200.0	189.3	Grid	Grid receptors were located from fenceline out to 10km.
7673	GR-GEM-7271	375,400.0	3,871,700.0	204.8	Grid	Grid receptors were located from fenceline out to 10km.
7674	GR-GEM-7272	375,400.0	3,872,200.0	274.4	Grid	Grid receptors were located from fenceline out to 10km.
7675	GR-GEM-7273	374,900.0	3,856,200.0	782.5	Grid	Grid receptors were located from fenceline out to 10km.
7676	GR-GEM-7274	374,900.0	3,856,700.0	785.7	Grid	Grid receptors were located from fenceline out to 10km.
7677	GR-GEM-7275	374,900.0	3,857,200.0	788.6	Grid	Grid receptors were located from fenceline out to 10km.
7678	GR-GEM-7276	374,900.0	3,857,700.0	789.4	Grid	Grid receptors were located from fenceline out to 10km.
7679	GR-GEM-7277	374,900.0	3,858,200.0	789.6	Grid	Grid receptors were located from fenceline out to 10km.
7680	GR-GEM-7278	374,900.0	3,858,700.0	790.7	Grid	Grid receptors were located from fenceline out to 10km.
7681	GR-GEM-7279	374,900.0	3,859,200.0	794.3	Grid	Grid receptors were located from fenceline out to 10km.
7682	GR-GEM-7280	374,900.0	3,859,700.0	802.1	Grid	Grid receptors were located from fenceline out to 10km.
7683	GR-GEM-7281	374,900.0	3,860,200.0	811.7	Grid	Grid receptors were located from fenceline out to 10km.
7684	GR-GEM-7282	374,900.0	3,860,700.0	822.8	Grid	Grid receptors were located from fenceline out to 10km.
7685	GR-GEM-7283	374,900.0	3,861,200.0	833.5	Grid	Grid receptors were located from fenceline out to 10km.
7686	GR-GEM-7284	374,900.0	3,861,700.0	844.9	Grid	Grid receptors were located from fenceline out to 10km.
7687	GR-GEM-7285	374,900.0	3,862,200.0	857.9	Grid	Grid receptors were located from fenceline out to 10km.
7688	GR-GEM-7286	374,900.0	3,862,700.0	870.5	Grid	Grid receptors were located from fenceline out to 10km.
7689	GR-GEM-7287	374,900.0	3,863,200.0	882.8	Grid	Grid receptors were located from fenceline out to 10km.
7690	GR-GEM-7288	374,900.0	3,863,700.0	894.2	Grid	Grid receptors were located from fenceline out to 10km.
7691	GR-GEM-7289	374,900.0	3,864,200.0	906.6	Grid	Grid receptors were located from fenceline out to 10km.
7692	GR-GEM-7290	374,900.0	3,864,700.0	920.9	Grid	Grid receptors were located from fenceline out to 10km.
7693	GR-GEM-7291	374,900.0	3,865,200.0	938.8	Grid	Grid receptors were located from fenceline out to 10km.
7694	GR-GEM-7292	374,900.0	3,865,700.0	958.5	Grid	Grid receptors were located from fenceline out to 10km.
7695	GR-GEM-7293	374,900.0	3,866,200.0	981.2	Grid	Grid receptors were located from fenceline out to 10km.
7696	GR-GEM-7294	374,900.0	3,866,700.0	999.0	Grid	Grid receptors were located from fenceline out to 10km.
7697	GR-GEM-7295	374,900.0	3,867,200.0	20.1	Grid	Grid receptors were located from fenceline out to 10km.
7698	GR-GEM-7296	374,900.0	3,867,700.0	47.2	Grid	Grid receptors were located from fenceline out to 10km.
7699	GR-GEM-7297	374,900.0	3,868,200.0	72.6	Grid	Grid receptors were located from fenceline out to 10km.
7700	GR-GEM-7298	374,900.0	3,868,700.0	88.8	Grid	Grid receptors were located from fenceline out to 10km.
7701	GR-GEM-7299	374,900.0	3,869,200.0	108.5	Grid	Grid receptors were located from fenceline out to 10km.
7702	GR-GEM-7300	374,900.0	3,869,700.0	134.4	Grid	Grid receptors were located from fenceline out to 10km.
7703	GR-GEM-7301	374,900.0	3,870,200.0	131.3	Grid	Grid receptors were located from fenceline out to 10km.
7704	GR-GEM-7302	374,900.0	3,870,700.0	208.2	Grid	Grid receptors were located from fenceline out to 10km.
7705	GR-GEM-7303	374,900.0	3,871,200.0	202.7	Grid	Grid receptors were located from fenceline out to 10km.
7706	GR-GEM-7304	374,900.0	3,871,700.0	219.5	Grid	Grid receptors were located from fenceline out to 10km.
7707	GR-GEM-7305	374,900.0	3,872,200.0	298.9	Grid	Grid receptors were located from fenceline out to 10km.
7708	GR-GEM-7306	374,400.0	3,856,200.0	787.3	Grid	Grid receptors were located from fenceline out to 10km.
7709	GR-GEM-7307	374,400.0	3,856,700.0	790.0	Grid	Grid receptors were located from fenceline out to 10km.
7710	GR-GEM-7308	374,400.0	3,857,200.0	793.6	Grid	Grid receptors were located from fenceline out to 10km.
7711	GR-GEM-7309	374,400.0	3,857,700.0	794.4	Grid	Grid receptors were located from fenceline out to 10km.
7712	GR-GEM-7310	374,400.0	3,858,200.0	794.7	Grid	Grid receptors were located from fenceline out to 10km.
7713	GR-GEM-7311	374,400.0	3,858,700.0	795.2	Grid	Grid receptors were located from fenceline out to 10km.
7714	GR-GEM-7312	374,400.0	3,859,200.0	799.1	Grid	Grid receptors were located from fenceline out to 10km.
7715	GR-GEM-7313	374,400.0	3,859,700.0	806.8	Grid	Grid receptors were located from fenceline out to 10km.
7716	GR-GEM-7314	374,400.0	3,860,200.0	816.6	Grid	Grid receptors were located from fenceline out to 10km.
7717	GR-GEM-7315	374,400.0	3,860,700.0	827.8	Grid	Grid receptors were located from fenceline out to 10km.
7718	GR-GEM-7316	374,400.0	3,861,200.0	839.0	Grid	Grid receptors were located from fenceline out to 10km.
7719	GR-GEM-7317	374,400.0	3,861,700.0	850.8	Grid	Grid receptors were located from fenceline out to 10km.
7720	GR-GEM-7318	374,400.0	3,862,200.0	863.1	Grid	Grid receptors were located from fenceline out to 10km.
7721	GR-GEM-7319	374,400.0	3,862,700.0	877.6	Grid	Grid receptors were located from fenceline out to 10km.
7722	GR-GEM-7320	374,400.0	3,863,200.0	889.6	Grid	Grid receptors were located from fenceline out to 10km.
7723	GR-GEM-7321	374,400.0	3,863,700.0	902.3	Grid	Grid receptors were located from fenceline out to 10km.
7724	GR-GEM-7322	374,400.0	3,864,200.0	916.0	Grid	Grid receptors were located from fenceline out to 10km.
7725	GR-GEM-7323	374,400.0	3,864,700.0	928.8	Grid	Grid receptors were located from fenceline out to 10km.
7726	GR-GEM-7324	374,400.0	3,865,200.0	946.2	Grid	Grid receptors were located from fenceline out to 10km.
7727	GR-GEM-7325	374,400.0	3,865,700.0	967.2	Grid	Grid receptors were located from fenceline out to 10km.
7728	GR-GEM-7326	374,400.0	3,866,200.0	990.9	Grid	Grid receptors were located from fenceline out to 10km.
7729	GR-GEM-7327	374,400.0	3,866,700.0	14.7	Grid	Grid receptors were located from fenceline out to 10km.
7730	GR-GEM-7328	374,400.0	3,867,200.0	36.3	Grid	Grid receptors were located from fenceline out to 10km.
7731	GR-GEM-7329	374,400.0	3,867,700.0	63.8	Grid	Grid receptors were located from fenceline out to 10km.
7732	GR-GEM-7330	374,400.0	3,868,200.0	87.2	Grid	Grid receptors were located from fenceline out to 10km.
7733	GR-GEM-7331	374,400.0	3,868,700.0	109.9	Grid	Grid receptors were located from fenceline out to 10km.
7734	GR-GEM-7332	374,400.0	3,869,200.0	134.3	Grid	Grid receptors were located from fenceline out to 10km.
7735	GR-GEM-7333	374,400.0	3,869,700.0	158.8	Grid	Grid receptors were located from fenceline out to 10km.
7736	GR-GEM-7334	374,400.0	3,870,200.0	145.9	Grid	Grid receptors were located from fenceline out to 10km.
7737	GR-GEM-7335	374,400.0	3,870,700.0	172.8	Grid	Grid receptors were located from fenceline out to 10km.
7738	GR-GEM-7336	374,400.0	3,871,200.0	178.1	Grid	Grid receptors were located from fenceline out to 10km.
7739	GR-GEM-7337	374,400.0	3,871,700.0	235.4	Grid	Grid receptors were located from fenceline out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
7740	GR-GEM-7338	374,400.0	3,872,200.0	285.9	Grid	Grid receptors were located from fence line out to 10km.
7741	GR-GEM-7339	373,900.0	3,856,200.0	790.0	Grid	Grid receptors were located from fence line out to 10km.
7742	GR-GEM-7340	373,900.0	3,856,700.0	793.4	Grid	Grid receptors were located from fence line out to 10km.
7743	GR-GEM-7341	373,900.0	3,857,200.0	797.8	Grid	Grid receptors were located from fence line out to 10km.
7744	GR-GEM-7342	373,900.0	3,857,700.0	799.7	Grid	Grid receptors were located from fence line out to 10km.
7745	GR-GEM-7343	373,900.0	3,858,200.0	799.7	Grid	Grid receptors were located from fence line out to 10km.
7746	GR-GEM-7344	373,900.0	3,858,700.0	800.9	Grid	Grid receptors were located from fence line out to 10km.
7747	GR-GEM-7345	373,900.0	3,859,200.0	803.3	Grid	Grid receptors were located from fence line out to 10km.
7748	GR-GEM-7346	373,900.0	3,859,700.0	811.1	Grid	Grid receptors were located from fence line out to 10km.
7749	GR-GEM-7347	373,900.0	3,860,200.0	820.2	Grid	Grid receptors were located from fence line out to 10km.
7750	GR-GEM-7348	373,900.0	3,860,700.0	830.5	Grid	Grid receptors were located from fence line out to 10km.
7751	GR-GEM-7349	373,900.0	3,861,200.0	842.8	Grid	Grid receptors were located from fence line out to 10km.
7752	GR-GEM-7350	373,900.0	3,861,700.0	855.0	Grid	Grid receptors were located from fence line out to 10km.
7753	GR-GEM-7351	373,900.0	3,862,200.0	867.7	Grid	Grid receptors were located from fence line out to 10km.
7754	GR-GEM-7352	373,900.0	3,862,700.0	881.9	Grid	Grid receptors were located from fence line out to 10km.
7755	GR-GEM-7353	373,900.0	3,863,200.0	895.9	Grid	Grid receptors were located from fence line out to 10km.
7756	GR-GEM-7354	373,900.0	3,863,700.0	910.7	Grid	Grid receptors were located from fence line out to 10km.
7757	GR-GEM-7355	373,900.0	3,864,200.0	924.7	Grid	Grid receptors were located from fence line out to 10km.
7758	GR-GEM-7356	373,900.0	3,864,700.0	938.6	Grid	Grid receptors were located from fence line out to 10km.
7759	GR-GEM-7357	373,900.0	3,865,200.0	952.2	Grid	Grid receptors were located from fence line out to 10km.
7760	GR-GEM-7358	373,900.0	3,865,700.0	969.4	Grid	Grid receptors were located from fence line out to 10km.
7761	GR-GEM-7359	373,900.0	3,866,200.0	992.5	Grid	Grid receptors were located from fence line out to 10km.
7762	GR-GEM-7360	373,900.0	3,866,700.0	20.2	Grid	Grid receptors were located from fence line out to 10km.
7763	GR-GEM-7361	373,900.0	3,867,200.0	51.8	Grid	Grid receptors were located from fence line out to 10km.
7764	GR-GEM-7362	373,900.0	3,867,700.0	74.5	Grid	Grid receptors were located from fence line out to 10km.
7765	GR-GEM-7363	373,900.0	3,868,200.0	107.0	Grid	Grid receptors were located from fence line out to 10km.
7766	GR-GEM-7364	373,900.0	3,868,700.0	131.0	Grid	Grid receptors were located from fence line out to 10km.
7767	GR-GEM-7365	373,900.0	3,869,200.0	155.9	Grid	Grid receptors were located from fence line out to 10km.
7768	GR-GEM-7366	373,900.0	3,869,700.0	176.3	Grid	Grid receptors were located from fence line out to 10km.
7769	GR-GEM-7367	373,900.0	3,870,200.0	198.7	Grid	Grid receptors were located from fence line out to 10km.
7770	GR-GEM-7368	373,900.0	3,870,700.0	226.4	Grid	Grid receptors were located from fence line out to 10km.
7771	GR-GEM-7369	373,900.0	3,871,200.0	226.8	Grid	Grid receptors were located from fence line out to 10km.
7772	GR-GEM-7370	373,900.0	3,871,700.0	268.7	Grid	Grid receptors were located from fence line out to 10km.
7773	GR-GEM-7371	373,900.0	3,872,200.0	306.9	Grid	Grid receptors were located from fence line out to 10km.
7774	GR-GEM-7372	373,400.0	3,856,200.0	792.9	Grid	Grid receptors were located from fence line out to 10km.
7775	GR-GEM-7373	373,400.0	3,856,700.0	796.8	Grid	Grid receptors were located from fence line out to 10km.
7776	GR-GEM-7374	373,400.0	3,857,200.0	800.6	Grid	Grid receptors were located from fence line out to 10km.
7777	GR-GEM-7375	373,400.0	3,857,700.0	803.5	Grid	Grid receptors were located from fence line out to 10km.
7778	GR-GEM-7376	373,400.0	3,858,200.0	804.6	Grid	Grid receptors were located from fence line out to 10km.
7779	GR-GEM-7377	373,400.0	3,858,700.0	807.3	Grid	Grid receptors were located from fence line out to 10km.
7780	GR-GEM-7378	373,400.0	3,859,200.0	809.8	Grid	Grid receptors were located from fence line out to 10km.
7781	GR-GEM-7379	373,400.0	3,859,700.0	816.2	Grid	Grid receptors were located from fence line out to 10km.
7782	GR-GEM-7380	373,400.0	3,860,200.0	824.6	Grid	Grid receptors were located from fence line out to 10km.
7783	GR-GEM-7381	373,400.0	3,860,700.0	835.6	Grid	Grid receptors were located from fence line out to 10km.
7784	GR-GEM-7382	373,400.0	3,861,200.0	847.8	Grid	Grid receptors were located from fence line out to 10km.
7785	GR-GEM-7383	373,400.0	3,861,700.0	860.7	Grid	Grid receptors were located from fence line out to 10km.
7786	GR-GEM-7384	373,400.0	3,862,200.0	872.8	Grid	Grid receptors were located from fence line out to 10km.
7787	GR-GEM-7385	373,400.0	3,862,700.0	887.7	Grid	Grid receptors were located from fence line out to 10km.
7788	GR-GEM-7386	373,400.0	3,863,200.0	901.6	Grid	Grid receptors were located from fence line out to 10km.
7789	GR-GEM-7387	373,400.0	3,863,700.0	915.5	Grid	Grid receptors were located from fence line out to 10km.
7790	GR-GEM-7388	373,400.0	3,864,200.0	930.4	Grid	Grid receptors were located from fence line out to 10km.
7791	GR-GEM-7389	373,400.0	3,864,700.0	947.1	Grid	Grid receptors were located from fence line out to 10km.
7792	GR-GEM-7390	373,400.0	3,865,200.0	961.4	Grid	Grid receptors were located from fence line out to 10km.
7793	GR-GEM-7391	373,400.0	3,865,700.0	978.4	Grid	Grid receptors were located from fence line out to 10km.
7794	GR-GEM-7392	373,400.0	3,866,200.0	997.7	Grid	Grid receptors were located from fence line out to 10km.
7795	GR-GEM-7393	373,400.0	3,866,700.0	20.7	Grid	Grid receptors were located from fence line out to 10km.
7796	GR-GEM-7394	373,400.0	3,867,200.0	51.5	Grid	Grid receptors were located from fence line out to 10km.
7797	GR-GEM-7395	373,400.0	3,867,700.0	79.6	Grid	Grid receptors were located from fence line out to 10km.
7798	GR-GEM-7396	373,400.0	3,868,200.0	110.3	Grid	Grid receptors were located from fence line out to 10km.
7799	GR-GEM-7397	373,400.0	3,868,700.0	137.3	Grid	Grid receptors were located from fence line out to 10km.
7800	GR-GEM-7398	373,400.0	3,869,200.0	155.6	Grid	Grid receptors were located from fence line out to 10km.
7801	GR-GEM-7399	373,400.0	3,869,700.0	189.2	Grid	Grid receptors were located from fence line out to 10km.
7802	GR-GEM-7400	373,400.0	3,870,200.0	225.8	Grid	Grid receptors were located from fence line out to 10km.
7803	GR-GEM-7401	373,400.0	3,870,700.0	243.5	Grid	Grid receptors were located from fence line out to 10km.
7804	GR-GEM-7402	373,400.0	3,871,200.0	266.9	Grid	Grid receptors were located from fence line out to 10km.
7805	GR-GEM-7403	373,400.0	3,871,700.0	324.0	Grid	Grid receptors were located from fence line out to 10km.
7806	GR-GEM-7404	373,400.0	3,872,200.0	342.4	Grid	Grid receptors were located from fence line out to 10km.
7807	GR-GEM-7405	372,900.0	3,856,200.0	795.5	Grid	Grid receptors were located from fence line out to 10km.
7808	GR-GEM-7406	372,900.0	3,856,700.0	799.0	Grid	Grid receptors were located from fence line out to 10km.
7809	GR-GEM-7407	372,900.0	3,857,200.0	802.9	Grid	Grid receptors were located from fence line out to 10km.
7810	GR-GEM-7408	372,900.0	3,857,700.0	806.5	Grid	Grid receptors were located from fence line out to 10km.
7811	GR-GEM-7409	372,900.0	3,858,200.0	809.5	Grid	Grid receptors were located from fence line out to 10km.
7812	GR-GEM-7410	372,900.0	3,858,700.0	812.7	Grid	Grid receptors were located from fence line out to 10km.
7813	GR-GEM-7411	372,900.0	3,859,200.0	816.9	Grid	Grid receptors were located from fence line out to 10km.
7814	GR-GEM-7412	372,900.0	3,859,700.0	821.6	Grid	Grid receptors were located from fence line out to 10km.
7815	GR-GEM-7413	372,900.0	3,860,200.0	829.5	Grid	Grid receptors were located from fence line out to 10km.
7816	GR-GEM-7414	372,900.0	3,860,700.0	840.6	Grid	Grid receptors were located from fence line out to 10km.
7817	GR-GEM-7415	372,900.0	3,861,200.0	853.7	Grid	Grid receptors were located from fence line out to 10km.
7818	GR-GEM-7416	372,900.0	3,861,700.0	865.5	Grid	Grid receptors were located from fence line out to 10km.
7819	GR-GEM-7417	372,900.0	3,862,200.0	879.5	Grid	Grid receptors were located from fence line out to 10km.
7820	GR-GEM-7418	372,900.0	3,862,700.0	893.1	Grid	Grid receptors were located from fence line out to 10km.
7821	GR-GEM-7419	372,900.0	3,863,200.0	908.6	Grid	Grid receptors were located from fence line out to 10km.
7822	GR-GEM-7420	372,900.0	3,863,700.0	924.4	Grid	Grid receptors were located from fence line out to 10km.
7823	GR-GEM-7421	372,900.0	3,864,200.0	940.9	Grid	Grid receptors were located from fence line out to 10km.
7824	GR-GEM-7422	372,900.0	3,864,700.0	955.6	Grid	Grid receptors were located from fence line out to 10km.
7825	GR-GEM-7423	372,900.0	3,865,200.0	969.8	Grid	Grid receptors were located from fence line out to 10km.
7826	GR-GEM-7424	372,900.0	3,865,700.0	984.7	Grid	Grid receptors were located from fence line out to 10km.

Number of Receptor	ID	UTM E (m)	UTM N (m)	Terrain Elevation (m)	Type of Receptor	Description
7827	GR-GEM-7425	372,900.0	3,866,200.0	3.5	Grid	Grid receptors were located from fenceline out to 10km.
7828	GR-GEM-7426	372,900.0	3,866,700.0	27.1	Grid	Grid receptors were located from fenceline out to 10km.
7829	GR-GEM-7427	372,900.0	3,867,200.0	52.2	Grid	Grid receptors were located from fenceline out to 10km.
7830	GR-GEM-7428	372,900.0	3,867,700.0	79.7	Grid	Grid receptors were located from fenceline out to 10km.
7831	GR-GEM-7429	372,900.0	3,868,200.0	114.4	Grid	Grid receptors were located from fenceline out to 10km.
7832	GR-GEM-7430	372,900.0	3,868,700.0	149.3	Grid	Grid receptors were located from fenceline out to 10km.
7833	GR-GEM-7431	372,900.0	3,869,200.0	175.7	Grid	Grid receptors were located from fenceline out to 10km.
7834	GR-GEM-7432	372,900.0	3,869,700.0	206.5	Grid	Grid receptors were located from fenceline out to 10km.
7835	GR-GEM-7433	372,900.0	3,870,200.0	241.8	Grid	Grid receptors were located from fenceline out to 10km.
7836	GR-GEM-7434	372,900.0	3,870,700.0	256.5	Grid	Grid receptors were located from fenceline out to 10km.
7837	GR-GEM-7435	372,900.0	3,871,200.0	311.7	Grid	Grid receptors were located from fenceline out to 10km.
7838	GR-GEM-7436	372,900.0	3,871,700.0	385.1	Grid	Grid receptors were located from fenceline out to 10km.
7839	GR-GEM-7437	372,900.0	3,872,200.0	464.2	Grid	Grid receptors were located from fenceline out to 10km.
7840	GR-GEM-7438	372,400.0	3,856,200.0	798.2	Grid	Grid receptors were located from fenceline out to 10km.
7841	GR-GEM-7439	372,400.0	3,856,700.0	801.9	Grid	Grid receptors were located from fenceline out to 10km.
7842	GR-GEM-7440	372,400.0	3,857,200.0	805.7	Grid	Grid receptors were located from fenceline out to 10km.
7843	GR-GEM-7441	372,400.0	3,857,700.0	809.9	Grid	Grid receptors were located from fenceline out to 10km.
7844	GR-GEM-7442	372,400.0	3,858,200.0	814.3	Grid	Grid receptors were located from fenceline out to 10km.
7845	GR-GEM-7443	372,400.0	3,858,700.0	818.1	Grid	Grid receptors were located from fenceline out to 10km.
7846	GR-GEM-7444	372,400.0	3,859,200.0	823.3	Grid	Grid receptors were located from fenceline out to 10km.
7847	GR-GEM-7445	372,400.0	3,859,700.0	827.7	Grid	Grid receptors were located from fenceline out to 10km.
7848	GR-GEM-7446	372,400.0	3,860,200.0	834.6	Grid	Grid receptors were located from fenceline out to 10km.
7849	GR-GEM-7447	372,400.0	3,860,700.0	845.4	Grid	Grid receptors were located from fenceline out to 10km.
7850	GR-GEM-7448	372,400.0	3,861,200.0	856.7	Grid	Grid receptors were located from fenceline out to 10km.
7851	GR-GEM-7449	372,400.0	3,861,700.0	869.6	Grid	Grid receptors were located from fenceline out to 10km.
7852	GR-GEM-7450	372,400.0	3,862,200.0	884.2	Grid	Grid receptors were located from fenceline out to 10km.
7853	GR-GEM-7451	372,400.0	3,862,700.0	898.6	Grid	Grid receptors were located from fenceline out to 10km.
7854	GR-GEM-7452	372,400.0	3,863,200.0	914.3	Grid	Grid receptors were located from fenceline out to 10km.
7855	GR-GEM-7453	372,400.0	3,863,700.0	930.3	Grid	Grid receptors were located from fenceline out to 10km.
7856	GR-GEM-7454	372,400.0	3,864,200.0	947.8	Grid	Grid receptors were located from fenceline out to 10km.
7857	GR-GEM-7455	372,400.0	3,864,700.0	964.8	Grid	Grid receptors were located from fenceline out to 10km.
7858	GR-GEM-7456	372,400.0	3,865,200.0	984.0	Grid	Grid receptors were located from fenceline out to 10km.
7859	GR-GEM-7457	372,400.0	3,865,700.0	997.7	Grid	Grid receptors were located from fenceline out to 10km.
7860	GR-GEM-7458	372,400.0	3,866,200.0	13.5	Grid	Grid receptors were located from fenceline out to 10km.
7861	GR-GEM-7459	372,400.0	3,866,700.0	31.9	Grid	Grid receptors were located from fenceline out to 10km.
7862	GR-GEM-7460	372,400.0	3,867,200.0	62.3	Grid	Grid receptors were located from fenceline out to 10km.
7863	GR-GEM-7461	372,400.0	3,867,700.0	77.1	Grid	Grid receptors were located from fenceline out to 10km.
7864	GR-GEM-7462	372,400.0	3,868,200.0	94.4	Grid	Grid receptors were located from fenceline out to 10km.
7865	GR-GEM-7463	372,400.0	3,868,700.0	136.6	Grid	Grid receptors were located from fenceline out to 10km.
7866	GR-GEM-7464	372,400.0	3,869,200.0	180.1	Grid	Grid receptors were located from fenceline out to 10km.
7867	GR-GEM-7465	372,400.0	3,869,700.0	200.9	Grid	Grid receptors were located from fenceline out to 10km.
7868	GR-GEM-7466	372,400.0	3,870,200.0	245.8	Grid	Grid receptors were located from fenceline out to 10km.
7869	GR-GEM-7467	372,400.0	3,870,700.0	276.2	Grid	Grid receptors were located from fenceline out to 10km.
7870	GR-GEM-7468	372,400.0	3,871,200.0	350.8	Grid	Grid receptors were located from fenceline out to 10km.
7871	GR-GEM-7469	372,400.0	3,871,700.0	329.9	Grid	Grid receptors were located from fenceline out to 10km.
7872	GR-GEM-7470	372,400.0	3,872,200.0	352.7	Grid	Grid receptors were located from fenceline out to 10km.
7873	GR-GEM-7471	371,900.0	3,856,200.0	801.6	Grid	Grid receptors were located from fenceline out to 10km.
7874	GR-GEM-7472	371,900.0	3,856,700.0	804.7	Grid	Grid receptors were located from fenceline out to 10km.
7875	GR-GEM-7473	371,900.0	3,857,200.0	808.8	Grid	Grid receptors were located from fenceline out to 10km.
7876	GR-GEM-7474	371,900.0	3,857,700.0	813.0	Grid	Grid receptors were located from fenceline out to 10km.
7877	GR-GEM-7475	371,900.0	3,858,200.0	818.1	Grid	Grid receptors were located from fenceline out to 10km.
7878	GR-GEM-7476	371,900.0	3,858,700.0	823.9	Grid	Grid receptors were located from fenceline out to 10km.
7879	GR-GEM-7477	371,900.0	3,859,200.0	827.9	Grid	Grid receptors were located from fenceline out to 10km.
7880	GR-GEM-7478	371,900.0	3,859,700.0	834.4	Grid	Grid receptors were located from fenceline out to 10km.
7881	GR-GEM-7479	371,900.0	3,860,200.0	841.3	Grid	Grid receptors were located from fenceline out to 10km.
7882	GR-GEM-7480	371,900.0	3,860,700.0	849.5	Grid	Grid receptors were located from fenceline out to 10km.
7883	GR-GEM-7481	371,900.0	3,861,200.0	861.4	Grid	Grid receptors were located from fenceline out to 10km.
7884	GR-GEM-7482	371,900.0	3,861,700.0	873.7	Grid	Grid receptors were located from fenceline out to 10km.
7885	GR-GEM-7483	371,900.0	3,862,200.0	888.2	Grid	Grid receptors were located from fenceline out to 10km.
7886	GR-GEM-7484	371,900.0	3,862,700.0	903.0	Grid	Grid receptors were located from fenceline out to 10km.
7887	GR-GEM-7485	371,900.0	3,863,200.0	918.4	Grid	Grid receptors were located from fenceline out to 10km.
7888	GR-GEM-7486	371,900.0	3,863,700.0	935.7	Grid	Grid receptors were located from fenceline out to 10km.
7889	GR-GEM-7487	371,900.0	3,864,200.0	955.1	Grid	Grid receptors were located from fenceline out to 10km.
7890	GR-GEM-7488	371,900.0	3,864,700.0	973.1	Grid	Grid receptors were located from fenceline out to 10km.
7891	GR-GEM-7489	371,900.0	3,865,200.0	991.9	Grid	Grid receptors were located from fenceline out to 10km.
7892	GR-GEM-7490	371,900.0	3,865,700.0	12.1	Grid	Grid receptors were located from fenceline out to 10km.
7893	GR-GEM-7491	371,900.0	3,866,200.0	27.2	Grid	Grid receptors were located from fenceline out to 10km.
7894	GR-GEM-7492	371,900.0	3,866,700.0	46.3	Grid	Grid receptors were located from fenceline out to 10km.
7895	GR-GEM-7493	371,900.0	3,867,200.0	69.7	Grid	Grid receptors were located from fenceline out to 10km.
7896	GR-GEM-7494	371,900.0	3,867,700.0	107.9	Grid	Grid receptors were located from fenceline out to 10km.
7897	GR-GEM-7495	371,900.0	3,868,200.0	134.8	Grid	Grid receptors were located from fenceline out to 10km.
7898	GR-GEM-7496	371,900.0	3,868,700.0	154.5	Grid	Grid receptors were located from fenceline out to 10km.
7899	GR-GEM-7497	371,900.0	3,869,200.0	176.5	Grid	Grid receptors were located from fenceline out to 10km.
7900	GR-GEM-7498	371,900.0	3,869,700.0	206.1	Grid	Grid receptors were located from fenceline out to 10km.
7901	GR-GEM-7499	371,900.0	3,870,200.0	253.2	Grid	Grid receptors were located from fenceline out to 10km.
7902	GR-GEM-7500	371,900.0	3,870,700.0	276.3	Grid	Grid receptors were located from fenceline out to 10km.
7903	GR-GEM-7501	371,900.0	3,871,200.0	357.2	Grid	Grid receptors were located from fenceline out to 10km.
7904	GR-GEM-7502	371,900.0	3,871,700.0	451.4	Grid	Grid receptors were located from fenceline out to 10km.
7905	GR-GEM-7503	371,900.0	3,872,200.0	501.8	Grid	Grid receptors were located from fenceline out to 10km.

**APPENDIX 5.1G**

**Ambient Air Quality Concentrations by Year**

**Appendix 5.1G - Table 1**  
**Background Data By Year and Station**  
**Gem Energy Storage Center**

**Station Information**

Station	AQS Number	CARB Number	Air Basin	County	Latitude (N)	Longitude (W)	Elevation (m)
Mojave	60290011	15252	Mojave Desert	Kern	35.05045	-118.14778	835
Lancaster	60379033	70301	Mojave Desert	Los Angeles	34.66959	-118.13068	750
Victorville	60710306	36306	Mojave Desert	San Bernardino	34.51096	-117.32555	913

**Background Data**

Pollutant	Units	Averaging Time	Basis	Site	2018	2019	2020
Ozone	ppm	1-hour	CAAQS-1st High	Mojave	0.11	0.09	0.11
		8-hour	CAAQS-1st High	Mojave	0.09	0.08	0.10
			NAAQS-4th High	Mojave	0.09	0.07	0.09
NO <sub>2</sub>	ppb	1-hour	CAAQS-1st High	Lancaster	48.00	50.00	52.00
			NAAQS-98th percentile	Lancaster	40.00	40.00	40.00
		Annual	CAAQS/NAAQS-AAM	Lancaster	8.66	8.17	8.35
CO	ppm	1-hour	CAAQS/NAAQS-1ST High	Lancaster	1.20	1.40	1.60
		8-hour	CAAQS/NAAQS-1ST High	Lancaster	1.00	0.90	1.10
SO <sub>2</sub>	ppb	1-hour	CAAQS/NAAQS-1ST High	Victorville	9.90	4.30	3.60
		24-hour	CAAQS/NAAQS-1ST High	Victorville	2.70	3.40	2.20
PM10	µg/m <sup>3</sup>	24-hour	CAAQS-1st High	Mojave	92.00	248.00	111.00
			NAAQS-2nd High	Mojave	89.00	192.00	109.00
		Annual	CAAQS-AAM	Mojave	24.16	21.70	35.32
PM2.5	µg/m <sup>3</sup>	24-hour	NAAQS-98th percentile	Mojave	26.00	14.00	33.00
		Annual	CAAQS/NAAQS-AAM	Mojave	7.10	6.50	8.40