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 BAQ Air Permitting Division

Company Name:	Haile Gold Mine Inc	Permit Writer:	Mareesa Singleton
Permit Number:	1460-0070-CD	Date:	December 28, 2022

DATE APPLICATION RECEIVED: August 29, 2022

FACILITY DESCRIPTION (SIC CODES/NAICS CODES)

Gold Mine and an ore processing plant (1041/212221; 1044/212222).

PROJECT DESCRIPTION: Construction permit application for mine expansion. The expansion includes the addition of underground mining operations at the Horseshoe Deposit and the optimization of the mill operations to increase the ore throughput capacity from approximately ~9,100 tons per day / ~3,300,000 tons per year to ~14,000 tons per day / 5,100,000 tons per year. The facility will also install a new crushing plant (PT-20a) associated with the CFR Plant (PT-20). The exact crusher planned for use has not been determined, therefore, a conservative estimation of a 342 ton/hr crusher with two engines (100 kW and a 300 kW) was used.

Facility throughput will be increased by improved blasting efficiencies prior to ore extraction creating a smaller size fraction of material with microfractures which allows for more efficient breakage in the SAG Mill. The more efficient breakage will result in material entering and exiting the mill faster, thus increasing throughput. Also, the existing exempt pebble mill (located adjacent to the SAG Mill) further allows increased throughput by removing gravel-sized rock from the SAG Mill discharge and efficiently grinding it separately from the mill.

Additionally, instead of utilizing a lime silo system and releasing the agricultural lime from the silo into truck bed, sources PT-10 (Overburden lime silo bin vent filter) and PT-11 (Lime drop to truck bed) from the original construction permit will not be installed. The facility will in its place, create a lime stockpile on the ground and load 40-ton trucks with a loader to deliver the agricultural lime to the pit backfill (Overburden Lime Operations (fugitive source)).

The current Title V permit has PT-7a with a bin vent as a control device. However, the source is not equipped with a bin vent. Therefore, the facility is requesting to remove the bin vent from the Title V permit.

The facility also requesting the following changes to the Standard 4 Processes and Process Weight Rates:

Permitted Process	Permitted Process Weight Rate (tph)	Proposed Process	Proposed Process Weight Rate (tph)
Primary Crushing and Coarse Ore Handling (PT-1, PT-2, PT-2a, PT-3, PT-3a)	1,000	Primary Crushing and Coarse Ore Handling (PT-1, PT-2, PT-2a, PT-3, PT-3a, PT-4)	1,000
Gold Extraction Process (PT-4, PT-5a, PT-5b, PT-6)	380	Gold Extraction Process (PT-5a, PT-5b, and PT-6)	600
Lime Silo Loading No.1 (PT-7, PT-7a)	30	Lime Silo Loading No.1 (PT-7 and PT-7a)	30

The list of changes related to the expansion are in the table titled "Expansion Changes." Modifications to other existing sources are also considered commensurate with the increase in ore throughput. These changes are listed in the table titled "Other Changes."



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With this project, the facility has the potential to emit above the PSD major source threshold of 250.0 tpy of PM facility wide. The facility is requesting a synthetic minor limit of less than 250.0 tpy of PM to avoid being a PSD major source.

Expansion Changes						
Equipment ID	Equipment Description	Permitted		Proposed		Basis
		Daily (tons/day)	Annually (tons/year)	Daily (tons/day)	Annually (tons/year)	
PT-1	Primary Crusher including Load-In/Load-Out with 3-sided enclosure	24,000	3,328,800	24,000	5,100,000	Daily production is already maximized; Increased annual production based on optimizations
PT-2	Crusher Conveyor Transfer to Stockpile Feed Conveyor	24,000	3,328,800	24,000	5,100,000	Daily production is already maximized; Increased annual production based on optimizations
PT-2a	Crusher Conveyor to Transfer to Coarse Ore Bin	24,000	3,328,800	24,000	5,100,000	Daily production is already maximized; Increased annual production based on optimizations
PT-3	Stockpile Feed Conveyor Transfer to Coarse Ore Stockpile	24,000	450,000	24,000	1,785,000	Daily production is already maximized; Increased annual production based on optimizations; (35% of ore may be diverted to stockpile)
PT-3a	Emergency Hopper Load-In	9,120	450,000	14,400	1,785,000	Increased production based on optimizations; (35% of ore may be loaded from stockpile)
PT-4	Conveyor Transfer to SAG Mill	9,120	3,328,800	14,400	5,100,000	Increased production based on optimizations
PT-7	75-ton Reagent Area Lime Silo	--	10,500	75	12,750	Daily max for silo based on silo capacity
PT-7a	Reagent Lime Paste Slaker	--	10,500	36	12,750	Daily max is based on 5 lb of lime per ton of ore



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Expansion Changes						
Equipment ID	Equipment Description	Permitted		Proposed		Basis
		Daily (tons/day)	Annually (tons/year)	Daily (tons/day)	Annually (tons/year)	
PT-20a	CFR Batch Plant Portable Crushing Operations	--	--	8,208	2,987,712	New Source

Other Changes		
Equipment ID	Equipment Description	Basis
PT-5a	Carbon Regeneration Kiln	Controlled PM, PM ₁₀ , and PM _{2.5} emissions updated to 90% control efficiency (previous application used 98%; however, unapproved source test data results showed 94% efficiency, therefore, a conservative 90% was used); Uncontrolled annual mercury emissions updated based on source test from December 2018 (highest source test data prior to installation of the mercury abatement system); Hourly uncontrolled mercury emissions calculated using USEPA emission rate calculation for carbon regeneration kilns (more conservative than the source test data); Controlled annual mercury emission updated based on May 2021 source test data (highest emissions from source test data after the installation of the mercury abatement system and a 50% safety factor)
PT-5b	Electrowinning Cells, Pregnant and Barren Tanks	Mercury emissions updated based on source test from May 2021 test (highest emissions from source test after installation of the mercury abatement system and a 50% safety factor); No controlled of mercury emissions assumed; Hydrogen Cyanide emissions updated based on projected Sodium Cyanide usage
PT-6	0.25 tph Electric Melting Furnace with Product Recovery Baghouse	PM, PM ₁₀ , and PM _{2.5} emissions updated based on the average flowrate from source test data; Mercury emissions updated based on source test from the February 2020 source test (highest emissions from source test after the installation of the mercury abatement system and a 50% safety factor); No controlled of mercury emissions assumed
IA PT-9	Trailer Mounted Lighting Systems (10 Kw each)	Updated from 8 units to 20 units and used EPA Non- Road engine Tier 4 standards
PT-10	Overburden lime silo bin vent filter	Sources will not be installed; Will instead use lime stockpile on the ground and load 40-ton trucks with a loader (IA Overburden Lime Operation)
PT-11	Lime-drop to truck bed	



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Other Changes		
Equipment ID	Equipment Description	Basis
PT-15	Five (5) - Diesel Powered Pit Sump Pump Engines 335 Hp (250 kW) Each	The sump pumps are now Model Rain for Rent and not the Model CAT C9 ATAAC from the original construction. Therefore, the emissions were updated using EPA Non-Road engine Tier 4 standards instead of the manufacturer data.
IA PT-16	12.50E+06 Btu/hr Natural Gas Fired Thermal Fluid Heater	Like for like replacement; The new heater is 9.2 million Btu/hr (natural gas fired) and thus an insignificant activity.
T1	Eight (8) - Carbon-in-Leach Tanks 1-8	Hydrogen Cyanide emissions updated based on projected Sodium Cyanide usage
	Cyanide Recovery Thickener Tank	
IA Overburden Lime	Overburden Lime Operation	Replaces PT-10 and PT-11
IA Pebble Crusher	Pebble Crusher	IA previously not included in facility wide emissions
IA T2	HCl Storage Tank	Updated based on projected usage
IA-T3	Sulfuric Acid Storage Tank	Updated based on projected usage
IA-T4	NaOH Storage Tank	Updated based on projected usage
IA-T5	Potassium Amyl Xanthate Storage Tank	Updated based on projected usage

IA – Insignificant Activity

NET EXPANSION EMISSIONS						
Pollutant	Uncontrolled		Controlled		PTE	
	lb/hr*	TPY	lb/hr	TPY	lb/hr	TPY
PM	13.20	76.38	2.881	18.78	13.20	76.38
PM ₁₀	5.074	30.54	1.078	7.641	5.074	30.54
PM _{2.5} **	-0.5520	2.155	0.29	1.984	-0.5520	2.155
SO ₂	0.89	3.90	--	--	0.89	3.90
NO _x	1.03	4.49	--	--	1.03	4.49
CO	2.49	10.90	--	--	2.49	10.90
VOC	0.15	0.66	--	--	0.15	0.66

*There was no change in hourly throughput for source where the short-term rate was already maximized. **The previous calculations did not speciate PM_{2.5} from PM₁₀ for PT-7 and did not speciate PM_{2.5} from PM or PM₁₀ for PT-7a.

NET CHANGE IN EMISSIONS (EXPANSION + OTHER CHANGES)			
Pollutant	Uncontrolled	Controlled	PTE
	TPY	TPY	TPY
PM	68.49	14.01	68.35
PM ₁₀	24.56	4.914	24.49



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NET CHANGE IN EMISSIONS (EXPANSION + OTHER CHANGES)

Pollutant	Uncontrolled	Controlled	PTE
	TPY	TPY	TPY
PM _{2.5}	-5.632	-0.5741	-5.642
SO ₂	2.53	3.02	3.02
NO _x	-32.75	-30.87	-30.87
CO	42.4	43.96	43.96
VOC	2.714	3.394	3.394
Total Mercury	-1.74E-02	-3.67E-03	-3.67E-03
Total HCN (Total of Process and Fugitive)	-4.23	--	-4.23

FACILITY WIDE EMISSIONS*

Pollutant	Prior to Construction**			Post Construction		
	Uncontrolled	Controlled	PTE	Uncontrolled	Controlled	PTE
	TPY	TPY	TPY	TPY	TPY	TPY
Total Lead	2.05E-04	1.19E-04	2.05E-04	3.56E-04	1.19E-04	3.56E-04
Total Arsenic	2.39E-03	7.60E-04	2.39E-03	2.64E-03	7.60E-04	2.64E-03
Total Mercury	3.23E-02	4.98E-03	<0.14 lb Hg/ton concentrate	1.49E-03	1.31E-03	<0.14 lb Hg/ton concentrate
Total HCN (Total of Process and Fugitive)	5.63	--	5.63	1.4	--	1.4
Total HAP	1.226	1.205	1.226	2.04	1.205	2.04
PM	239.35	42.47	239.35	307.8	59.52	<250.0
PM ₁₀	80.82	21.20	80.82	105.4	27.18	105.3
PM _{2.5}	29.81	7.63	29.81	24.18	8.116	24.17
SO ₂	20.57	20.08	20.08	23.1	22.61	23.1
NO _x	64.84	62.96	62.96	32.09	30.21	32.09
CO	21.90	20.34	20.34	64.3	62.74	64.3
VOC	3.746	3.066	3.066	6.46	5.78	6.46
Beryllium	2.45E-06	--	2.45E-06	2.45E-06	--	2.45E-06
Cadmium	2.36E-06	1.49E-07	2.36E-06	2.36E-06	1.49E-07	2.36E-06
Total Chrome	3.24E-04	6.26E-05	3.24E-04	3.24E-04	6.26E-05	3.24E-04
Manganese	1.24E-02	7.91E-04	1.24E-02	1.24E-02	7.91E-04	1.24E-02
Nickel	7.29E-04	1.17E-04	7.29E-04	7.29E-04	1.17E-04	7.29E-04
Total Phosphorus	4.17E-03	3.35E-04	4.17E-03	4.17E-03	3.35E-04	4.17E-03
Selenium	1.86E-06	--	1.86E-06	1.86E-06	--	1.86E-06

*Includes emissions from exempt sources. **Emissions taken from 1460-0070.CC.sob.



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OPERATING PERMIT STATUS: The facility operates under Title V Operating Permit 1460-0070. The permit was issued on June 1, 2021, became effective on July 1, 2021, and expires on June 30, 2026. This permit will be incorporated as a minor modification to the Title V permit.

Synthetic Minor Limits					
Permit ID	Equipment ID	Permit Issue Date	Pollutant	Emission Limit (TPY)	Explanation
1460-0070-CD	Facility Wide	12-28-2022	PM	<250.0	PSD Avoidance

REGULATORY APPLICABILITY REVIEW						
Regulations	Comments/Periodic Monitoring Requirements					
Section II(E) - Synthetic Minor	Applicable - The facility has the potential to emit above the PSD major source threshold of 250.0 tpy of PM. Therefore, the facility is requesting a synthetic minor limit of less than 250.0 tpy of PM to avoid being a PSD major source.					
Standard No. 7	Not Applicable - The facility is not one of the 28 source categories. Therefore, its major source threshold is 250.0 tpy. The facility has the potential to emit more than 250.0 tpy of PM but is requesting a federally enforceable facility wide limit of less than 250.0 tpy to avoid PSD.					
Standard No. 1	Applicable: The insignificant thermal heater (IA PT-16) is subject.					
Standard No. 4	Applicable: The facility is subject to Sections VII (furnace building), VIII, IX, X, and XII.					
	Section VIII:					
		Max Process Weight Rate (tons/hr)	PM Allowable at Max (lb/hr)	Uncontrolled Emissions PM (lb/hr)	Controlled Emissions PM (lb/hr)	Monitoring
	Primary Crushing and Coarse Ore Handling (PT-1, PT-2, PT-2a, PT-3, PT-3a, PT-4)	1,000	77.6	23.21	8.4	Not required because the uncontrolled emissions are less than the allowable; however, the facility is required to have a dust control plan to control fugitive PM emissions



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REGULATORY APPLICABILITY REVIEW

Regulations	Comments/Periodic Monitoring Requirements					
	Gold Extraction Process (PT-5a, PT-5b, and PT-6)	600	71.2	10.33	1.15	Not required for Standard 4 but required per 40 CFR 63 Subpart EEEEEEE for subject sources
	Lime Silo Loading No.1 (PT-7 and PT-7a)	30	40.0	2.44	0.186	Not required because the uncontrolled emissions are less than the allowable; however, the facility is required to have a dust control plan to control fugitive PM emissions
	PT-20a	342	64.50	12.30	1.63	Not required for standard 4 because the uncontrolled are less than the allowable.
	<p>Section IX – 20% opacity.</p> <p>Section X – Nonencoded operations</p> <p>Section XII(A)(4) requires that metallurgical furnaces greater than 10 tph normal output be tested. This facility will have a melting furnace which is a metallurgical furnace, but its output will be less than 10 tph normal output and so no testing is required.</p>					
Standard No. 3 (state only)	Not Applicable: No Waste combustion or reduction.					
Standard No. 5	Not Applicable: This facility will not have any of the process operations that are specified by this standard.					



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REGULATORY APPLICABILITY REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
Standard No. 5.2	Not Applicable: The rotary kiln (PT5-A), the insignificant emergency generator (IA PT-8), the insignificant trailer mounted lighting systems (IA PT-9), the insignificant thermal fluid heater (IA PT-16), the pump engines (PT-15), the insignificant fire pump engine (IA PT-17), the portable crusher engine (PT-18), and the CFC crusher engines (PT-20a) meet Section I exemption B(3).
61-62.6	Applicable: This facility will have non-enclosed operations which are capable of fugitive PM emissions. The fugitive dust plan is required to be updated to address the new sources.
40 CFR 60 and 61-62.60	<p>Not Applicable: The insignificant thermal fluid heater (IA PT-16) is not subject to Subpart Dc because process heaters are not subject.</p> <p>Applicable: The Primary Crushing and Coarse Ore Handling (PT-1, PT-2, PT-2a, PT-3, PT-3a, PT-4) is subject to Subpart LL.</p> <p>Applicable: The diesel engines (IA PT-8, IA PT-9, PT-15, IA PT-17, PT-18, and PT-20a) are subject to Subpart IIII.</p> <p>Not Applicable: The facility is not subject to Subpart UUU because it does not meet the definition of a mineral processing plant per 40 CFR 60.731.</p> <p>Applicable: The portable crusher (PT-18) and the CFC crusher (PT-20a) are subject to Subpart OOO.</p>
40 CFR 61 and 61-62.61	Not applicable: No applicable subparts.
40 CFR 63 and 61-62.63	<p>Applicable: - The diesel engines (IA PT-8, IA PT-9, PT-15, IA PT-17, PT-18, and PT-20a) are subject to Subpart ZZZZ.</p> <p>Applicable: - The facility is subject to Subpart EEEEEEE.</p>
61-62.68	Not Applicable: - This facility will not store any chemicals specified by this regulation above the threshold quantities required to trigger applicability to this regulation.
40 CFR 64 (CAM)	Not Applicable: None of the Pollutant Specific Emission Units have the PTE above a major source threshold.

AMBIENT AIR STANDARDS REVIEW	
Regulations	Comments/Periodic Monitoring Requirements
Standard No. 2	The facility has demonstrated compliance with the standard. For more details see the modeling summary dated November 2, 2022.
Standard No. 8 (state only)	The facility has demonstrated compliance with the standard. For more details see the modeling summary dated November 2, 2022.



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PUBLIC NOTICE

This construction permit(s) will undergo a 30-day public notice period, in accordance with SC Regulation 61-62.1, Section II(N) and SC Regulation 61-62.1, Section II(E) to establish a PSD avoidance limit of less than 250.0 tons per year of PM. The comment period was open from November 17, 2022 to December 16, 2022 and was placed on the BAQ website during that time period. Comments were received during the comment period.

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.