TECHNICAL MEMORANDUM

GOLDEN QUEEN MINE MODIFICATION AIR QUALITY IMPACTS

PREPARED FOR:	Golden Queen Mining Company
PREPARED BY:	Tom Brauch
PROJECT NO.:	48-1
COPIES:	Brian Smith, Dara English, Jason Rodden, Ken Mann
DATE:	June 24, 2020

This memorandum outlines the potential air quality impacts of the proposed mine modification for the Soledad Mountain Mine near Mojave, CA. The Mine has been subject to prior environmental review, including a Final Environmental Impact Report/Environmental Impact Statement (Final EIR/EIS, Kern County Planning Department & Bureau of Land Management 1997) (1997 EIR/EIS) and a Supplement to the 1997 EIR/EIS adopted in 2010 (2010 Supplemental EIR). The 2010 Supplemental EIR analyzed a subset of the overall project analyzed in the 1997 EIR/EIS. The Modified Project is similar to the 1997 Project, with some modifications. Accordingly, this memo will discuss operational and equipment configurations from the 1997 Project in relation to the Modified Project. It will summarize the difference in emissions of the two scenarios and discuss the significance of the emissions of the proposed modification in terms of CEQA.

Proposed Changes in Operations and Equipment that may affect Air Quality

This section will outline the proposed changes from the Project as approved in 1997 that have the potential to impact air quality. Table 1 presents the Project site and processing differences between 1997 and the Modified Project.

Table 1. Site and Processing Differences between 1997 and Modified Project

1997 Project	Modified Project	Difference from 1997
Project Acreage		
Project Site: 1,690 acres Disturbed Acreage: 930 acres	Project Site: ~2009 acres Disturbed Acreage: 1188 acres	Project Site: + 319 acres Disturbed Acreage: +258 acres
Project Tonnage		
Overburden: 225 million tons Ore: 60 million tons	Overburden: 264 million tons Ore: 59 million tons	Overburden: +39 million tons Ore: -1 million ton
Mining rate up to 6 million tons ore per year	Mining rate up to 4.7 million tons ore per year	Mining rate: -1.3 million tons ore per year
Up to 30 million tons combined ore and overburden per year	Up to 24 million tons combined ore and overburden per year	- 6 million tons combined ore and overburden per year
Blast rate of up to one blast per day	Blast rate of up to one blast per day	No change

Table 2 presents the equipment differences between 1997 and Modified Project.

Table 2. Equipment Differences between 1997and Modified Project.

1997 Project	Modified Project	Difference from 1997
Equipment:	*Equipment:*	*Equipment:*
Crawler Drills (2)	Crawler Drills (5)	Crawler Drills (+3)
Blast Hole Drills (3)		Blast Hole Drills (-3)
ANFO Truck (1)		ANFO Truck (-1)
Wheel Loaders (5)	Front-end Loader (4)	Front-end Loader (-1)
	Excavator (6)	Excavator (+6)
Haul Trucks (9)	Haul trucks (13)	Haul trucks (+4)
Dozers-Track (4)	Dozers-Track (3)	Dozers-Track (-1)
	Rubber Tired Dozer (1)	Rubber Tired Dozer (+1)
Motor Graders (2)	Motor Grader (1)	Motor Grader (-1)
Water Wagon (2)	Water Wagon (2)	Water Wagon (n.c)
	Utility Loader (1)	Utility Loader (+1)
	Skid Steer (3)	Skid Steer (+3)
Hydraulic Crane (1)	Hydraulic Crane (1)	Hydraulic Crane (n.c.)
Maint.Trucks (3)	Maint.Truck (5)	Maint.Truck (+2)
	Service Truck (2)	Service Truck (+1)
Portable Lights (8)	Light Plant (9)	Light Plant (+1)
	Forklift (4)	Forklift (+4)
	Small Track Dozer (1)	Small Track Dozer (+1)
	ATV (9)	ATV (+9)
	Pickups (48)	Pickups (+48)
Van (1)	Van (2)	Van (+1)
	Backhoe (1)	Backhoe (+1)
Fuel Truck (1)		Fuel Truck (-1)

Emissions Summary for Modified Project

This section presents the assumptions made and the emission factors used to calculate the emissions summary for the proposed modification.

Emission Sources

These air quality impact analyses include both process and fugitive emissions from the Project. The emission sources included in these analyses can be categorized as shown in Table 3.

Table 3: Source Categories Included in Analyses

Process Sources	Fugitive Sources
Ore Dumping at Primary Crusher	Drilling
Ore Crushing and Screening	Blasting
Ore Transfers and Stockpiles	Material (ore and waste rock) Loading and Unloading
Ore Grinding and Agglomeration	Material Hauling
Cement Silo (loading and discharge)	Mobile Machinery (mining equipment and support vehicles) Tailpipe
Aggregate Processing	Wind Erosion
	Haul Road and Surface Maintenance (dozing and grading)

The Project process and fugitive sources included in these analyses and their corresponding activity rates are presented in Tables 4 and 5.

Table 4. List of Process Sources

Source/Activity	Process rate	
Truck Dump to Coarse Ore Hopper	716.5	*ton/hr*
Primary Crushing	716.5	*ton/hr*
Ore Transfer - Primary Crusher to Primary Crusher Discharge Conveyor (3141)	716.5	*ton/hr*
Ore Transfer - 3141 to Coarse Ore Stacker (3142)	716.5	*ton/hr*
Ore Transfer - 3142 to Coarse Ore to Stockpile	716.5	*ton/hr*
Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241)	716.5	*ton/hr*
Ore Transfer - 3241 to Secondary Crushing-Screening Plant	1,095.7	*ton/hr*
Screening	1,095.7	*ton/hr*
Cone Crushing	379.2	*ton/hr*
Ore Transfer - Screen to Fine Ore Conveyor (3244)	716.5	*ton/hr*
Ore Transfer - Cone Crusher Product Conveyor (3242)	379.2	*ton/hr*
Ore Transfer - 3242 to Scissors Conveyor (3243)	379.2	*ton/hr*
Ore Transfer - 3243 to 3241	379.2	*ton/hr*
Ore Transfer - 3244 to Fine Ore Bin	716.5	*ton/hr*
Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342)	716.6	*ton/hr*
Ore Transfer - 3342 to HPGR	716.6	*ton/hr*
Cement Silo Loading	30.0	*ton/hr*
Cement Silo Discharge	3.6	*ton/hr*
High Pressure Grinding Roll	720.1	*ton/hr*
Ore Transfer - HPGR Discharge to HPGR Product Conveyor (3343)	720.1	*ton/hr*
Ore Transfer - 3343 to Fine Ore Stacker (3441)	720.1	*ton/hr*
Ore Transfer - 3441 to Fine Ore Stockpile	720.1	*ton/hr*
Ore Transfer - Fine Ore Stockpile to Overland Conveyor	720.0	*ton/hr*
Ore Transfer - Overland Conveyor to Leach Pads	720.0	*ton/hr*
Aggregate Processing	200.0	*ton/hr*

Table 5. List of Fugitive Sources

Source Description	Activity rate	
Drilling	47,619	*holes/yr*
Blasting	250	*blasts/yr*
In-Pit Ore Loading	4,700,000	*ton/yr*
In-Pit Waste Rock Loading	19,300,000	*ton/yr*
Waste Rock Unloading	19,300,000	*ton/yr*
Ore and Waste Rock Hauling - Inside Pit	84,906	*VMT*
Ore Hauling - Pit to Primary Crusher	25,193	*VMT*
Waste Rock Hauling - Pit to Waste Rock Storage Area	51,726	*VMT*
Waste Rock Hauling - Inside Waste Rock Storage Area	31,036	*VMT*
Waste Rock Hauling - Pit to Access Road Construction Site	51,726	*VMT*
Dozing	7,641	*hr/yr*
Grading	11,680	*VMT*
Wind Erosion -Coarse Ore Stockpile	0.90	*acre/yr*
Wind Erosion -Fine Ore Stockpile	0.60	*acre/yr*
Wind Erosion -Haul Roads - Inside Pit	1.82	*acre/yr*
Wind Erosion -Haul Roads - Pit to PC	2.75	*acre/yr*
Wind Erosion -Haul Roads - Pit to Waste Rock Storage Area	2.99	*acre/yr*
Wind Erosion -Haul Roads - Inside Waste Rock Storage Area	1.65	*acre/yr*
Wind Erosion -Haul Roads - Pit to Access Road Construction Site	2.75	*acre/yr*
Wind Erosion -Access Roads - Inside Process Area	6.43	*acre/yr*
Mining Equipment (Diesel) Tailpipe	77,348,965	*hp-hr/yr*
Support Vehicles (Gasoline) Tailpipe	738,000	*miles/yr*

Unlike process sources, fugitive sources are not modeled exclusively, rather they are represented by appropriate activity locations. The activity locations modeled to represent the fugitive source emissions are presented in Table 6.

Table 6. Activity Locations Modeled to Represent Fugitive Emissions

Activity Location	Emission Sources
Pit	Drilling, blasting, ore and waste rock loading, hauling, equipment tailpipe, dozing, grading, wind erosion
Waste Rock Storage Area	Hauling, waste rock unloading, equipment tailpipe, dozing, grading, wind erosion
Access Road Construction Site	Hauling, waste rock unloading, equipment tailpipe, dozing, wind erosion
Haul Roads - Pit to Primary Crusher	Hauling, equipment tailpipe, grading, wind erosion
Haul Roads - Pit to Waste Rock Storage Area	Hauling, equipment tailpipe, grading, wind erosion
Access Roads - Inside Process Area	Hauling, equipment tailpipe, grading, wind erosion
Haul Roads - Pit to Access Road Construction Site	Hauling, equipment tailpipe, grading, wind erosion

Table 6 shows that the Project fugitive emissions associated with activities listed in Table 5 are included in the calculations characterized by three activity locations, i.e., the Pit, the waste rock storage area, and the access road construction site; and four haul/access routes, i.e., pit to primary crusher, pit to waste rock storage area, pit to access road construction site, and access road inside process area. Hauling emissions inside each activity location are included in the respective activity locations. As shown in this table, the Pit includes emissions from drilling, blasting, material loading and hauling inside the pit and associated haul truck tailpipe, mining equipment tailpipe, dozing, grading, and wind erosion. Similarly, the waste rock storage area represents emissions associated with waste rock hauling and unloading, haul truck tailpipe, surface maintenance, and wind erosion of the waste rock dumps. The haul roads include emissions associated with hauling, surface maintenance, and wind erosion.

The hauling and associated tailpipe emissions are distributed amongst the hauling routes and activity locations, based on scaling factors derived from vehicle miles travelled ("VMT") on each of the haul routes.

Project Potential Emissions

The estimated short-term (pounds per hour ["lb/hr"]) and long-term (tons per year ["ton/yr"]) Project potential emissions are presented in Table 7.

Table 7. Project Potential Emissions

Source/Activity	Potential Emissions											
	CO		NO_x		PM_{10}		$PM_{2.5}$		SO_2		VOC	
	lb/hr	*ton/yr*	*lb/hr*	*ton/yr*	*lb/hr*	*ton/yr*	*lb/hr*	*ton/yr*	*lb/hr*	*ton/yr*	*lb/hr*	*ton/yr*
Ore Processing					0.49	2.06	0.06	0.21				
Aggregate Processing					3.01	3.76	0.15	0.17				
Emergency Generator	2.59	0.13	16.35	0.82	0.225	.011	0.225	.011	4.55	0.01	0.20	0.01
Fugitives	31.64	228.37	17.38	187.18	405.29	88.32	51.23	14.88	2.22	13.71	2.36	13.71
Facility-wide Total	34.23	228.50	33.73	188.00	409.01	94.15	51.67	15.27	6.78	13.72	2.56	13.72

The fugitive source hourly emission rates presented in Table 7 are not continuous rates, but rather represent the maximum hourly emissions for activities with variable hourly emission rates. For example, blasting occurs once per day, and for the rest of the day there are no blasting emissions. The hourly blasting emission rate is calculated by applying the emissions from a blast to a single hour, rather than averaging the blasting emissions over the entire day.

The source-specific short-term (in lb/hr) and long-term (in ton/yr) potential emissions are presented in Appendix A.

The emission factors used to develop the Project potential emissions inventory are presented in Appendix A.

Several particulate control methods are currently implemented and will continue to be implemented at the Project. The particulate control methods associated with each source of dust emissions are incorporated into the emissions inventory using control efficiency values. The particulate control methods and associated efficiencies used for the Project potential emissions inventory are provided in Table 8.

Table 8. Control Methods and Efficiencies

Control	Efficiency
Water Sprays	75.0%
Highly Maintained Haul/Access Roads	90.0%
Chemical Application/Watering	90.0%
Dust Collection System (Drilling)	90.0%
Water Sprays/Enclosure	94.0%
Foggers	99.0%
Wet Scrubber	99.0%
Wet Material	95.0%
Bin Vent	99.0%

Emissions Summaries for the 1997 Project and for the Modified Project

This section will present the emissions for the 1997 Project as analyzed in the 1997 EIR/EIS and the Modified Project, and summarize the changes between the two.

Net Increase in Nonattainment Pollutants

The Project would result in a cumulative net emissions decrease compared to the Project analyzed and approved in 1997.

The cumulative setting for the Project is in the KCAPCD. Cumulative impacts are two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts.

One of the significance criteria applied in the 1997 FEIR/EIS was whether the Project would *"result in a net increase of any criteria pollutant for which the project area has not attained applicable federal or state ambient air quality standards"* (1997 FEIR/EIS, p. 208). The 1997 FEIR/EIS concluded:

> *This type of mining project was anticipated by the Kern County Air Pollution Control District and is in conformity with the air district's plan for attainment of the ozone NAAQS and CAAQS... The proposed project will obtain permits, as applicable, from the Kern County Air Pollution Control District and comply with all applicable rules and regulations designed to achieve or maintain compliance with NAAQS or CAAQS... The proposed project would not violate any approved plan for achieving or maintaining compliance with NAAQS or CAAQS, local or regional growth or congestion plans or local CEQA significance standards for air quality...* (1997 FEIR/EIS, pp. 208, 219, 220)

With the exception of NO_x emissions from mobile sources (due to added truck trips transporting aggregate), the changes in the Modified Project do not change the conclusions in the 1997 FEIR/EIS. Although some Project changes (e.g., aggregate processing) and methodologies (e.g., different emission factors) may result in higher non-mobile source emissions, this increase is more than offset by other Project changes that reduce emissions. Additional information is presented here regarding all Project pollutants.

The Project site is in a relatively remote area and there are no other significant projects within a six-mile radius that are expected to contribute significantly to cumulative air quality impacts.

As shown in Table 9, changes to key design features in the Modified Project indicate that material handling activities and fuel consumption will be slightly higher for the Modified Project than they would have been for the previously approved 1997 Project.

Table 9. Soledad Mountain Project 1997and 2019 Design Features

Design Feature/Parameter	Unit	1997	2019
Life of extractive operations	yr	15	15
Life of mine ore production	MMt	45.5	41.8
Life of mine waste production	MMt	204.5	233.6
Life of mine total material production	MMt	250.0	275
Life of mine aggregate production	MMt	0.0	18.2
Life of mine on-site diesel use	MMgal	24.9	49.7
Life of mine on-site gasoline use	MMgal	0.6	0.7

A complete summary of criteria emissions from the Modified Project is presented in Table 10 along with a comparison to the 1997 Project and the mass thresholds currently used in applying this significance criterion.

Table 10. Modified Project Emissions Summary and Thresholds of Significance

Pollutant	1997 Project Emissions[a]	Modified Project Emissions[b]	Thresholds of Significance
Non-Mobile Sources (ton/yr)			
PM_{10}	18.42	15.6	15
$PM_{2.5}$	3.30	0.9	n/a
CO	170.9	144.7	100
SO_x	5.1	4.3	27
NO_x	43.4	36.7	25
VOC/ROG	.002	.002	25
Mobile Sources (lb/day)			
NOx	463.3	415.9	137
VOC/ROG	66.8	56.6	137

[a]Source: Non-Mobile sources calculated from annual tons processed times emission factors (lb/ton), and conversion to tons. Mobile sources calculated based on equipment list, emission factors, and usage in 1997 Project.
[b] Source: Engineering Calculations in Appendix A.

Table 10 shows that the Modified Project will result in fewer emissions in every category than analyzed in the 1997 EIR/EIS. While several of the emissions categories exceed applicable thresholds of significance, none of the emissions sources represent a new or more severe significant impact compared to emissions as analyzed in the 1997 EIR/EIS.

Further, the existing mitigation measures identified in the 1997 EIR/EIS and 2010 Supplemental EIR will continue to apply to the Modified Project.

The following regulatory requirements and mitigation measures/conditions of approval from the 1997 FEIR/EIS remain applicable to the Modified Project:

Regulatory Requirements

- The Kern County Air Pollution Control District (KCAPCD) will review facility designs and operations for compliance with Federal and California regulations for the protection of air quality. An application for Authority to Construct has been submitted to the KCAPCD.

- As required by the KCAPCD, permitted sources of emissions will be equipped with Best Available Control Technology (BACT).
- Roads will be maintained on a routine basis. Appropriate dust suppression techniques will be used on roads and disturbed surfaces to minimize fugitive emissions.
- As required by the KCAPCD, sources of emissions will be controlled to ensure compliance with California Health and Safety Code §41700 (i.e., nuisance) and §41701 (i.e., visible emissions).

Existing Mitigation Measures/Conditions of Approval

- Onsite equipment and vehicles will be maintained on a routine basis, as recommended by manufacturer manuals, to reduce exhaust emissions. (Condition of Approval No. 21)
- Monitoring stations for PM_{10} have been established upwind and downwind from the processing facilities. (Condition of Approval No. 22 – condition satisfied)
- A mercury retort will be installed to control mercury emissions. (Condition of Approval No. 23 – condition satisfied)
- The size and number of blasts in the mine will be limited by good engineering design. (Condition of Approval No. 24)
- The existing tailings piles will be removed, thereby reducing the long- term fugitive emissions from the site. (Condition of Approval No. 25)
- The adopted reclamation plan shall include reclamation of previously disturbed areas. (Condition of Approval No. 26)

Greenhouse Gas Emissions

Global climate change could be caused by increased greenhouse gas emissions and refers to changes in average climatic conditions on earth as a whole, including temperature, wind patterns, precipitation, and storms. The six major greenhouse gases identified by the Kyoto Protocol are carbon dioxide (CO_2), methane, nitrous oxide, sulfur hexafluoride, haloalkanes, and perfluorocarbons.

The 1997 FEIR/EIS did not analyze the Project's greenhouse gas emissions or the potential impact on or contribution to climate change because CEQA did not require such an analysis at that time. In order to trigger additional environmental review following certification of an initial EIR for a project, Public Resources Code Section 21166 provides that there must be "new information, which was not known and could not have been known at the time the environmental impact report was certified..." The concepts of climate change and human contribution to that phenomenon do not constitute "new information" within the meaning of Public Resources Code Section 21166 because information relating to these concepts was widely available and publicly debated as early as 1988, when the United Nations established the Intergovernmental Panel on Climate Change. Thus, information about climate change was available at the time the 1997 FEIR/EIS was certified and could have been raised at that time. The time to challenge any deficiencies in the 1997 FEIR/EIS has long since passed, and it must be accepted as adequate for the Project as then approved. Therefore, as with all other topics covered in this document, there would only need to be analysis of climate change and greenhouse gas emissions if the Project's contribution of greenhouse gases were to increase as a result of changes incorporated into the Modified Project.

The AQ/HRA (Air Sciences 2009b) determined that carbon dioxide will be the only greenhouse gas emitted in any substantial quantity.

The changes incorporated into the Modified Project will not increase the Project's emissions of greenhouse gases. Although there will be additional greenhouse gas emissions associated with the addition of aggregate production (which was not evaluated in the 1997 FEIR/EIS), these changes will decrease greenhouse gas emissions from the Modified Project compared to the 1997 Project.

Although greenhouse gas (GHG/CO_2) emissions were not evaluated in the 1997 FEIR/EIS, the emissions associated with the 1997 Project can be estimated and compared to the emissions estimate for the Modified Project. Detailed fuel consumption and CO_2 estimates for the 1997 Project are contained in the Soledad Mountain Project, Greenhouse Gas Emissions (Air Sciences 2009).

The underlying key design features for the CO_2 emission estimates for the 1997 Project, and the Modified Project are presented in Table 12. The comparison is presented for the life of the mine. This is for two reasons. First, unlike criteria pollutants which can result in immediate or near-term health effects, a particular concern with greenhouse gases is their tendency to accumulate in the atmosphere and contribute to climate change over time. Second, the Modified Project extends the life of the Project. The 1997 Project design had a 15- year Project life and the Modified Project has a 15-year Project life.

Table 11. Comparison of 1997 Project and Modified Project Design Features and Impact on GHG

Design Feature/Parameter	Unit	1997	2019
Life of mine	yr	15	15
Life of mine ore production	MMt	45.5	41.8
Life of mine waste production	MMt	204.5	233.6
Life of mine total material production	MMt	250.0	275
Life of mine aggregate production	MMt	0.0	18.2
Life of mine on-site diesel use	MMgal	24.9	49.7
Life of mine on-site gasoline use	MMgal	0.6	0.7
Diesel Combustion CO_2 emission factor	lb/gal	22.2	22.2
Gasoline Combustion CO_2 emission factor	lb/gal	19.4	19.4

Table 11, above, presents the life of mine schedule for both Projects. Taking into account the different length of time projected for each activity under the 1997 Project and the Modified Project, Table 12 compares CO_2 emissions over the life of the Project.

Table 12. Life of Mine CO2 Emissions, 1997 Project and Modified Project (tons)

Emission Scenario	1997	Modified Project	Difference
Maximum annual	36,502	37,348	263
Life of mine annual average	19,687	20,188	501
Active mining annual average	19,687	20,188	501

Maximum and life-of-mine average annual CO2 emissions in the Modified Project design are only slightly higher than the CO_2 emissions estimated for the 1997 Project (as shown in Table 12). The annual emissions, however, will be less than the 25,000 metric ton per year reporting threshold which is the CEQA significance threshold.

Appendix A. Engineering Calculations

GOLDEN QUEEN MINING CO., INC.

SOLEDAD MOUNTAIN PROJECT KERN COUNTY, CA

EMISSION CALCULATIONS

TABLE OF CONTENTS

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 1	OF 5	PAGE 1
	SUBJECT: Facility-wide Summary	DATE: 06/24/2020		

FACILITY - WIDE EMISSIONS SUMMARY

	Potential Emissions											
	CO		NO_x		PM_{10}		$PM_{2.5}$		SO_2		VOC	
Source/Activity	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*
Ore Processing					0.49	2.06	0.06	0.21				
Aggregate Processing					3.01	3.76	0.15	0.17				
Emergency Generator	2.59	0.13	16.35	0.82	0.225	0.011	0.225	0.011	4.55	0.23	0.20	0.01
Fugitives	31.64	228.37	17.38	187.18	405.29	88.32	51.23	14.88	2.22	11.76	2.36	13.71
Facility-wide Total	34.23	228.50	33.73	188.00	409.01	94.15	51.67	15.27	6.78	11.99	2.55	13.72

GREENHOUSE GAS EMISSIONS

	CO_2	
Source/Activity	*(ton/yr)*	*(MT/yr)*
Emergency Generator	128	116
Diesel Machinery	36,765	33,423
Gasoline Vehicles	455	414
Total	37,348	33,953

Conversion 1.1 *ton/MT*

Values in blue are entries and black are calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 2	OF 5	PAGE 1/5
	SUBJECT: Ore and Aggregate Processing Emissions Summary	DATE: 06/24/2020		

ORE AND AGGREGATE PROCESSING, AND SUPPORT ACTIVITIES EMISSIONS SUMMARY

	PM		PM_{10}		$PM_{2.5}$		
Source/Activity	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*	*(lb/hr)*	*(ton/yr)*	
ORE PROCESSING ACTIVITIES							
Truck Dump to Coarse Ore Hopper	0.0412	0.17	0.02	0.08	0.00	0.02	
Primary Crushing	0.2321	0.98	0.10	0.43	0.00	0.02	
Ore Transfer - Primary Crusher to Primary Crusher Discharge Conveyor (3141)	0.0412	0.17	0.02	0.08	0.00	0.02	
Ore Transfer - 3141 to Coarse Ore Stacker (3142)	0.0412	0.17	0.02	0.08	0.00	0.02	
Ore Transfer - 3142 to Coarse Ore to Stockpile	0.0412	0.17	0.02	0.08	0.00	0.02	
Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241)	0.0016	0.01	0.00	0.00	0.00	0.00	
Ore Transfer - 3241 to Secondary Crushing-Screening Plant	0.0025	0.01	0.00	0.01	0.00	0.00	
Screening	0.2739	1.15	0.10	0.40	0.00	0.00	
Cone Crushing	0.0205	0.09	0.01	0.04	0.00	0.00	
Ore Transfer - Screen to Fine Ore Conveyor (3244)	0.0016	0.01	0.00	0.00	0.00	0.00	
Ore Transfer - Cone Crusher Product Conveyor (3242)	0.0009	0.00	0.00	0.00	0.00	0.00	
Ore Transfer - 3242 to Scissors Conveyor (3243)	0.0009	0.00	0.00	0.00	0.00	0.00	
Ore Transfer - 3243 to 3241	0.0009	0.00	0.00	0.00	0.00	0.00	
Ore Transfer - 3244 to Fine Ore Bin	0.1648	0.69	0.08	0.33	0.01	0.06	
Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342)	0.1648	0.69	0.08	0.33	0.01	0.00	
Ore Transfer - 3342 to HPGR	0.0412	0.17	0.02	0.08	0.00	0.02	
Cement Silo Loading	0.0003	0.00	0.00	0.00	0.00	0.00	
Cement Silo Discharge	0.0184	0.08	0.01	0.04	0.01	0.04	
High Pressure Grinding Roll	0.0017	0.01	0.00	0.00	0.00	0.00	
Ore Transfer - HPGR Discharge to HPGR Product Conveyor (3343)	0.0017	0.01	0.00	0.00	0.00	0.00	
Ore Transfer - 3343 to Fine Ore Stacker (3441)	0.0017	0.01	0.00	0.00	0.00	0.00	
Ore Transfer - 3441 to Fine Ore Stockpile	0.0083	0.03	0.00	0.02	0.00	0.00	
Ore Transfer - Fine Ore Stockpile to Overland Conveyor	0.0083	0.03	0.00	0.02	0.00	0.00	
Ore Transfer - Overland Conveyor to Leach Pads	0.0083	0.03	0.00	0.02	0.00	0.00	
Ore Processing Subtotal	1.12	4.70	0.49	2.06	0.06	0.21	
AGGREGATE PROCESSING ACTIVITIES							
Raw Material Loading	0.76	0.95	0.36	0.45	0.05	0.07	
Raw Material Feeding to Screen	0.05	0.06	0.02	0.03	0.00	0.00	
Screening	5.00	6.25	1.74	2.18	0.01	0.01	
Crushing	1.08	1.35	0.48	0.60	0.02	0.03	
Aggregate Discharge	0.05	0.06	0.02	0.03	0.00	0.00	
Aggregate Transfer to Stockpile	0.05	0.06	0.02	0.03	0.00	0.00	
Aggregate Loading to Trucks	0.76	0.95	0.36	0.45	0.05	0.07	
Aggregate Processing Subtotal	7.74	9.67	3.01	3.76	0.15	0.17	
SUPPORT ACTIVITIES							
Emergency Generator	0.225	0.011	0.225	0.011	0.225	0.011	
Support Activitites Subtotal	0.23	0.01	0.23	0.01	0.23	0.01	
Total		9.08	14.38	3.72	5.83	0.44	0.39

Conversion 2000 *lb/ton*

Values in blue are entries and black are calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 2	OF 5	PAGE 2/5
	SUBJECT: Ore and Aggregate Processing Ore Processing Activities	DATE: 06/24/2020		

ORE PROCESSING

OPERATION SCHEDULE

24.00 *hr/day*

350.00 *day/yr*

8,400.00 *hr/yr*

PROCESS ACTIVITY RATES

Source/Activity	Process rate		Reference
Truck Dump to Coarse Ore Hopper	716.5	*ton/hr*	*Primary Processor Crusher rate*
Primary Crushing	716.5	*ton/hr*	*GQM, D-158716-00-P-001, Rev. B, 03/09/08*
Ore Transfer - Primary Crusher to Primary Crusher Discharge Conveyor	716.5	*ton/hr*	*Primary Processor Crusher rate*
Ore Transfer - 3141 to Coarse Ore Stacker (3142)	716.5	*ton/hr*	*Primary Processor Crusher rate*
Ore Transfer - 3142 to Coarse Ore to Stockpile	716.5	*ton/hr*	*Primary Processor Crusher rate*
Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241)	716.5	*ton/hr*	*Primary Processor Crusher rate*
Ore Transfer - 3241 to Secondary Crushing-Screening Plant	1,095.7	*ton/hr*	*GQM, D-158716-00-P-001, Rev. B, 03/09/08*
Screening	1,095.7	*ton/hr*	*GQM, D-158716-00-P-001, Rev. B, 03/09/08*
Cone Crushing	379.2	*ton/hr*	
Ore Transfer - Screen to Fine Ore Conveyor (3244)	716.5	*ton/hr*	*GQM, D-158716-00-P-001, Rev. B, 03/09/08*
Ore Transfer - Cone Crusher Product Conveyor (3242)	379.2	*ton/hr*	
Ore Transfer - 3242 to Scissors Conveyor (3243)	379.2	*ton/hr*	
Ore Transfer - 3243 to 3241	379.2	*ton/hr*	
Ore Transfer - 3244 to Fine Ore Bin	716.5	*ton/hr*	
Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342)	716.6	*ton/hr*	
Ore Transfer - 3342 to HPGR	716.6	*ton/hr*	
Cement Silo Loading	30.0	*ton/hr*	*Assumption*
Cement Silo Discharge	3.6	*ton/hr*	*10 lb/ton HPGR feed*
High Pressure Grinding Roll	720.1	*ton/hr*	*Ore plus cement*
Ore Transfer - HPGR Discharge to HPGR Product Conveyor (3343)	720.1	*ton/hr*	
Ore Transfer - 3343 to Fine Ore Stacker (3441)	720.1	*ton/hr*	
Ore Transfer - 3441 to Fine Ore Stockpile	720.1	*ton/hr*	
Ore Transfer - Fine Ore Stockpile to Overland Conveyor	720.0	*ton/hr*	
Ore Transfer - Overland Conveyor to Leach Pads	720.0	*ton/hr*	
Aggregate Processing	200.0	*ton/hr*	*GQM, Projection*
	55,142.9	*ton/day*	*GQM, Projection*
	19,300,000.0	*ton/yr*	*GQM, Projection*

ACTIVITY EMISSION FACTORS

Activity	Emission Factor ID	PM	PM_{10}	$PM_{2.5}$	Unit	Reference
One Discharge to PC Hopper	AP42_13.2.4_Eql	0.00023	0.00011	0.00002	*lb/ton*	*AP-42, Sec. 13.2.4, Eq. 1 (11/06) using avg WS of 1.3 mph and 3% MC*
Primary Crushing (Jaw)	AP42_11.19.2-2_TC	0.00540	0.00240	0.00010	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (tertiary crushing)* [a]
Ore Transfer Points	AP42_13.2.4_Eql	0.00023	0.00011	0.00002	*lb/ton*	*AP-42, Sec. 13.2.4, Eq. 1 (11/06) using avg WS of 1.3 mph and 3% MC*
Primary Screening	AP42_11.19.2-2_SC	0.02500	0.00870	0.00005	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (screening)* [a]
Secondary Crushing (Cone)	AP42_11.19.2-2_TC	0.00540	0.00240	0.00010	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (tertiary crushing)* [a]
Silo Loading	AP42_11.12-2_PL	0.00099	0.00034	0.00034	*lb/ton*	*AP-42, Tab. 11.12-2 6/06 (pneumatic loading-controlled)* [b]
Silo Discharge	AP42_11.12-2_WHL	0.00510	0.00240	0.00240	*lb/ton*	*AP-42, Tab. 11.12-2, 6/06 (weigh hopper loading)* [b]
HPGR	GQM_2009_PG6.2	0.00000	0.00000	0.00000	*lb/ton*	*GQM, 2009, pg. 6-2*
Aggregate Handling	AP42_13.2.4_Eql	0.00380	0.00180	0.00027	*lb/ton*	*AP-42, Sec. 13.2.4, Eq. 1 (11/06) using avg WS of 1.3 mph and 3% MC*
Aggregate Screening	AP42_11.19.2-2_SC	0.02500	0.00870	0.00005	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (screening)* [a]
Aggregate Crushing	AP42_11.19.2-2_TC	0.00540	0.00240	0.00010	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (tertiary crushing)* [a]

[a] *Uncontrolled $PM_{2.5}$ EF is not detectable (ND), therefore controlled EF is used*

[b] $PM_{2.5}$ EF is not available, therefore it is assumed to be equal to PM_{10} EF

AP-42, Sec. 13.2.4, Predictive Emission Factor Equation: $.0032k\ (U/5)^{1.3}\ /(M/2)^{1.4}$

U	Wind Speed	1.3	mph	*Lowest wind speed for enclosed transfers*
M	Moisture Content	3	%	GQM
k	Scaling Factors	PM	PM10	PM2.5
		0.74	0.35	0.053

Values in blue are entries and black are either carried over or calculated

ORE PROCESSING - CONTINUED

CONTROLS AND EFFICIENCIES

Source ID	Source/Activity	Contol Description	Efficiency
	Truck Dump to Coarse Ore Hopper	Water Sprays	75%
	Primary Crushing	Water Sprays/Enclosure	94%
	Ore Transfer - Primary Crusher to Primary Crusher Discharge Conveyor (3141)	Water Sprays	75%
	Ore Transfer - 3141 to Coarse Ore Stacker (3142)	Water Sprays	75%
	Ore Transfer - 3142 to Coarse Ore to Stockpile	Water Sprays	75%
	Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241)	Foggers	99%
	Ore Transfer - 3241 to Secondary Crushing-Screening Plant	Wet Scrubber	99%
	Screening	Wet Scrubber	99%
	Cone Crushing	Wet Scrubber	99%
	Ore Transfer - Screen to Fine Ore Conveyor (3244)	Wet Scrubber	99%
	Ore Transfer - Cone Crusher Product Conveyor (3242)	Wet Scrubber	99%
	Ore Transfer - 3242 to Scissors Conveyor (3243)	Wet Scrubber	99%
	Ore Transfer - 3243 to 3241	Foggers	99%
	Ore Transfer - 3244 to Fine Ore Bin	None	0%
	Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342)	None	0%
	Ore Transfer - 3342 to HPGR	Water Sprays	75%
	Cement Silo Loading	Bin Vent	99%
	Cement Silo Discharge	None	0%
	High Pressure Grinding Roll	Wet Scrubber	99%
	Ore Transfer - HPGR Discharge to HPGR Product Conveyor (3343)	Wet Scrubber	99%
	Ore Transfer - 3343 to Fine Ore Stacker (3441)	Wet Scrubber	99%
	Ore Transfer - 3441 to Fine Ore Stockpile	Wet Material	95%
	Ore Transfer - Fine Ore Stockpile to Overland Conveyor	Wet Material	95%
	Ore Transfer - Overland Conveyor to Leach Pads	Wet Material	95%

EMISSION FACTORS

Source ID	Source/Activity	Emission Factor ID	PM	PM_{10}	$PM_{2.5}$	Unit
	Truck Dump to Coarse Ore Hopper	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Primary Crushing	AP42_11.19.2-2_TC	0.00540	0.0024	0.0001	*lb/ton*
	Ore Transfer - Primary Crusher to Primary Crusher Discharge Conveyor (3141)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3141 to Coarse Ore Stacker (3142)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3142 to Coarse Ore to Stockpile	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3241 to Secondary Crushing-Screening Plant	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Screening	AP42_11.19.2-2_SC	0.02500	0.0087	0.0001	*lb/ton*
	Cone Crushing	AP42_11.19.2-2_TC	0.00540	0.0024	0.0001	*lb/ton*
	Ore Transfer - Screen to Fine Ore Conveyor (3244)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - Cone Crusher Product Conveyor (3242)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3242 to Scissors Conveyor (3243)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3243 to 3241	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3244 to Fine Ore Bin	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3342 to HPGR	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Cement Silo Loading	AP42_11.12-2_PL	0.00099	0.00034	0.0003	*lb/ton*
	Cement Silo Discharge	AP42_11.12-2_WHL	0.00510	0.0024	0.0024	*lb/ton*
	High Pressure Grinding Roll	GQM_2009_PG6.2	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - HPGR Discharge to HPGR Product Conveyor (3343)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3343 to Fine Ore Stacker (3441)	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - 3441 to Fine Ore Stockpile	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - Fine Ore Stockpile to Overland Conveyor	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*
	Ore Transfer - Overland Conveyor to Leach Pads	AP42_13.2.4_Eql	0.00023	0.00011	0.0000	*lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 2	OF 5	PAGE 4/5
	SUBJECT: Ore and Aggregate Processing Aggregate Processing Activities	DATE: 06/24/2020		

AGGREGATE PREOCESSING

Source ID AGGPROC Reference:
Process Rate 500,000 *ton/yr* GQM
2,000 *ton/day* GQM
200 *ton/hr* Based on *10 hr/day operation schedule*

ACTIVITY EMISSION FACTORS

Activity	PM	PM_{10}	$PM_{2.5}$	Unit	Reference
Material Loading	0.00380	0.00180	0.00027	*lb/ton*	*AP-42, Sec. 13.2.4, Eq. 1 (11/06) using avg WS of 1.3 mph and 3% MC*
Aggregate Transfers (Enclosed)	0.00023	0.00011	0.00002	*lb/ton*	*AP-42, Sec. 13.2.4, Eq. 1 (11/06) using avg WS of 1.3 mph and 3% MC*
Screening	0.02500	0.00870	0.00005	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (screening)* [a]
Crushing	0.00540	0.00240	0.00010	*lb/ton*	*AP-42, Tab. 11.19.2-2, 8/04 (tertiary crushing)* [a]

[a] *Uncontrolled $PM_{2.5}$ EF is not detectable (ND), therefore controlled EF is used*

ACTIVITY EMISSION FACTORS

Activity	PM *(ton/yr)*	PM_{10} *(ton/yr)*	$PM_{2.5}$ *(ton/yr)*	PM *(lb/hr)*	PM_{10} *(lb/hr)*	$PM_{2.5}$ *(lb/hr)*
Raw Material Loading b	0.95	0.45	0.07	0.76	0.36	0.05
Raw Material Feeding to Screen	0.06	0.03	0.00	0.05	0.02	0.00
Screening	6.25	2.18	0.01	5.00	1.74	0.01
Crushing	1.35	0.60	0.03	1.08	0.48	0.02
Aggregate Discharge	0.06	0.03	0.00	0.05	0.02	0.00
Aggregate Transfer to Stockpile	0.06	0.03	0.00	0.05	0.02	0.00
Aggregate Loading to Trucks	0.95	0.45	0.07	0.76	0.36	0.05
Aggregate Processing Total	9.67	3.76	0.17	7.74	3.01	0.15

[b] Emissions from raw material and stockpile erosion have been accounted for in waste rock unloading and dump erosion

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 2	OF 5	PAGE 5/5
	SUBJECT: Ore and Aggregate Processing Emergency Generator	DATE: 06/24/2020		

EMERGENCY GENERATOR

ENGINE DATA

Source ID	EMGEN		*Reference:*
Make and Model	Cummins QSK50-G4 NR2		
Rating	1,250	*kW*	Manufacturer Cummins
	2,220	*hp*	

FUEL DATA

Fuel Type	Diesel		*Reference:*
Fuel Heating Value	0.137	*MMBTtu/gal*	*AP42, App. A (Typical parameters for various fuels)*
Fuel Consumption	58.2	*gal/hr*	*Manufacturer at 100% load*
	3.9	*MMBtu/hr*	
	8,348	*Btu/hp-hr*	
	2,860	*gal/yr*	

OPEARTION AND CONTROL

Control Equipment	*None*	
Control Efficiency	*0*	%
Hours of Operation per Year	100	*hrs*

EMISSION FACTORS

CO	0.53	*g/hp-hr*	*Manufacturer*
NO_x	3.34	*g/hp-hr*	*Manufacturer*
PM_{10}/PM	0.046	*g/hp-hr*	*Manufacturer*
SO_2	0.00205	*lb/hp-hr*	*AP-42, Tab. 3.3-1, 10/96 (Industrial diesel engines up to 600 hp)*
VOC	0.04	*g/hp-hr*	*Manufacturer*
CO_2	1.15	*lb/hp-hr*	*AP-42, Tab. 3.3-1, 10/96 (Industrial diesel engines up to 600 hp)*

EMISSIONS ESTIMATE

Pollutant	Emission Rate *(g/hp-hr)*	*(lb/MMBtu)*	*(lb/hr)*	*(lb/yr)*	*(ton/yr)*
CO	0.53	0.13997	2.5940	259.40	1.30E-01
NO_x	3.34	0.88206	16.3469	1634.69	8.17E-01
PM_{10}/PM	0.05	0.01215	0.2251	22.51	1.13E-02
SO_2	0.93	0.24557	4.5510	455.10	2.28E-01
VOC	0.04	0.01056	0.1958	19.58	9.79E-03
CO_2	521.63	137.76	2553.00	255,300	1.28E+02

STACK PARAMETERS

Ht (ft)	Dia (ft)	Temp (^oF)	Vel (ft/s)	Flow ACFM
9.86	0.67	919	159.2	3,334

Conversions	1.34	*hp/kW*
	453.59	*g/lb*
	2,000	*lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 3	OF 5	PAGE 1/10
	SUBJECT: Fugitive Emissions Summary	DATE: 06/24/2020		

FUGITIVE EMISSIONS

EMISSIONS SUMMARY ***(ton/yr)***

Fugitive Source /Category	CO	NO_x	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Drilling			3.10	1.61	0.09		
Blasting	0.03	0.01	29.99	15.60	0.90	0.00	
Material Loading			45.60	21.60	3.60		
Material Unloading			36.67	17.37	2.90		
Material Hauling			101.97	22.96	2.32		
Dozing			16.43	2.60	1.72		
Grading			2.55	1.21	0.08		
Wind Erosion			4.96	2.48	0.37		
Mining Equipment Tailpipe	226.07	187.10	2.89	2.89	2.89	11.76	13.64
Support Equipment Tailpipe	2.28	0.07	0.01	0.01	0.01		0.07
	228.37	187.18	244.16	88.32	14.88	11.76	13.71

EMISSIONS SUMMARY ***(lb/hr)***

Fugitive Source /Category	CO	NO_x	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC
Drilling			1.03	0.54	0.03		
Blasting	0.21	0.05	239.95	124.78	7.20	0.01	
Material Loading			10.86	5.14	0.86		
Material Unloading			8.73	4.14	0.69		
Material Hauling			20.49	4.61	0.47		
Dozing			4.30	0.68	0.45		
Grading			3.49	1.66	0.11		
Wind Erosion			522.81	261.41	39.20		
Mining Equipment Tailpipe	30.57	17.29	0.43	2.33	2.22	2.22	2.33
Support Equipment Tailpipe	0.87	0.04	0.01	0.01	0.01		0.03
	31.64	17.38	812.10	405.29	51.23	2.22	2.36

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 3	OF 5	PAGE 2/10
	SUBJECT: Fugitive Emissions - Mining Activities	DATE: 06/24/2020		

FUGITIVE EMISSIONS

MINING ACTIVITIES

ACTIVITY AND EMISSION FACTOR (EF) PARAMETER INFORMATION

Ore Production	4,700,000	*ton/yr*	GQM
Waste Production	19,300,000	*ton/yr*	GQM
Total Material Production	24,000,000	*ton/yr*	
Mass per Drill Hole	504	*ton*	GQM
Surface Area per Drill Hole	349	*ft* ^{2}	GQM
Drilling Control	Dust Collection System		GQM
Drilling Control Efficiency	90	*%*	GQM
Mass per Blast	96,000	*ton*	GQM
Number of Drill Holes	190	*holes/blast*	
	47,619	*holes/yr*	
Surface Area per Blast (A)	66,476	*ft* ^{2}	
Number of Blasts	250	*blasts/yr*	
ANFO Consumption	0.36	*lb/ton*	GQM
	17.28	*ton/blast*	
	4,320.00	*ton/hr*	
Mean Wind Speed (U)	11.14	*mph*	2008 on-site data
Material Moisture Content (M)	3	*%*	GQM
Haul Truck Weight (empty)	74	*ton*	Manufacturer Specifications
Haul Truck Payload Capacity	106	*ton*	Manufacturer Specifications
Hauling Control	Chemical Application Watering		
Hauling Control Efficiency	90	*%*	
Hauling - Inside Pit	990	*ft*	GQM, Site Drawing
Hauling - Pit to PC	1,500	*ft*	GQM, Site Drawing
Hauling Pit to Waste Rock Storage	1,500	*ft*	GQM, Site Drawing
Hauling - Inside Waste Rock Storage	900	*ft*	GQM, Site Drawing
Hauling - Pit to Access Road Construction Site	1,500	*ft*	GQM, Site Drawing
Hauling - Inside Process Area	3,500	*ft*	GQM, Site Drawing
Truck Loads - Ore	44,340	*trips*	
Truck Loads - Waste	182,075	*trips*	
VMT - Inside Pit	84,906	*mi*	
VMT - Pit to PC	25,193	*mi*	
VMT - Pit to Waster Rock Storage	51,726	*mi*	50% of Waste Rock dumped at this site GQM
VMT - Inside Waste Rock Storage	31,036	*mi*	
VMT - Pit to Access Road Construction Site	51,726	*mi*	50% of Waste Rock dumped at this site GQM
Dozer Use	7,641	*hr/yr*	
Grader Use	1,460	*hr/yr*	
	11,680	*VMT/yr*	*Based on 8 mph*

EMISSION FACTORS

Drilling - TSP EF	1.300	*lb/hole*	AP-42, Tab. 11.9-4 (10/98)
Drilling - PM10 Scaling Factor (SF)	0.520		AP-42, Tab. 11.9-1 (10/98)
Drilling - PM2.5 SF	0.030		AP-42, Tab. 11.9-1 (10/98)
Drilling - PM10 EF	0.676	*lb/hole*	
Drilling - PM2.5 EF	0.039	*lb/hole*	
Blasting TSP EF eq.	$.000014\ A^{1.5}$	*lb/blast*	AP-42, Tab. 1 A = Surface Area (ft ^{2}) per blast
Blasting - PM10 EF	0.520		AP-42, Tab. 11.9-1 (10/98)
Blasting - PM2.5 SF	0.030		AP-42, Tab. 11.9-1 (10/98)
Blasting - PM EF	239.95	*lb/blast*	
Blasting - PM10 EF	124.78	*lb/blast*	
Blasting - PM2.5 EF	7.20	*lb/blast*	
Blasting - CO EF	67	*lb/ton*	AP-42, Tab. 13.3-1
Blasting - NOx EF	17	*lb/ton*	AP-42, Tab. 13.3-1
Blasting SO2 EF	2	*lb/ton*	AP-42, Tab. 13.3-1

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 3	OF 5	PAGE 3/10
	SUBJECT: Fugitive Emissions - Mining Activities	DATE: 06/24/2020		

FUGITIVE EMISSIONS

MINING ACTIVITIES - CONTINUED
EMISSION FACTORS - CONTINUED

Material Handling - TSP EF eq.	$0.0032k\ (U/5)^{1.3}/(M/2)^{1.4}$		lb/ton
Material Handling - PM (PM30) SF (k)	0.74		
Material Handling - PM10 SF (k)	0.35		
Material Handling - PM2.5 SF (k)	0.053		
Material Handling - PM EF	0.0038		lb/ton
Material Handling - PM10 EF	0.0018		lb/ton
Material Handling - PM2.5 EF	0.0003		lb/ton

Hauling - TSP EF eq. $k(s/12)^a x(W/3)^b x(365-P)/365$

Empirical Constants	PM	PM10	PM2.5
k	4.90	1.50	0.15
a	0.70	0.90	0.90
b	0.45	0.45	0.45

Surface Material Silt Content	s	2.6	%
Mean Vehicle Weight	W	127	ton
Days/tr with at least 0.01" ppt.	P	29	days
Hauling - PM EF		8.35	lb/VMT
Hauling - PM10 EF		1.88	lb/VMT
Hauling - PM2.5 EF		0.19	lb/VMT
Dozer - TSP EF eq.		$5.7(s)^{1.2}/(M)^{1.3}$	lb/hr
Dozer - PM10 EF eq.		$.75(s)^{1.5}/(M)^{1.4}$	lb/hr
Dozer - PM2.5 SF		0.105	
Dozing - TSP EF		4.3	lb/hr
Dozing - PM10 EF		0.68	lb/hr
Dozing - PM2.5 EF		0.45	lb/hr
Grading - TSP EF eq.		$0.04\ (s)^{2.5}$	lb/VMT
Grading - PM10 EF eq.		$0.6x0.051(s)^2$	lb/VMT
Grading - PM2.5 SF		0.031	
Grading - TSP EF		0.436	lb/VMT
Grading - PMA01 EF		0.207	lb/VMT
Grading - PM2.5 EF		0.014	lb/VMT

EMISSIONS ESTIMATE

Activity/Source	Note	PM (ton/yr)	PM_{10} (ton/yr)	$PM_{2.5}$ (ton/yr)	CO (ton/yr)	NO_x (ton/yr)	SO_2 (ton/yr)
Drilling		3.10	1.61	0.09			
Blasting		29.99	15.60	0.90	0.03	0.01	0.00
In-Pit Ore Loading	a	8.93	4.23	0.71			
In-Pit Waste Rock Loading		36.67	17.37	2.90			
Waste Rock Unloading		36.67	17.37	2.90			
Ore and Waste Rock Hauling - Inside Pit	b	35.45	7.98	0.81			
Ore Hauling - Pit to Primary Crusher	c	5.26	1.18	0.12			
Waste Rock Hauling - Pit to Waste Rock Storage Area	b	23.47	5.28	0.53			
Waste Rock Hauling - Inside Waste Rock Storage Area	b	12.96	2.92	0.29			
Waste Rock Hauling - Pit to Access Road Construction Site	b, d	24.83	5.59	0.57			
Dozing		16.43	2.60	1.72			
Grading		2.55	1.21	0.08			
		236.30	82.94	11.61	0.03	0.01	0.00

[a] Ore unloading at PC covered in process emissions
[b] Controlled by watering
[c] Hiighly maintained access road, controlled at 95%
[d] 1,950 ft section highly maintained, controlled at 95%

Conversions 2,000 *lb/ton*
5,280 *ft/mi*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 3	OF 5	PAGE 4/10
	SUBJECT: Fugitive Emissions - Mining Activities - Continued	DATE: 06/24/2020		

FUGITIVE EMISSIONS

MINING ACTIVITIES - CONTINUED

EMISSIONS ESTIMATE

Activity/Source	Note	PM (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	CO (lb/hr)	NO_x (lb/hr)	SO_2 (lb/hr)
Drilling	e	1.03	0.54	0.03			
Blasting	f	239.95	124.78	7.20	0.21	0.05	0.01
In-Pit Ore Loading	g	2.13	1.01	0.17			
In-Pit Waste Rock Loading	g	8.73	4.14	0.69			
Waste Rock Unloading	g	8.73	4.14	0.69			
Ore and Waste Rock Hauling - Inside Pit	g	8.44	1.90	0.19			
Ore Hauling - Pit to Primary Crusher	g	1.25	0.28	0.03			
Waste Rock Hauling - Pit to Waste Rock Storage Area	g	5.14	1.16	0.12			
Waste Rock Hauling - Inside Waste Rock Storage Area	g	3.09	0.69	0.07			
Waste Rock Hauling - Pit to Access Road Construction Site	g	2.57	0.58	0.06			
Dozing		4.30	0.68	0.45			
Grading	h	3.49	1.66	0.11			
		288.85	141.54	9.80	0.21	0.05	0.01

[e] *Based on:* 190 *holes/blast &* 1 *blast per* 24 *hr period*

[f] *Based on:* 1 *blast/hr*

[g] *Based on:* 8,400 *hr/yr* *continuous operations*

[h] *Based on:* 8 *VMT/hr* 4.61

WIND EROSION

ERODIBLE AREA ESTIMATION

Conical Surface Area and Volume

Conical Surface Area (SA) $\pi \times r \times \sqrt{(h^2 + r^2)}$

Conical Volume (V) $1/3 \times \pi \times h \times r^2$ *r = conical base radius, h = conical height*

Truck Dump Surface Area Calculations *Assuming a conical dump*

pi (π)	3.14		
Truck Dump Base Radius	13.0 *ft*	*Calculated based on 38° slope and 106 ton truck dump*	
Truck Dump Height	10.0 *ft*	*Calculated based on 38° slope and 106 ton truck dump*	
Truck Dump Surface Area	705.0 *ft^2 / truck dump*		
	0.02 *acre/truck dump*		
Conical Load Mass	106.0 *ton*		
Surface Area/ton material dumped	0.0001528 *acre/ton dumped*		

Stockpile Surface Area Calculations *Assuming a conical pile*

Coarse Ore Stockpile	44,000 *ton*	*GQM*	
Coarse Ore Stockpile Radius	99 *ft*	*Calculated based on 38° slope*	
Coarse Ore Stockpile Height	77 *ft*	*Calculated based on 38° slope*	
Coarse Ore Stockpile Surface Area	39,007.60 *ft^2*	0.90 *acre*	
Fine Ore Stockpile	24,200 *ton*	*Estimate scaled from coarse ore stockpile total capacity to live capacity ratio*	
Fine Ore Stockpile Radius	81 *ft*	*Calculated based on 38° slope*	
Fine Ore Stockpile Height	63 *ft*	*Calculated based on 38° slope*	
Fine Ore Stockpile Surface Area	26,112.50 *ft^2*	0.59946 *acre*	
Fine Ore Stockpile Dust Control	Wet Material		
Control Efficiency	95 *%*		

Values in blue are entries and black are either carried over or calculated

FUGITIVE EMISSIONS

WIND EROSION - CONTINUED

Haul Road Surface Area [a]

[a] *Based on Haul Road Width* 80 *ft*

Inside Pit	1.82 *acre*
Pit to PC	2.75 *acre*
Pit to waste rock storage	2.99 *acre*
Inside Waste Rock Storage	1.65 *acre*
Pit to Access Road Construction Site	2.75 *acre*
Roads Inside Process Area	6.43 *acre*

EMISSION FACTORS

	PM	PM10	PM2.5		
Scaling Factors		0.5	0.075		*AP-42, Sec. 13.2.5 (11/06)*
Flat Areas EF	90.3	45.2	6.8	*lb/acre-yr* [b]	*AP-42, Sec. 13.2.5 (11/06) methods using on site wind data*
Stockpiles EF	16	8	1.2	*lb/acre-yr* [c]	*AP-42, Sec. 13.2.5 (11/06) methods using on site wind data*

[b] Annual emission factor based on erodible surface created between threshold wind occurrence periods of 1 day

[c] Annual emission factor based on erodible surface created between threshold wind occurrence periods of 3 days

EMISSIONS

Activity/Source	Note	PM (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)	PM (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)
Waste Rock Storage	d	2.450	1.226	0.184	261.40	130.70	19.60
Access Road Construction Site	d	2.450	1.226	0.184	261.40	130.70	19.60
Coarse Ore Stockpile	e	0.007	0.004	0.001	0.002	0.001	0.000
Fine Ore Stockpile	e, f	0.00024	0.00012	0.00002	0.000	0.000	0.000
Haul Roads - Inside Pit	e, g	0.008	0.004	0.001	0.002	0.001	0.000
Haul Roads - Pit to PC	e, h	0.006	0.003	0.000	0.001	0.001	0.000
Haul Roads - Pit to Waste Rock Storage Area	e, g	0.014	0.007	0.001	0.003	0.002	0.000
Haul Roads - Inside Waste Rock Storage Area	e, g	0.007	0.004	0.001	0.002	0.001	0.000
Haul Roads - Pit to Access Road Construction Site	e, g, h	0.006	0.003	0.000	0.001	0.001	0.000
Access Roads - Inside Process Area	e, h	0.015	0.007	0.001	0.003	0.002	0.000
		4.96	2.48	0.37	522.81	261.41	39.20

[d] *Maximum hourly emissions occurring during hour 7 on JAN 7, 2008. Detailed hourly calcluations provided ona separate spreadsheet*

[e] *Based on:* 8,784 *hr/yr* *Emission factors are based on 2008 meteorological data*

[f] *Wet Material Controlled at* 95 *%*

[g] *Controlled by:* Chemical Application/Watering

[h] *Highly Maintained Access Road, controlled at* 95 %

Conversions 43,560 $ft^2/acre$

4,047 $m^2/acre$

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 3	OF 5	PAGE 6/10
	SUBJECT: Fugitive Emissions - Mobile Sources	DATE: 06/24/2020		

FUGITIVE EMISSIONS

MOBILE SOURCES

NON ROAD DIESEL MACHINERY

Make and Model	Equipment Category	Rating (hp)	Number of Equipment	Diesel Consumption[a] (gal/yr)	Consumption Total (gal/yr)	Load Factor[b]	Operation Schedule[a] (hr/yr)	Power Output[c] (hp-hr/yr)
LINK-BELT-RT8075	Crane 35ton or more	235	1	10,000	10,000	0.9	684	144,666
KOMATSU-WD600-3	Wheeled Dozer	485	1	84,000	84,000	0.6	4,200	1,222,200
KOMATSU-D65PX-17	Track Dozer	360	1	42,000	42,000	0.6	2,800	604,800
Atlas Copco-DM45	Drill Rig	425	4	63,000	252,000	0.5	4,500	3,825,000
FURUKAWA-HCR1500EDII	Drill Rig	348	1	28,800	28,800	0.5	2,400	417,600
KOMATSU-PC3000	Excavators/Shovel/Trac	1260	4	240,000	960,000	0.5	6,000	15,120,000
KOMATSU-PC240LC-11	Excavators/Track/Backl	177	2	48,000	96,000	0.5	2,400	424,800
KOMATSU-FH50-1	Forklifts	68	2	5,000	10,000	0.8	2,800	304,640
KOMATSU-WA500-8	Forklifts	357	1	10,000	10,000	0.8	1,000	285,600
KOMATSU-GD655	Graders	218	1	28,800	28,800	0.5	2,400	261,600
KOMATSU-D275AX	Dozer/Track	449	1	84,000	84,000	0.4	4,200	754,320
KOMATSU-D375A-6	Dozer/Track	610.2	1	84,000	84,000	0.4	4,200	1,025,136
KOMATSU-D275AX-5E	Dozer/Track	410	1	84,000	84,000	0.4	4,200	688,800
KOMATSU-HD785-7	Off-Highway Trucks	1178	13	78,000	1,014,000	0.4	6,800	41,654,080
JLG-G12-55A	Rough Terrain Forklifts	130	1	10,000	10,000	0.8	4,200	436,800
KOMATSU-WA600-8	Rubber Tired Loaders	529	1	50,400	50,400	0.5	6,400	1,692,800
CATERPILLAR-924K	Rubber Tired Loaders	141	1	10,000	10,000	0.5	2,400	169,200
KOMATSU-WA800-3	Rubber Tired Loaders	529	2	105,000	210,000	0.5	4,500	2,380,500
BOBCAT-S450	Skid Steer Loaders	49	2	5,000	10,000	0.8	2,400	188,160
CATERPILLAR-226D	Skid Steer Loaders	55	1	5,000	5,000	0.8	2,400	105,600
CATERPILLAR-420E	Tractors/Loaders/Backl	93	1	5,000	5,000	0.6	2,000	111,600
KOMATSU-WA900-3	Tractors/Loaders/Backl	853	1	105,000	105,000	0.6	4,500	2,303,100
KOMATSU-HM400-5	Water Truck	466	2	42,000	84,000	0.7	4,000	2,609,600
Ford F-750	Service Truck	325.0	2	1,680	3,360	0.1	1,200	65,002
Allmand Night-Light Pro	Light Plant	10.5	9	1,343	12,087	0.8	2,920	210,371
Polaris 6x6 ATV	ATV	45.0	9	2,190	19,710	0.6	1,460	342,990
Total					3,312,157			77,348,965

[a] Per Equipment

[b] Ratio of Fuel-based Heat input to power-based input

[c] Product of hp, number of equipment, load factor, and operation schedule

SUPPORT VEHICLES (GASOLINE)

Make and Model	Equipment Category	Number of Equipment	Operation Schedule[d] (mi/yr)	Fuel Use[e] (gal/yr)
F-140 4WD	Pick-up Truck	40	12,000	30,000
F-150 4WD Crew Cab	Crew-Cab Truck	8	18,000	9,000
Ford E-150 Van	Van	2	12,000	1,500
Ford F-350 Cab and Chassis	Maintenance Truck	5	18,000	6,429
			738,000	46,929

[d] *Per Vehicle*

[e] *Based on EPA Fuel Economy of*

F-150	16	*mi/gal*
F-350	14	*mi/gal*

Values in blue are entries and black are either carried over or calculated

FUGITIVE EMISSIONS

MOBILE SOURCES - CONTINUED

NON ROAD DIESEL MACHINERY
EMISSION FACTORS (g/kW-hr**)** https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA05.pdf

Make and Model		CO	NO_x [a]	PM	VOC [b]
LINK-BELT-RT8075	Crane 35ton or more	3.50	3.52	0.04	0.48
KOMATSU-WD600-3	Wheeled Dozer	3.50	0.40	0.02	0.19
KOMATSU-D65PX-17	Track Dozer	3.50	3.52	0.02	0.48
Atlas Copco-DM45	Drill Rig	3.50	0.40	0.02	0.19
FURUKAWA-HCR1500EDII	Drill Rig	3.50	0.40	0.02	0.19
KOMATSU-PC3000	Excavators/Shovel/Track	3.50	3.50	0.04	0.19
KOMATSU-PC240LC-11	Excavators/Track/Backhoe	3.50	0.40	0.02	0.19
KOMATSU-FH50-1	Forklifts	5.00	4.14	0.40	0.56
KOMATSU-WA500-8	Forklifts	3.50	0.40	0.02	0.19
KOMATSU-GD655	Graders	5.00	0.40	0.02	0.19
KOMATSU-D275AX	Dozer/Track	3.50	3.50	0.02	0.50
KOMATSU-D375A-6	Dozer/Track	3.50	0.40	0.19	0.02
KOMATSU-D275AX-5E	Dozer/Track	3.50	0.40	0.02	0.19
KOMATSU-HD785-7	Off-Highway Trucks	3.50	3.50	0.04	0.19
JLG-G12-55A	Rough Terrain Forklifts	5.00	5.81	0.30	0.79
KOMATSU-WA600-8	Rubber Tired Loaders	3.50	0.40	0.02	0.19
CATERPILLAR-924K	Rubber Tired Loaders	5.00	0.40	0.02	0.19
KOMATSU-WA800-3	Rubber Tired Loaders	3.50	0.40	0.02	0.19
BOBCAT-S450	Skid Steer Loaders	5.50	4.14	0.03	0.56
CATERPILLAR-226D	Skid Steer Loaders	5.00	4.14	0.03	0.56
CATERPILLAR-420E	Tractors/Loaders/Backhoes	5.00	4.14	0.40	0.56
KOMATSU-WA900-3	Tractors/Loaders/Backhoes	3.50	3.52	0.02	0.48
KOMATSU-HM400-5	Water Truck	3.50	0.40	0.02	0.19
Ford F-750	Service Truck	3.50	3.50	0.04	0.50
Allmand Night-Light Pro	Light Plant	8.00	6.60	0.80	0.90
Polaris 6x6 ATV	ATV	5.50	6.60	0.60	0.90

[a] NO_x Fraction of NQ+NMCH Emission Factor if not Specified **88%** *Derived From Tier 4 EF*

[b] VOC Fraction of NQ+NMCH Emission Factor if not Specified **12%** *Derived From Tier 4 EF*

SUPPORT VEHICLES (GASOLINE)
EMISSION FACTORS (g/mi**)** *EPA Green Vehicle Database (http://www.epa.gov/greenvehicles/Index.do)*

Make and Model	CO	NO_x	PM	VOC
F-140 4WD	2.10	0.04	0.01	0.07
F-150 4WD Crew Cab	2.10	0.04	0.01	0.07
Ford E-150 Van	4.20	0.20	0.02	0.16
Ford F-350 Cab and Chassis	7.30	0.40	0.06	0.17

Values in blue are entries and black are either carried over or calculated

FUGITIVE EMISSIONS

MOBILE SOURCES - CONTINUED

NON ROAD DIESEL MACHINERY
EMISSIONS (ton/yr**)**

Make and Model		CO	NOx	PM	VOC	SO_2 [a]
LINK-BELT-RT8075	Crane 35ton or more	0.42	0.42	0.00	0.06	0.0355
KOMATSU-WD600-3	Wheeled Dozer	3.52	0.40	0.02	0.19	0.2982
KOMATSU-D65PX-17	Track Dozer	1.74	1.75	0.01	0.24	0.1491
Atlas Copco-DM45	Drill Rig	11.01	1.26	0.06	0.60	0.8946
FURUKAWA-HCR1500EDII	Drill Rig	1.20	0.14	0.01	0.07	0.1022
KOMATSU-PC3000	Excavators/Shovel/Track	43.53	43.53	0.50	2.36	3.4080
KOMATSU-PC240LC-11	Excavators/Track/Backhoe	1.22	0.14	0.01	0.07	0.3408
KOMATSU-FH50-1	Forklifts	1.25	1.04	0.10	0.14	0.0355
KOMATSU-WA500-8	Forklifts	0.82	0.09	0.00	0.04	0.0355
KOMATSU-GD655	Graders	1.08	0.09	0.00	0.04	0.1022
KOMATSU-D275AX	Dozer/Track	2.17	2.17	0.01	0.31	0.2982
KOMATSU-D375A-6	Dozer/Track	2.95	0.34	0.16	0.02	0.2982
KOMATSU-D275AX-5E	Dozer/Track	1.98	0.23	0.01	0.11	0.2982
KOMATSU-HD785-7	Off-Highway Trucks	119.93	119.93	1.37	6.51	3.5997
JLG-G12-55A	Rough Terrain Forklifts	1.80	2.09	0.11	0.28	0.0355
KOMATSU-WA600-8	Rubber Tired Loaders	4.87	0.56	0.03	0.26	0.1789
CATERPILLAR-924K	Rubber Tired Loaders	0.70	0.06	0.00	0.03	0.0355
KOMATSU-WA800-3	Rubber Tired Loaders	6.85	0.78	0.04	0.37	0.7455
BOBCAT-S450	Skid Steer Loaders	0.85	0.64	0.00	0.09	0.0355
CATERPILLAR-226D	Skid Steer Loaders	0.43	0.36	0.00	0.05	0.0178
CATERPILLAR-420E	Tractors/Loaders/Backhoes	0.46	0.38	0.04	0.05	0.0178
KOMATSU-WA900-3	Tractors/Loaders/Backhoes	6.63	6.67	0.04	0.91	0.3728
KOMATSU-HM400-5	Water Truck	7.51	0.86	0.04	0.41	0.2982
Ford F-750	Service Truck	0.19	0.19	0.00	0.03	0.0119
Allmand Night-Light Pro	Light Plant	1.38	1.14	0.14	0.16	0.0429
Polaris 6x6 ATV	ATV	1.55	1.86	0.17	0.25	0.0700
		226.07	187.10	2.89	13.64	11.76

[a] SO2 emissions are based on following:

Diesel Sulfur Content of:	500	**ppm**	*Fuel Quality Standard*
Diesel Density of:	7.1	**lb/gal**	*AP-42, Section 3.4*

SUPPORT VEHICLES (GASOLINE)
EMISSION (ton/yr**)** *EPA Green Vehicle Database (http://www.epa.gov/greenvehicles/Index.do)*

Make and Model	CO	NO_x	PM	VOC
F-140 4WD	1.1111	0.0212	0.0053	0.0370
F-150 4WD Crew Cab	0.3333	0.0063	0.0016	0.0111
Ford E-150 Van	0.1111	0.0053	0.0005	0.0041
Ford F-350 Cab and Chassis	0.7242	0.0397	0.0060	0.0166
	2.28	0.07	0.01	0.07

Conversions

1.34	*hp/kW*
907,185	*g/ton*
2,000	*lb/ton*
453.5924	*g/lb*

Values in blue are entries and black are either carried over or calculated

FUGITIVE EMISSIONS

MOBILE SOURCES - CONTINUED

NON ROAD DIESEL MACHINERY
EMISSIONS (lb/hr)

Make and Model		CO	NO_x	PM	VOC	SO_2
LINK-BELT-RT8075	Crane 35ton or more	1.22	1.22	0.01	0.17	0.10
KOMATSU-WD600-3	Wheeled Dozer	1.68	0.19	0.01	0.09	0.14
KOMATSU-D65PX-17	Track Dozer	1.24	1.25	0.01	0.17	0.11
Atlas Copco-DM45	Drill Rig	1.22	0.14	0.01	0.07	0.10
FURUKAWA-HCR1500EDII	Drill Rig	1.00	0.11	0.01	0.05	0.09
KOMATSU-PC3000	Excavators/Shovel/Track	3.63	3.63	0.04	0.20	0.28
KOMATSU-PC240LC-11	Excavators/Track/Backhoe	0.51	0.06	0.00	0.03	0.14
KOMATSU-FH50-1	Forklifts	0.45	0.37	0.04	0.05	0.01
KOMATSU-WA500-8	Forklifts	1.64	0.19	0.01	0.09	0.07
KOMATSU-GD655	Graders	0.90	0.07	0.00	0.03	0.09
KOMATSU-D275AX	Dozer/Track	1.03	1.03	0.01	0.15	0.14
KOMATSU-D375A-6	Dozer/Track	1.41	0.16	0.08	0.01	0.14
KOMATSU-D275AX-5E	Dozer/Track	0.94	0.11	0.01	0.05	0.14
KOMATSU-HD785-7	Off-Highway Trucks	2.71	2.71	0.03	0.15	0.08
JLG-G12-55A	Rough Terrain Forklifts	0.86	0.99	0.05	0.14	0.02
KOMATSU-WA600-8	Rubber Tired Loaders	1.52	0.17	0.01	0.08	0.06
CATERPILLAR-924K	Rubber Tired Loaders	0.58	0.05	0.00	0.02	0.03
KOMATSU-WA800-3	Rubber Tired Loaders	1.52	0.17	0.01	0.08	0.17
BOBCAT-S450	Skid Steer Loaders	0.35	0.27	0.00	0.04	0.01
CATERPILLAR-226D	Skid Steer Loaders	0.36	0.30	0.00	0.04	0.01
CATERPILLAR-420E	Tractors/Loaders/Backhoes	0.46	0.38	0.04	0.05	0.02
KOMATSU-WA900-3	Tractors/Loaders/Backhoes	2.95	2.96	0.02	0.40	0.17
KOMATSU-HM400-5	Water Truck	1.88	0.21	0.01	0.10	0.07
Ford F-750	Service Truck	0.16	0.16	0.00	0.02	0.01
Allmand Night-Light Pro	Light Plant	0.11	0.09	0.01	0.01	0.00
Polaris 6x6 ATV	ATV	0.24	0.28	0.03	0.04	0.01
		30.57	17.29	0.43	2.33	2.22
	lb/day	754.4	415.9	10.5	56.6	53.2

SUPPORT VEHICLES (GASOLINE)
EMISSIONS (lb/hr) [a] *EPA Green Vehicle Database (http://www.epa.gov/greenvehicles/Index.do)*

Make and Model	CO	NO_x	PM	VOC
F-140 4WD	0.1157	0.0022	0.0006	0.0039
F-150 4WD Crew Cab	0.1157	0.0022	0.0006	0.0039
Ford E-150 Van	0.2315	0.0110	0.0011	0.0086
Ford F-350 Cab and Chassis	0.4023	0.0220	0.0033	0.0092
	0.87	0.04	0.01	0.03

[a] *Based on* 25 *mph* *Maximum Speed*

CO2 EMISSIONS

Equipment Category	EF [b] (lb/gal)	Fuel Use *(gal/yr)*	Emissions (lb/yr)	(ton/yr)
Diesel Machinery	22.2	3,312,157	73,529,885	36,765
Gasoline Vehicles	19.4	46,928.57	910,414	455
		TOTAL	**74,440,300**	**37,220**

[b] *EPA420-F-05-001*

Values in blue are entries and black are either carried over or calculated

FUGITIVE EMISSIONS

FUGITIVE EMISSIONS ALLOCATION

Modeled Fugitive Activity Locations

Source/Activity		NWPIT	WRS	ARCS	HRIP	HRP2WR	HRIWR	HRP2PC	HRP2AR	ARPROC
LINK-BELT-RT8075	Crane 35ton or more	1.00								
KOMATSU-WD600-3	Wheeled Dozer	1.00								
KOMATSU-FH50-1	Forklifts	1.00								
KOMATSU-WA500-8	Forklifts	1.00								
KOMATSU-GD655	Graders	0.27	0.08			0.15		0.24	0.25	
KOMATSU-D275AX	Dozer/Track	0.27	0.08			0.15		0.24	0.25	
KOMATSU-D375A-6	Dozer/Track	0.60	0.20	0.20						
KOMATSU-D275AX-5E	Dozer/Track	0.60	0.20	0.20						
KOMATSU-HD785-7	Off-Highway Trucks	0.27	0.08			0.15		0.24	0.25	
JLG-G12-55A	Rough Terrain Forklifts	1.00								
KOMATSU-WA600-8	Rubber Tired Loaders	0.27	0.08			0.15		0.24	0.25	
CATERPILLAR-924K	Rubber Tired Loaders									1.00
KOMATSU-WA800-3	Rubber Tired Loaders									1.00
BOBCAT-S450	Skid Steer Loaders	0.14	0.04			0.08		0.12	0.13	0.50
CATERPILLAR-226D	Skid Steer Loaders									1.00
CATERPILLAR-420E	Tractors/Loaders/Backhoes									1.00
KOMATSU-WA900-3	Tractors/Loaders/Backhoes	0.14	0.04			0.08		0.12	0.13	0.50
KOMATSU-HM400-5	Water Truck	0.14	0.04			0.08		0.12	0.13	0.50
Ford F-750	Service Truck	0.14	0.04			0.08		0.12	0.13	0.50
Allmand Night-Light Pro	Light Plant									1.00
Polaris 6x6 ATV	ATV	0.25	0.25	0.25						0.25
F-140 4WD	Pick-up Truck	0.14	0.04			0.08		0.12	0.13	0.50
F-150 4WD Crew Cab	Crew-Cab Truck	0.14	0.04			0.08		0.12	0.13	0.50
Ford E-150 Van	Van									1.00
Ford F-350 Cab and Chassis	Maintenance Truck	0.14	0.04			0.08		0.12	0.13	0.50
Drilling		1.00								
Blasting		1.00								
In-Pit Ore Loading		1.00								
In-Pit Waste Rock Loading		1.00								
Waste Rock Unloading			0.50	0.50						
Ore and Waste Rock Hauling - Inside Pit		1.00								
Ore Hauling - Pit to Primary Crusher								1.00		
Waste Rock Hauling - Pit to Waste Rock Storage Area						1.00				
Waste Rock Hauling - Inside Waste Rock Storage Area			1.00							
Waste Rock Hauling - Pit to Access Road Construction Site									1.00	
Dozing		0.60	0.20	0.20						
Grading		0.27	0.08			0.15		0.24	0.25	
Wind Erosion -Waste Rock Storage			1.00							
Wind Erosion -Access Road Construction Site				1.00						
Wind Erosion -Coarse Ore Stockpile										
Wind Erosion -Fine Ore Stockpile										
Wind Erosion -Haul Roads - Inside Pit		1.00								
Wind Erosion -Haul Roads - Pit to PC								1.00		
Wind Erosion -Haul Roads - Pit to Waste Rock Storage Area			1.00							
Wind Erosion -Haul Roads - Inside Waste Rock Storage Area						1.00				
Wind Erosion -Haul Roads - Pit to Access Road Construction Site									1.00	
Wind Erosion -Access Roads - Inside Process Area										1.00

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS

PROJECT TITLE:	BY:		
GQM - Soledad Mountain	Tom Brauch		
PROJECT NO:	SHEET	OF	PAGE
48-1	4	5	1/8
SUBJECT:	DATE:		
Facility - Wide HAPs Summary	06/24/2020		

FACILITY - WIDE HAPs EMISSIONS SUMMARY

		Potential Emissions		
Pollutant	**CAS#**	*(lb/hr)*	*(lb/yr)*	*(ton/yr)*
Antimony	7440360	2.07E-03	9.01E-01	4.50E-04
Arsenic	7440382	9.32E-03	4.06E+00	2.03E-03
Barium	7440393	5.41E-02	2.36E+01	1.18E-02
Beryllium	7440417	4.05E-05	1.77E-02	8.83E-06
Cadmium	7440439	1.34E-03	5.83E-01	2.91E-04
Chromium	7440473	4.54E-02	1.98E+01	9.90E-03
Cobalt	7440484	8.11E-05	3.53E-02	1.77E-05
Copper	7440508	2.72E-03	1.18E+00	5.92E-04
Lead	7439921	4.70E-03	2.05E+00	1.02E-03
Mercury	7439976	1.09E-03	4.77E-01	2.38E-04
Nickel	7440020	6.48E-04	2.83E-01	1.41E-04
Selenium	7782492	4.05E-05	1.77E-02	8.83E-06
Silver	7440224	5.27E-04	2.30E-01	1.15E-04
Thalium	7440280	1.31E-02	5.72E+00	2.86E-03
Zinc	7440666	4.17E-03	1.82E+00	9.10E-04
Hyrdogen Cyanide	74908	9.55E-02	8.37E+02	4.18E-01
1,3-Butadiene	106990	2.27E-03	1.78E+01	8.89E-03
Acetaldehyde	75070	4.45E-02	3.49E+02	1.74E-01
Acrolein	107028	5.36E-03	4.20E+01	2.10E-02
Benzene	71432	5.41E-02	4.24E+02	2.12E-01
Formaldehyde	50000	6.84E-02	5.36E+02	2.68E-01
Propylene	115071	1.01E-02	1.01E+00	5.06E-04
Toluene	108883	2.37E-02	1.86E+02	9.30E-02
Xylenes	1330207	1.65E-02	1.30E+02	6.48E-02
Acenaphthene	83329	5.57E-06	5.57E-04	2.78E-07
Acenapthylene	208968	1.98E-05	1.98E-03	9.92E-07
Anthracene	120127	7.33E-06	7.33E-04	3.67E-07
Benz(a)anthracene	56553	9.74E-05	7.64E-01	3.82E-04
Benzo(a)pyrene	50328	1.09E-05	8.55E-02	4.27E-05
Benzo(b)fluoranthene	205823	5.75E-06	4.50E-02	2.25E-05
Benzo(g,h,l)perylene	191242	1.92E-06	1.92E-04	9.58E-08
Benzo(k)fluoranthene	207089	6.08E-07	6.08E-05	3.04E-08
Chrysene	218019	1.38E-06	1.38E-04	6.92E-08
Dibenz(a,h)anthracene	53703	3.38E-05	2.65E-01	1.33E-04
Fluoranthene	206440	2.98E-05	2.98E-03	1.49E-06
Fluorene	86737	1.14E-04	1.14E-02	5.72E-06
Indeno(1,2,3-cd)pyrene	193395	2.17E-05	1.70E-01	8.52E-05
Napthalene	91203	4.92E-03	3.85E+01	1.93E-02
Phenathrene	85018	1.15E-04	1.15E-02	5.76E-06
Pyrene	129000	1.87E-05	1.87E-03	9.37E-07
Total PAH	1150	5.41E-03	4.00E+01	2.00E-02
Total		4.71E-01	2662.62	1.33E+00
Total (excluding total PAH)		4.65E-01	2622.63	1.31E+00

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 2/8
	SUBJECT: HCN Emissions from HLF	DATE: 06/24/2020		

HCN EMISSIONS FROM HEAP LEACH FACILITY (HLF)

Phase 1 HLF Total Acres	205	*acre*	*Estimate GQM*
Phase 1 HLF Area Under Active Leach	15.00	*acre*	*Estimate GQM*
Phase 1 HLF Area Under Inactive Leach	190.00	*acre*	

HCN EMISSIONS FACTORS

Active - Wet -and - Dry	49.70	*lb/acre-yr* [a]	*Average HCN Emission rate based on in-situ monitoring of HCN concentrations at the surface of an HLF*
Active - Dry	12.80	*lb/acre-yr*	*Average HCN Emission rate based on in-situ monitoring of HCN concentrations at the surface of an HLF*
Inactive - Dry	3.00	*lb/acre-yr*	*Average HCN Emission rate based on in-situ monitoring of HCN concentrations at the surface of an HLF*

[a] Derived from Active - Wet Emissions Factor of 435.70 *lb/acre-yr* and Active 12.80 *lb/acre-yr* *Based on following assumptions*

An emitter hole produces and average saturated circular area of	12.00	*inches diameter around the hole*
Emitter Spacing is	36.00	*inches*
Emitter hole spacing is	36.00	*inches*
Area served by each emitter hole	1296.00	*sq. inches*
saturated Area under each emitter hole	113.10	*sq. inches*
Ratio of saturated area over total area served by an emitter hole	0.09	
Active - Wet - and - Dry Emission Factor is	49.70	*lb/acre-yr*

Calculated as:

435.7 *lb/acre-yr -wet area x* 0.09 *acre-wet area/acre* + 12.80 *lb/acre-yr-wet area* x 0.91 *acre-wet area/acre*

EMISSIONS

Surface Area Type	Area (acre)	Note	HCN (lb/hr)	HCN lb/yr	HCN (ton/yr)
Phase 1 HLF - Active Sloped	1.50	b, c	0.009	75	0.037
Phase 1 HLF - Active Flat	15.00	d	0.022	192	0.096
Phase 1 - Inactive	190.00	e	0.065	570	0.285
Total			0.095	837	0.418

[b] Assumed as 10% of the flat area

[c] Emitters are exposed on slope surface. Active - Wet - and - Dry emission factor is used

[d] Emitters are buried underneath flat surface. Active - Dry Emission Factor is used

[e] Inactive - Dry Emission Factor is used

Conversions:		
	8,760	*hr/yr*
	2,000	*lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 3/8
	SUBJECT: Mercury Retort Emissions	DATE: 06/24/2020		

MERCURY RETORT

Operation Schedule	24	*hr/batch*	*GQM*
Phase 1 HLF Area Under Active Leach	3	*batch/week*	*GQM*
Phase 1 HLF Area Under Inactive Leach	156.00	*batch/yr*	*GQM*
	3,744.00	*hr/yr*	*GQM*
Maximum Condensor Temperature	30.00	*^{o}C*	
	86.00	*^{o}F*	
Maximum Condensor Outlet Hg Concentration	0.00040	*kPa* [a,b]	
	0.01432	*gr/dscf* [a,b]	
Maximum Exhaust Flow Rate	100.00	*ACFM*	*GQM*
	83.80	*DSCFM* [c]	
Uncontrolled Hg Emission Rate	0.0103	*lb/hr*	
	38.50	*lb/yr*	
	0.02	*ton/yr*	
Control Equipment	Carbon Adsorption		
Control Efficiency	95.00	*%*	
Controlled Hg Emission Rate	0.000514	*lb/hr*	
	1.90	*lb/yr*	
	0.0010	*ton/yr*	

STACK PARAMETERS

Ht (ft)	Dia (ft)	Temp (^{o}F)	Vel (ft/s)	Flow ACFM
45.00	0.50	86.00	8.50	100.00

Flow Rate Conversion

83.76	DSCFM	100 *acf*	460 + 68 F	27.05 in Hg (at 2775 ft elev)	1 - 4.19%	dry (sat. value) [c]
		min	460 + 86 F	29.92 in Hg (1 atm)		wet

References

[a] CRC Handbook of Chemistry and Physics, 86th Ed. Taylor and Francis Group. New York. 2005 p. 6-126

[b] Perry, Robert H. and Green, Don W. Perry's Checmical Engineers' Handbook, Sveenth Edition. McGraw Hill. 1997. p 2-250

[c] Smith, J.M. and Van Ness, H.C. Introduction to Chemical Thermodynamics 4th Ed. McGraw-Hill Book Company. 1987 p. 574

Conversions:		
	7,000	*gr/lb*
	60	*min/hr*
	2,000	*lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 4/8
	SUBJECT: Melt Furnace Emissions	DATE: 06/24/2020		

MELT FURNACE

Operation Schedule	12	*hr/batch*	*GQM*
	3	*batch/week*	*GQM*
	156.00	*batch/yr*	
	1,872.00	*hr/yr*	
Furnace Throughput	500.00	*kg/hr*	*GQM*
	1102.00	*lb/hr*	
Hg Concentration	100.00	*ppm* [(a)]	
Uncontrolled Hg Emission Rate	0.1102	*lb/batch*	
	0.11	*lb/hr*	*(maximum assuming all Hg in batch is emitted in 1 bhour)*
	17.19	*lb/yr*	
	0.01	*ton/yr*	
Control Equipment	Carbon Adsorption		
Control Efficiency	95.00	*%*	
Controlled Hg Emission Rate	0.01	*lb/hr*	
	0.86	*lb/yr*	
	0.0004	*ton/yr*	

STACK PARAMETERS

Ht (ft)	Dia (ft)	Temp (°F)	Vel (ft/s)	Flow ACFM
45.00	1.67	103.00	22.90	3000.00

References

[a] CRC Handbook of Chemistry and Physics, 86th Ed. Taylor and Francis Group. New York. 2005 p. 6-126

[b] Perry, Robert H. and Green, Don W. Perry's Checmical Engineers' Handbook, Sveenth Edition. McGraw Hill. 1997. p 2-250

[c] Smith, J.M. and Van Ness, H.C. Introduction to Chemical Thermodynamics 4th Ed. McGraw-Hill Book Company. 1987 p. 574

Conversions:		
	2	*lb/kg*
	3.28084	*ft/m*
	2,000	*lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 5/8
	SUBJECT: Dust Sources Emissions	DATE: 06/24/2020		

DUST (PROCESS AND FUGITIVE) SOURCES

Process and Fugitive Dust (PM10) Emissions (Excluding Combustion Sources) 405.29 *lb/hr*
88.32 *ton/yr*

Pollutant	Symbol	CAS#	Concentration[a] (ppm)	Potential Emissions (lb/hr)	(lb/yr)	(ton/yr)
Antimony	Sb	7440360	5.10	2.07E-03	9.01E-01	4.50E-04
Arsenic	As	7440382	23.0000	9.32E-03	4.06E+00	2.03E-03
Barium	Ba	7440393	133.60	5.41E-02	2.36E+01	1.18E-02
Beryllium	Be	7440417	0.10	4.05E-05	1.77E-02	8.83E-06
Cadmium	Cd	7440439	3.30	1.34E-03	5.83E-01	2.91E-04
Chromium	Cr	7440473	112.10	4.54E-02	1.98E+01	9.90E-03
Cobalt	Co	7440484	0.20	8.11E-05	3.53E-02	1.77E-05
Copper	Cu	7440508	6.70	2.72E-03	1.18E+00	5.92E-04
Lead	Pb	7439921	11.60	4.70E-03	2.05E+00	1.02E-03
Mercury	Hg	7439976	2.700000	1.09E-03	4.77E-01	2.38E-04
Nickel	Ni	7440020	1.60	6.48E-04	2.83E-01	1.41E-04
Selenium	Se	7782492	0.1000	4.05E-05	1.77E-02	8.83E-06
Silver	Ag	7440224	1.30	5.27E-04	2.30E-01	1.15E-04
Thalllium	Th	7440280	32.40	1.31E-02	5.72E+00	2.86E-03
Zinc	Zn	7440666	10.30	4.17E-03	1.82E+00	9.10E-04
Total						

[a] Jeff Gillow, ARCADIS, Report of Waste Discharge, March 2007

Conversions 2,000 *lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 6/8
	SUBJECT: Diesel Machinery Emissions	DATE: 06/24/2020		

DIESEL MACHINERY

Estimated Diesel Consumption for Mining Equipment	3,312,157	*gal/yr*
Hourly Emissions Averaged Based on:	8,400	*hr/yr*
Diesel Heating Value	0.137	*MMBtu/gal*

Pollutant	CAS#	Emission Factor [a] *(lb/MMBtu)*	Potential Emissions *(lb/hr)*	*(lb/yr)*	*(ton/yr)*
1,3-Butadiene	106990	3.91E-05	2.11E-03	1.77E+01	8.87E-03
Acetaldehyde	75070	7.67E-04	4.14E-02	3.48E+02	1.74E-01
Acrolein	107028	9.25E-05	5.00E-03	4.20E+01	2.10E-02
Benzene	71432	9.33E-04	5.04E-02	4.23E+02	2.12E-01
Formaldehyde	50000	1.18E-03	6.37E-02	5.35E+02	2.68E-01
Toluene	108883	4.09E-04	2.21E-02	1.86E+02	9.28E-02
Xylenes	1330207	2.85E-04	1.54E-02	1.29E+02	6.47E-02
Benz(a)anthracene	56553	1.68E-06	9.08E-05	7.62E-01	3.81E-04
Benzo(a)pyrene	50328	1.88E-07	1.02E-05	8.53E-02	4.27E-05
Benzo(b)fluoranthene	205823	9.91E-08	5.35E-06	4.50E-02	2.25E-05
Benzo(k)fluoranthene	207089	1.55E-07	8.37E-06	7.03E-02	3.52E-05
Dibenz(a,h)anthracene	53703	5.83E-07	3.15E-05	2.65E-01	1.32E-04
Indeno(1,2,3-cd)pyrene	193395	3.75E-07	2.03E-05	1.70E-01	8.51E-05
Napthalene	91203	8.48E-05	4.58E-03	3.85E+01	1.92E-02
Total PAH	1150	8.79E-05	4.75E-03	3.99E+01	1.99E-02
Total			2.10E-01	1.76E+03	8.81E-01
Total (excluding total PAH)			2.05E-01	1.72E+03	8.61E-01

[a] *KCAPCD provided diesel exhaust emission factors. June 29, 2009, Glen Stephen*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 7/8
	SUBJECT: Gasoline Vehicles Emissions	DATE: 06/24/2020		

GASOLINE VEHICLES

Hourly Emissions Averaged Based on: 8,400 *hr/yr*

Pollutant	CAS#	Emission Factor [a] (fraction)	Potential Emissions (lb/hr)	(lb/yr)	(ton/yr)
1,3-Butadiene	106990	2.39E-04	1.83E-06	1.54E-02	7.69E-06
Acetaldehyde	75070	4.68E-03	3.59E-05	3.01E-01	1.51E-04
Acrolein	107028	5.65E-04	4.33E-06	3.64E-02	1.82E-05
Benzene	71432	5.69E-03	4.36E-05	3.66E-01	1.83E-04
Formaldehyde	50000	7.20E-03	5.52E-05	4.64E-01	2.32E-04
Toluene	108883	2.50E-03	1.92E-05	1.61E-01	8.05E-05
Xylenes	1330207	1.74E-03	1.33E-05	1.12E-01	5.60E-05
Benz(a)anthracene	56553	1.03E-05	7.89E-08	6.63E-04	3.32E-07
Benzo(a)pyrene	50328	1.15E-06	8.81E-09	7.40E-05	3.70E-08
Benzo(b)fluoranthene	205823	6.05E-07	4.64E-09	3.89E-05	1.95E-08
Benzo(k)fluoranthene	207089	9.46E-07	7.25E-09	6.09E-05	3.05E-08
Dibenz(a,h)anthracene	53703	3.56E-06	2.73E-08	2.29E-04	1.15E-07
Indeno(1,2,3-cd)pyrene	193395	2.29E-06	1.76E-08	1.47E-04	7.37E-08
Napthalene	91203	5.18E-04	3.97E-06	3.33E-02	1.67E-05
Total PAH	1150	5.36E-04	4.11E-06	3.45E-02	1.73E-05
Total			1.82E-04	1.52	7.62E-04
Total (excluding total PAH)			1.77E-04	1.49	7.45E-04

[a] *Developed from diesel emissions. Metals as fraction of PM, and non-metals as fraction o f VOC emissions. Based on annual emission rates*

Diesel Machinery PM Emissions	3.16	*ton/yr*
Diesel Machinery VOC Emissions	10.57	*ton/yr*
Gasoline Vehicle PM Emissions	0.01	*ton/yr*
Gasoline vehicle VOC Emissions	0.03	*ton/yr*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 4	OF 5	PAGE 8/8
	SUBJECT: Emergency Generator Emissions	DATE: 06/24/2020		

EMERGENCY GENERATOR

Heat Input Rate	3.92	*MMBtu/hr*
Operation Schedule	100.00	*hr/yr*

Pollutant	CAS#	Emission Factor [a] *(lb/MMBtu)*	Potential Emissions *(lb/hr)*	*(lb/yr)*	*(ton/yr)*
1,3-Butadiene	106990	3.91E-05	1.53E-04	1.53E-02	7.66E-06
Acetaldehyde	75070	7.67E-04	3.01E-03	3.01E-01	1.50E-04
Acrolein	107028	9.25E-05	3.63E-04	3.63E-02	1.81E-05
Benzene	71432	9.33E-04	3.66E-03	3.66E-01	1.83E-04
Formaldehyde	50000	1.18E-03	4.63E-03	4.63E-01	2.31E-04
Propylene	115071	2.58E-03	1.01E-02	1.01E+00	5.06E-04
Toluene	108883	4.09E-04	1.60E-03	1.60E-01	8.02E-05
Xylenes	1330207	2.85E-04	1.12E-03	1.12E-01	5.59E-05
Acenaphthene	83329	1.42E-06	5.57E-06	5.57E-04	2.78E-07
Acenapthylene	208968	5.06E-06	1.98E-05	1.98E-03	9.92E-07
Anthracene	120127	1.87E-06	7.33E-06	7.33E-04	3.67E-07
Benz(a)anthracene	56553	1.68E-06	6.59E-06	6.59E-04	3.29E-07
Benzo(a)pyrene	50328	1.88E-07	7.37E-07	7.37E-05	3.68E-08
Benzo(b)fluoranthene	205823	9.91E-08	3.88E-07	3.88E-05	1.94E-08
Benzo(g,h,l)perylene	191242	4.89E-07	1.92E-06	1.92E-04	9.58E-08
Benzo(k)fluoranthene	207089	1.55E-07	6.08E-07	6.08E-05	3.04E-08
Chrysene	218019	3.53E-07	1.38E-06	1.38E-04	6.92E-08
Dibenz(a,h)anthracene	53703	5.83E-07	2.29E-06	2.29E-04	1.14E-07
Fluoranthene	206440	7.61E-06	2.98E-05	2.98E-03	1.49E-06
Fluorene	86737	2.92E-05	1.14E-04	1.14E-02	5.72E-06
Indeno(1,2,3-cd)pyrene	193395	3.75E-07	1.47E-06	1.47E-04	7.35E-08
Napthalene	91203	8.48E-05	3.32E-04	3.32E-02	1.66E-05
Phenathrene	85018	2.94E-05	1.15E-04	1.15E-02	5.76E-06
Pyrene	129000	4.78E-06	1.87E-05	1.87E-03	9.37E-07
Total PAH	1150	1.68E-04	6.59E-04	6.59E-02	3.29E-05
Total			2.60E-02	2.60	1.30E-03
Total (excluding total PAH)			2.53E-02	2.53	1.26E-03

[a] *AP-42 Tab. 3.3-2, 10/96 (industrial diesel engines up to 600 hp)*

Conversion	2000.00	*lb/ton*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS	PROJECT TITLE: GQM - Soledad Mountain	BY: Tom Brauch		
	PROJECT NO: 48-1	SHEET 5	OF 5	PAGE 1/2
	SUBJECT: Operational Parameters Ore and Aggregate Processing	DATE: 06/24/2020		

KEY OPERATIONAL PARAMETERS AND ASSUMPTIONS

MINING ACTIVITIES

Parameter	Rate	Unit	Reference
Ore Production	13,428.57	*ton/day*	GQM
	4,700,000.00	*ton/yr*	GQM
Waste Production	55,142.86	*ton/day*	GQM
	19,300,000.00	*ton/yr*	GQM
Total Production	24,000,000.00	*ton/yr*	
Material Specific Volume	18.10	*ft^3/ton*	GQM
Operation Schedule	8,400.00	*hr/yr*	
	24.00	*hr/day*	GQM
	350.00	*day/yr*	GQM
Truck Dump to Coarse Ore Hopper	716.50	*ton/hr*	GQM
Truck Dump to Coarse Ore Hopper - Control	Water Sprays		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Primary Crushing	716.50	*ton/hr*	GQM
	17,196.00	*ton/day*	*Based on 24 hr/day operation* Based on PTO
	6,018,600.00	*ton/yr*	*Based on 350 day/yr operation*
PC Control	Water Sprays/Enclosures		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore Transfer - Primary Crusher to Primary Crusher Discharge Conveyor (3141)	716.50	*ton/hr*	
Ore Transfer - PC to PC Discharge Conveyor (3141) - Control	Water Sprays		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore Transfer - 3141 to Coarse Ore Stacker (3142)	716.50	*ton/hr*	
Ore Transfer - 3141 to Coarse Ore Stacker (3142) - Control	Water Sprays		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore Transfer - 3142 to Coarse Ore to Stockpile	716.50	*ton/hr*	
Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241)	716.50	*ton/hr*	
Ore Transfer - Coarse Ore Stockpile to Screen Feed Conveyor (3241) - Control	Foggers		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Crushing-Screening Plant Common Exhaust			
Ore Transfer - 3241 to Secondary Crushing-Screening Plant	1,095.70	*ton/hr*	*GQM, D-158716-00-P-001, Rev B 03/09/08*
Screening	1,095.70	*ton/hr*	*GQM, D-158716-00-P-001, Rev B 03/09/08*
Cone Crushing	379.20	*ton/hr*	
Ore Transfer - Screen to Fine Ore Conveyor (3244)	716.50	*ton/hr*	*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore Transfer - Cone Crusher Product Conveyor (3242)	379.20	*ton/hr*	
Ore Transfer - 3242 to Scissors Conveyor (3243)	379.20	*ton/hr*	
Screening and Crushing Plant - Control	Wet Scrubber		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore transfer - 3243 to 3241	379.20	*ton/hr*	
Ore transfer - 3243 to 3241 - Control	Foggers		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore Transfer - 3244 ro Fine Ore Bin	716.50	*ton/hr*	
Ore Transfer - 3244 ro Fine Ore Bin - Control	None		
Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342)	716.60	*ton/hr*	
Ore Transfer - Fine Ore Bin to HPGR Feed Conveyor (3342) - Control	None		
Ore Transfer - 3342 to HPGR	716.60	*ton/hr*	
Ore Transfer - 3342 to HPGR - Control	Water Sprays		
Cement Silo Loading	30.00	*ton/hr*	*Assumption*
Cement Silo Loading - Control	Bin Vent		
Cement Silo - Discharge	3.60	*ton/hr*	*10 lb/ton HPGR Feed*
Cement Silo - Discharge - Control	None		
HPGR Plant - Common Exhaust			
High Pressure Grinding Roll	720.10	*ton/hr*	*Ore plus Cement*
Ore Transfer - HPGR Discharge to HPGR Product Conveyor (3343)	720.10	*ton/hr*	
Ore Transfer - 3343 to Fine Ore Stacker (3441)	720.10	*ton/hr*	
HPGR Plant - Control	Wet Scrubber		*GQM, D-158716-00-P-001, Rev B 03/09/08*
Ore Transfer - 3441 to Fine Ore Stockpile	720.10	*ton/hr*	
Ore Transfer - 3441 to Fine Ore Stockpile - Control	Wet Material		
Fine Ore Stockpile	24,200.00	*ton*	*Estimate scaled from coarse ore stockpile total capacity to live capacity ratio*
Ore Transfer - Fine Ore Stockpile to Overland Conveyor	720.00	*ton/hr*	
Ore Transfer - Overland Conveyor to Leach Pads	720.00	*ton/hr*	
Aggregate Processing	500,000.00	*ton/yr*	GQM
Aggregate Processing	2,000.00	*ton/day*	GQM
Aggregate Processing	200.00	*ton/hr*	*Based on 10 hr/day operations schedule*

Values in blue are entries and black are either carried over or calculated

ENGINEERING CALCULATIONS

PROJECT TITLE: GQM - Soledad Mountain			**BY:** Tom Brauch
PROJECT NO: 48-1	SHEET 5	OF 5	PAGE 2/2
SUBJECT: Operational Parameters Mining Activities			**DATE:** 06/24/2020

KEY OPERATIONAL PARAMETERS AND ASSUMPTIONS

MINING ACTIVITIES

Parameter	Rate	Unit	Reference
Drill Pattern - Dimension 1	21.30	*ft*	
Drill Pattern - Dimension 2	16.40	*ft*	
Surface Area Per Drill Hole	349.32	*ft²*	
Mass Per Drill Hole	504.00	*ton*	
Drilling Control	Dust Collection System		
Drilling Control Efficiency	90.00	*%*	
Number of Blasts	250.00	*blasts/yr*	
Mass per Blast	96,000.00	*ton*	
Drill Holes Per Blast	190.48	*holes*	
Surface Area per Blast	66,537.14	*ft²*	
ANFO Use	0.36	*lb/ton*	
	17.28	*ton/blast*	
	4,320.00	*ton/yr*	
Diesel Use in Blasting	259.20	*ton/hr*	Based on 6% mixture
Mean Wind Speed	11.14	*mph*	
Surface Material Silt Content	2.60	*%*	
Number of Days with > 0.01 in. of ppt per year	29.00	*days*	
Average Moisture Content	3.00	*%*	
Diesel Sulfur Content	500.00	*ppm*	
Mobile Machinery Diesel Consumption	3,312,157.00	*gal/yr*	
Haul Truck Weight (empty)	74.00	*ton*	
Haul Truck Payload Capacity	106.00	*ton*	
Average Haul Truck Speed	24.10	*mph*	
Hauling Control	Chemical Application/Watering		
Hauling - Inside Pit	990.00	*ft*	*GQM Site Drawing*
Hauling Pit to PC	1,500.00	*ft*	*GQM Site Drawing*
Hauling - Pit to Waste Rock Storage	1,630.00	*ft*	*GQM Site Drawing*
Hauling - Inside Waste Rock Storage Area	900.00	*ft*	*GQM Site Drawing*
Hauling - Pit to Access Road Construction	1,500.00	*ft*	*GQM Site Drawing*
Road Length - Inside Process Area	3,500.00	*ft*	*GQM Site Drawing*
Haul Road Width	80.00	*ft*	*GQM Site Drawing*
Mobile Machinery Gasoline Consumption	46,928.57	*gal/yr*	

Control	Pollutant	Efficiency
None	PM	0.0%
Water Sprays	PM	75.0%
Watering	PM	75.0%
Chemical Application/Watering	PM	90.0%
Enclosure	PM	75.0%
Water Sprays/Enclosure	PM	94.0%
Foggers	PM	99.0%
Wet Scrubber	PM	99.0%
Wet Material	PM	95.0%
Bin Vent	PM	99.0%

Values in blue are entries and black are either carried over or calculated