**TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT No. 96653**

I. INTRODUCTION

This Class I new permit is for the construction and operation of South32 Hermosa Inc.'s Hermosa Project. The facility's potential to emit for nitrogen oxides, carbon monoxide, single hazardous air pollutant (acetaldehyde, acrolein, formaldehyde, and methanol), and total hazardous air pollutants is greater than the major source thresholds. Therefore, this facility is classified as a major source and requires a Class I permit.

A. Company Information

Facility Name: South32 Hermosa Inc.

Mailing Address: 1860 E. River Road, Suite 200, Tucson, Arizona 85718

Facility Location: 749 Harshaw Road, Patagonia, Arizona 85624

B. Attainment Classification

This facility is located in Santa Cruz County which is designated as attainment or unclassified for all criteria air pollutants.

II. PROCESS DESCRIPTION

A. Process Description

South32 Hermosa Inc. (South32 Hermosa) is a mineral exploration and development company focused on the exploration and potential development of the Hermosa Project near Patagonia, Arizona, in Santa Cruz County. The exploration work conducted thus far has shown deposits of zinc (Zn), silver (Ag), manganese (Mn), and lead (Pb), and further exploration work is ongoing.

The Hermosa Project includes underground mining of two deposits:

- Taylor[1] sulfide deposit (Taylor), zinc-lead-silver deposit.
- Clark[1] oxide deposit (Clark), zinc-manganese-silver deposit.

Each deposit will have a dedicated main access (for employees and equipment). Taylor will be accessed via a main production shaft[2], and Clark will be accessed via a decline[3]. The

1 The location of the Taylor and Clark deposits can be found in the permit application Section 5.2.
2 A vertical excavation through which personnel and material can move between the surface and the mine.
3 A gradually-sloped, sometimes spiraled tunnel providing access to an underground mine.

underground operations will be supported by two (2) exhaust ventilation shafts/raises for Taylor and three (3) exhaust ventilation shafts/raises for Clark. Tailings and rock management will be shared between facilities, while ore will be handled separately. Taylor has primary crushing located underground as well as secondary crushing located aboveground. Clark has only aboveground crushing. Material beneficiation from the Taylor deposit will involve various ore beneficiation steps including underground crushing and above-ground milling, screening, froth flotation, and regrind, ultimately producing a zinc/lead concentrate. Material from Clark will go through above-ground crushing ultimately producing crushed ore. All products (concentrates and crushed ores) will be shipped off-site for further beneficiation. Tailings from the Taylor facility will be thickened, filtered, and returned underground to backfill voids as cemented paste backfill or dry stacked in either an onsite or nearby off-site lined tailing storage facility (TSF) when it becomes available.

1. Primary Operating Scenario (POS)

South32 Hermosa is proposing to install natural-gas fired reciprocating engines to provide sufficient onsite power to meet full development needs and both an onsite and off-site TSF. There will be fifty-eight (58) plus one (1) backup 2,600 KW natural gas engines, or twenty-seven (27) plus one (1) backup 4,481 KW natural gas engines operating. There will also be twelve (12) diesel engines throughout the facility.

- Seven (7) prime engines at Clark:
    - Six (6) CAT XQ1140 engines, each of 910 ekW
    - One (1) Cummins C200D2RE engine, 198 ekW
- Five (5) engines at Taylor:
    - Five (5) CAT C175 engines, each of 3,000 ekW
        - These five engines shall be subject to a voluntary limit of five hundred (500) hours per year to provide backup power for the Hermosa Project. These units would be used intermittently the same as traditional emergency engines. They would undergo periodic readiness testing recommended by the manufacturer or South32 Hermosa's insurer no more frequently than once a week for an hour or less and would otherwise be used only when the primary power (either line or prime generated power) to the area protected by the engine is not available or if more power is needed for a discrete, short-term project. Such projects are anticipated to be highly sporadic in nature, likely only one to three times a year for a few days.

Major operations at the Hermosa Project will consist of the following:

- Underground mining (including drilling, blasting, loading, hoisting, and hauling);
- Material transfer;
- Intermediate ore stockpiles;
- Primary and secondary crushing;
- Dust collection from drop points;
- Grinding and screening;
- Froth flotation and regrind;
- Magnetic separation;
- Concentrate filtration and thickening;
- Concentrate and crushed ore loading;
- Tailings filtration; and
- Tailings deposition/placement.

In addition to the major operations listed above, there will be the following auxiliary operations at the Hermosa Project:

- Power generation;
- Laboratory operations;
- Cooling towers (associated with water treatment plant and refrigeration plants);
- Mechanical evaporators;
- Paste backfill system;
- Rock stockpiles;
- Fuel storage tanks;
- Water and wastewater treatment facilities;
- Reagents storage; and
- Vehicle traffic.

a. Underground Mining Drilling, Blasting, Loading, and Unloading

Mining operations begin with drilling and blasting of ore underground. At the anticipated mining location, blast holes are drilled to an appropriate depth using a fleet of mobile drills. The blast holes are filled with an emulsion blasting agent and the blast area is evacuated. Following a blast, the area is sprayed with water to suppress dust, loaders are used to load the blasted material into haul trucks. The ore is then transferred to the underground crusher for Taylor and aboveground crusher for Clark. Ventilation is used to provide safe working conditions for workers. There are three (3) exhaust ventilation shafts/raises for Clark and two (2) exhaust ventilation shafts/raises for Taylor.

b. Primary Crushing System

Extracted material from both deposits will undergo primary crushing. The distinct processes for Taylor and Clark are described below.

(1) Taylor

Ore is fed directly into the crusher through an underground ore pass. This crushed material is then fed onto conveyor belt. The crushed ore is then conveyed to one of three bins from where it is metered onto conveyers which feed the shaft skips that transport the ore vertically to the surface. Once deposited in an aboveground bin adjacent to the shaft, ore is conveyed to the coarse ore storage silos. During this conveying process, a metal detector and magnet will collect any magnetized metals from the crushed ore and place the collected mass in a bin. A dust suppression system mitigates the dust from the crushing of the run-of-mine (ROM) ore and the conveying of the run.

(2) Clark

Once the ROM ore has been mined, it is transported to the above ground primary crusher via haul truck. The ROM ore is processed through the primary crushing system which includes a rock breaker, a feeder, and the primary crusher. Material will be unloaded into a dump pocket which feeds to a vibrating grizzly screen. Oversized material is routed first to a hydraulic impact rock breaker to be reduced, and undersize material gravity feeds into the primary jaw crusher. The crushed ore is conveyed to a coarse ore silos for storage before being hauled offsite by trucks. Emissions from the primary crusher dump pocket will be controlled by water spray. Emissions from each of the two drop points along the conveyor will be controlled by a collection fan and a baghouse.

c. Milling and Screening

The crushed ore in the coarse ore silos is conveyed to the milling and screening circuit. Only the Taylor deposit has onsite milling and screening activities; Clark material is hauled offsite.

At Taylor, the crushed ore will be transported from the coarse ore silos to the milling circuit using a series of feed conveyors. The grinding circuit comprises of an autogenous mill (AG mill/primary mill), vertical tower mill (VTM/secondary mill), and pebble crusher. Primary mill product will be screened with over-sized material sent to the pebble crusher to be crushed further. This ore will be returned to the primary mill by conveyor. Screen undersized material will be sent to hydro-cyclones. Over-sized material will be sent to the VTM for further size reduction. Cyclone undersized material will be sent to flotation. Water from the process water tank will combine with the crushed ore coming into the milling circuit resulting in a saturated grinding process.

d. Froth Flotation and Regrind

South32 Hermosa is proposing to construct a flotation and regrind building near the proposed Taylor mill grinding circuit. Here, the ore will go through a series of rougher, cleaner, and scavenger cells.

(1) Taylor (Lead)

After screening at the primary mill, the slurry goes through a trash screen, then flotation and a cleaner. The slurry will continue to the Jameson lead rougher while tailings from the flotation cells will be sent to the tailings thickener. The Jameson lead rougher and subsequent lead rougher scavenger will separate the slurry into lead rougher concentrate and zinc flotation feed. The lead rougher concentrate will be sent to a cyclone and regrind mill after which it will be separated further by a series of three lead cleaners. The tailings from this process are pumped to the zinc conditioning tanks, while the lead concentrate continues to the lead thickener. The lead thickener will then dewater the lead concentrate and use a filter and concentrate feeder to load containers that will then be sealed and transported via stackers to the container yard. The containerized concentrate is shipped offsite.

(2) Taylor (Zinc)

The zinc flotation feed separated by the lead rougher, and scavenger is pumped to zinc conditioning tanks. From there, the process flow is nearly identical as that for lead. The zinc conditioning tanks discharge to the Jameson zinc rougher and subsequent zinc rougher scavenger. The resultant tailings will be sent to the tailings thickener, while the zinc concentrate will be pumped to a cyclone cluster and regrind mill (cyclone underflow). The cyclone cluster overflow will go to a series of three cleaners that will separate the zinc slurry further into concentrate and tailings. The concentrate will go to the zinc thickener which will dewater the concentrate and then use a filter and feeder to load containers that will then be sealed and transported via stackers to the container yard. The containerized concentrate is shipped offsite.

e. Tailings Filtration

There will be a tailings filtration facility for Taylor. The Taylor facility will process tailings from the Taylor processing facility. Tailings will be dewatered by a thickener first and then tailings filters. The majority of the filter cake will be temporarily stored in silos to be loaded into trucks and hauled to a lined, dry-stack tailings storage facility. The rest will be transported to the tailings paste plant. Flocculants will be mixed in the flocculant skid, outside of the filter building next to the tailings thickener.

f. Power Generation (Natural Gas and Diesel Engines)

Natural gas engines will operate onsite to provide the power needed to operate the facility. There will be fifty-eight (58) plus one (1) backup 2,600 KW natural gas engines, or twenty-seven (27) plus one (1) backup 4,481 KW natural gas engines operating. There will also be twelve (12) diesel engines throughout the facility. If line power is available at the facility as described in Section II.A.2, under Alternate Operating Scenario No. 1 (AOS 1), all the natural gas engines would be retired from use, and only the 12 diesel fired engines would remain.

g. Auxiliary Operations

(1) Tailings Paste Plant

Two separate tailings paste plants will be constructed, one for Taylor and one for Clark. Through the use of recycled tailings and cement, the paste is able to serve as a fortification to stabilize mine conditions, making the underground environment safer and reducing the risk of subsidence. After the tailings have been mixed properly with cement, they will be pumped to the underground mine. Dust collectors will be installed at both plants.

(2) Destruction Tanks (Taylor only)

Minimal quantities of a cyanide compound (such as zinc cyanide) will be used to depress pyrite from tailings in rougher flotation and the zinc cleaner scavenger flotation as well as sump contents from the flotation areas sump. Solid cyanide pellets will be procured and transported via truck to the site, where water will be added to the truck. The solution will be premixed, and then the pre-mixed solution will be offloaded into the storage tanks on-site prior to use in the process. These destruction tanks will be installed to remove cyanide from the tailings using sodium metabisulfite (SMBS), a detox catalyzer ($CuSO_4$), compressed air, lime slurry, and a tank agitator. The contents will pass through two destruction tanks in series and are then gravity-fed to the tailings thickener. Only Taylor material beneficiation will include these destruction tanks.

(3) Tailings Storage Facility (TSF)

(a) TSF1

A tailings storage facility (TSF1) will be established for the tailings from the mining process to be permanently stored. The tailings will be filtered at the tailing filtration plant before they are sent to the tailings facility. The external faces of the TSF will be covered with rock armoring to protect against erosion and minimize dust emissions. Dozers/roto-compactors will operate to spread, and compact material. TSF1 is included in the primary operating scenario (POS).

(b) TSF2

The planned development of the Hermosa Project includes development of a second tailings storage facility (TSF2) on National Forest lands located to the north and east of the proposed Project area as a supplement to TSF1 as described in Section II.A.3. The external faces of the TSF2 will be covered with rock armoring to protect against erosion and minimize dust emissions. It will also produce dust emissions similar to TSF1. TSF2 is included in the Alternate Operating Scenario No. 2 (AOS 2) in Section II.A.3.

(4) Rock and Intermediate Piles

Rock from both deposits will be transported from the mine to piles. Additionally, for Clark, ore will also be stored in intermediate stockpiles. Dozers/roto-compactors will operate to spread, and compact material at the Rock Piles.

(5) Fuel Storage Tanks

Storage tanks for diesel and gasoline will be required at the Hermosa Project. The tanks will be located near the aboveground gasoline dispensing facilities and other areas. These will be used to fuel machinery and vehicles that are onsite. There will be two diesel fuel storage tanks of 50,000 gallons capacity each besides other smaller gasoline and diesel tanks. Compressed Natural Gas (CNG)/Liquified Natural Gas (LNG) will also be stored in tanks onsite.

(6) Reagents Storage

Various organic reagents will be used at the Hermosa Facility. The chemicals including sodium metabisulfite zinc sulphate, copper sulphate, zinc cyanide, lime, frothers (X-133 and MIBC), and collectors (A5100 and 3418A) will be shipped and stored at the Reagents Building. The compounds will be mixed and diluted in the Reagents Building and pumped to various parts of the Facility. Many of these compounds will produce VOC emissions. All materials which can evaporate VOCs shall be stored in closed containers when not in use to minimize VOC evaporation.

(7) Water Treatment Plant and associated Cooling Towers

South32 Hermosa is proposing to operate two water treatment plants (WTP1 and WTP2). No VOC containing chemicals would be used for water treatment at either. The WTP2 process involves the use of NaHS which will be delivered in totes and dosing will take place directly from the tote. Totes will be closed and equipped with a pressure safety valve to break the vacuum in the tote as NaHS is consumed and maintain tote's integrity. NaHS is stored at a high pH (>11) which ensure H_2S will not be released. When NaHS is added to the process, it is dosed into a pipe reactor, allowing for full dissolution of the reagent – creating Na^+ and HS^- in solution. The feed water is controlled at a pH of 9, at which point sulfide will be predominantly present in the HS^- form, with little H_2S present. Due to sulfide's affinity for metals in solution, it will instantaneously react and precipitate the dissolved metals from the feed water, as well as the ferric chloride that is added upstream of the NaHS injection, leaving no remaining sulfide under normal operating conditions. Additionally, there are control interlocks in place to prevent conditions where there is not a sufficient metal concentration to consume the H_2S (i.e., if there is low flow, or low pH in the feed line, the NaHS addition will stop).

Cooling towers will be used to cool water prior to treatment at the water treatment plant – WTP2.

(8) Refrigeration Plants

Two refrigeration plants will be located aboveground at the mine to provide cooling for the underground mine air. This refrigeration plant is composed of a chiller system (which uses centrifugal chillers, a cooling tower, and tanks) and a bulk air cooler system.

(9) Traffic on Unpaved Roads

Truck traffic associated with the proposed operations is from the following:

(a) Delivery vehicles, to transfer the following materials into/out of site:

- Diesel and gasoline fuel;
- CNG/LNG fuel for natural gas engines;
- Blasting agents;
- Chemical reagents;
- Zinc, silver, manganese, and lead concentrates/ore;
- Cement; and
- Materials and supplies.

(b) Transport of ore/concentrate within site;

(c) Transport vehicles for onsite transfer of rock and tailings;

(d) Bulldozers/Roto-compactors;

(e) Fuel and maintenance vehicles;

(f) Watering trucks; and

(g) Personnel transport vehicles.

(10) Concrete Batch Plant

There will be two separate concrete batch plants (CBP), one for Taylor and one for Clark. The concrete batch plants will provide cement to be used as a binder, that when mixed with tailings, is used for stabilizing mine conditions to make the underground environment safer and to reduce the risk of subsidence. Each CBP will have aggregate and shotcrete stockpiles and associated emissions from wind erosion of these piles.

(11) Evaporators

The water collected from the tailings storage facility is pumped to the water treatment plants for treatment. Prior to treatment, this water is collected in an Underdrain Collection Pond which will have mechanical evaporators installed to maintain the freeboard ratio of the ponds. Only 3 of the planned 4 evaporators would be used at any time and only for 10% of the year.

2. Alternate Operating Scenario No. 1 (AOS 1) – Line Power Alternative

South32 Hermosa is committed to reducing greenhouse gas (GHG) emissions from its mining operations to assist in the world-wide effort to minimize global warming. Currently, there is inadequate power available to develop the Hermosa Project. The absence of adequate line power requires installation of substantial generating equipment consisting of 58 plus 1 backup 2,600 KW natural gas engines, or 27 plus 1 backup 4,481 KW natural gas engines to generate the required power and provide necessary backup power for safety. If line power could be obtained, the facility-wide emissions would be greatly reduced, as under AOS 1 all the natural gas engines would be retired from use, and only the 12 diesel fired engines would remain. South32 Hermosa would keep a log of the date that it switches to the alternate operating scenario. No additional applicable requirements are triggered if AOS 1 is implemented.

3. Alternate Operating Scenario No. 2 (AOS 2) – Second Tailing Storage Facility (TSF2)

The planned development of the Hermosa Project includes development of Tailing Storage Facility One (TSF1) and Tailing Storage Facility Two (TSF2). TSF1 will be on-site, and TSF2 will be on National Forest lands located to the north and east of the proposed Project as a supplement to TSF1. Both TSFs would use the same technologies and are subject to the same air quality regulatory requirements. Addition of TSF2 requires approval from the Coronado National Forest through the approval of a mine plan of operations (MPO). Because of the processing time associated with an MPO, it is not likely that TSF2 will be immediately available. Because the ambient air boundary of the facility would change with the addition of TSF2, South32 Hermosa has submitted a modeling demonstration showing that the Hermosa Project will not interfere with attainment or maintenance of a NAAQS standard either prior to or after addition of TSF2. Addition of TSF2 does not trigger any additional applicable requirements beyond those discussed as applicable to TSF 1.

B. Control Devices

1. Dust Collectors will be installed to control the PM, PM_{10}, and $PM_{2.5}$ emissions from crushing, transfer points, paste plants at both sites, and Waste Water Treatment Plant No. 1 (WTP1) Lime Silo.

2. Selective catalytic reduction (SCR) and oxidation catalysts (OxCat) will be installed to control the emissions from the natural gas engines. These engines are interlocked to ensure that the SCR and OxCat will always operate when the engine is running.

C. Process Flow Diagram(s)

A process flow diagram is shown in Appendix A.

III. EMISSIONS

The potential to emit (PTE) was calculated based on EPA's Compilation of Air Pollution Emission Factors (AP-42 Section 5.2, 11.9, 11.12, 11.19.2, 13.2.4, 13.2.5, 13.3, and 13.4), Perry's Chemical Engineers' Handbook, Centers for Disease Control and Prevention Handbook for Dust Control in Mining, Air Sciences Inc. cooling tower calculator, manufacturer's guarantees and recommendations, and engine performance test results. This facility is a non-categorical source as it is not listed in A.A.C. R18-2-101.23 and thus, the PTE does not include fugitive emissions, except that the Hazardous Air Pollutants (HAPs) emissions include both non-fugitive and fugitive emissions. The facility has the PTE more than the major thresholds of NO_X, CO, and HAPs under POS and AOS 2 (with natural gas engines), and has the PTE more than the major threshold of CO under AOS 1 and AOS 2 (without natural gas engines). The facility's PTE is provided in Table 1, Table 2, Table 3 for POS, AOS 1, and AOS 2, respectively.

Table 1: Potential to Emit (Tons per Year (TPY)) for POS

Pollutant	PTE	Permitting Exemption Threshold	Minor NSR Triggered?
NO_X	205.61	20	Yes

Pollutant	PTE	Permitting Exemption Threshold	Minor NSR Triggered?
PM	208.04	N/A	N/A
PM_{10}	88.39	7.5	Yes
$PM_{2.5}$	50.83	5	Yes
CO	220.37	50	Yes
SO_2	6.87	20	No
VOCs	107.94	20	Yes
Pb	1.75	0.3	No
Manganese	5.46	N/A	N/A
Single HAP (Acetaldehyde)	39.84	N/A	N/A
Total HAPs	76.37	N/A	N/A
H_2S	10.12	N/A	N/A
GHG (CO_2e)	1,176,929	N/A	N/A

Table 2: Potential to Emit (TPY) for AOS 1

Pollutant	PTE	Permitting Exemption Threshold	Minor NSR Triggered?
NO_X	41.74	20	Yes
PM	169.91	N/A	N/A
PM_{10}	50.26	7.5	Yes
$PM_{2.5}$	12.70	5	Yes
CO	147.53	50	Yes
SO_2	5.65	20	No
VOCs	23.60	20	No
Pb	1.75	0.3	No
Single HAP (Manganese Compounds)	5.46	N/A	N/A
Total HAPs	8.37	N/A	N/A
GHG (CO_2e)	43,135	N/A	N/A

Table 3: Potential to Emit (Tons per Year (TPY)) for AOS 2

Pollutant	PTE	Permitting Exemption Threshold	Minor NSR Triggered?
With Natural Gas Engines			
NO_X	205.61	20	Yes
PM	208.04	N/A	N/A
PM_{10}	88.39	7.5	Yes
$PM_{2.5}$	50.83	5	Yes
CO	220.37	50	Yes
SO_2	6.87	20	No
VOCs	107.94	20	Yes
Pb	1.99	0.3	No
Manganese	7.84	N/A	N/A
Single HAP (Acetaldehyde)	39.84	N/A	N/A
Total HAPs	79.04	N/A	N/A
H_2S	10.12	N/A	N/A
GHG (CO_2e)	1,176,929	N/A	N/A
Line Power Alternative (without Natural Gas Engines)			
NO_X	41.74	20	Yes
PM	169.91	N/A	N/A
PM_{10}	50.26	7.5	Yes
$PM_{2.5}$	12.70	5	Yes
CO	147.53	50	Yes
SO_2	5.65	20	No
VOCs	23.60	20	No
Pb	1.99	0.3	No
Single HAP (Manganese Compounds)	7.84	N/A	N/A
Total HAPs	11.04	N/A	N/A
GHG (CO_2e)	43,135	N/A	N/A

IV. MAJOR NEW SOURCE REVIEW (NSR)

Two distinct federal NSR permitting programs apply depending on whether the facility is located in an attainment or nonattainment area for a particular pollutant, Prevention of Significant Deterioration (PSD) and Nonattainment Area NSR (NA NSR), respectively. NA NSR permitting applies to new construction or modifications that result in certain emission increases of a particular pollutant for which the area in which the facility is located is classified as “nonattainment”. The PSD permitting program applies to projects with certain emissions increases of pollutants for which the area is classified as “attainment” or “unclassifiable”.

South32 Hermosa will be located in the area of Santa Cruz County classified in attainment with the National Ambient Air Quality Standards (NAAQS) or unclassified for all regulated pollutants. A section of Santa Cruz County is nonattainment for PM_{10} in the Nogales planning area. However, South32 Hermosa will be outside the Nogales planning area and will not impact the nonattainment area, so NA NSR does not apply.

If a facility is a non-categorical source listed in A.A.C. R18-2-101.23, the PSD source threshold is 250 tpy for any individual regulated NSR pollutant. South32 Hermosa is a non-categorical source, only non-fugitive emissions are assessed against the 250 tpy major source threshold. As summarized in Table 1, all potential facility-wide non-fugitive emissions of regulated NSR pollutants will be less than 250 tpy. Therefore, South32 Hermosa is not subject to PSD review.

V. MINOR NEW SOURCE REVIEW (NSR)

Minor new source review is required if the emissions of a new source have the potential to emit any regulated air pollutant at an amount greater than or equal to the permitting exemption threshold (PET) in Table 1 and Table 3 above. The potential to emit for NO_X, PM_{10}, $PM_{2.5}$, CO, and VOCs is greater than the permitting exemption thresholds. Thus, the facility is subject to minor NSR requirements.

The facility has the option to either implement reasonably available control technology (RACT) or conduct screen modeling to satisfy the requirements of minor NSR. The facility elected to undergo screen modeling to demonstrate compliance with minor NSR Requirements. A detailed discussion of the screen modeling analysis can be found in Section XI below.

VI. VOLUNTARILY ACCEPTED EMISSION LIMITATIONS AND STANDARDS

A. Operation/Throughput Limits

The facility has voluntarily accepted the following operation/throughput limits. These limits were all incorporated into Permit No. 96653.

1. Taylor Site

   a. The blasting activity shall be limited to no more than one blast per hour.

   b. The blasting activity shall be limited to no more than two blasts per day.

c. The maximum emulsion agent usage during blasting shall be limited to no more than 17.42 tons per hour.

d. The maximum emulsion agent usage during blasting shall be limited to no more than 4,500 tons per year based on 12-month rolling total.

e. The amount of total Development Ore mined shall be limited to no more than 413,389 tons per year based on 12-month rolling total.

f. The amount of total Stope Ore mined shall be limited to no more than 4,618,867 tons per year based on 12-month rolling total.

g. The amount of total rock processed by the Primary Crusher shall be limited to no more than 37,032 tons per day.

h. The amount of total rock processed by the Primary Crusher shall be limited to no more than 4,665,131 tons per year based on 12-month rolling total.

i. The amount of total rock processed by the Pebble Crusher shall be limited to no more than 5,280 tons per day.

j. The maximum concrete processed by the Concrete Batch Plant shall be limited to no more than 110.34 tons per day.

2. Clark Site

a. The blasting activity shall be limited to no more than one blast per hour.

b. The blasting activity shall be limited to no more two blasts per day.

c. The maximum emulsion agent usage during blasting shall be limited to no more than 4.60 tons per hour.

d. The maximum emulsion agent usage during blasting shall be limited to no more than 562 tons per year based on 12-month rolling total.

e. The amount of total rock processed by the Rock Breaker shall be limited to no more than 47,131 tons per year based on 12-month rolling total.

f. The amount of total rock mined shall be limited to no more than 733,798 tons per year based on 12-month rolling total.

g. The amount of total rock processed by the Primary Crusher shall be limited to no more than 2,904 tons per day.

h. The maximum concrete processed by the Concrete Batch Plant shall be limited to no more than 5.44 tons per day.

3. No more than three of the four evaporator units shall be operated at once and each evaporator unit shall be operated no more than 876 hours in one year based on 12-month rolling total.

4. The natural gas engines shall only operate between 75% and 100% load except during startup and shutdown.

5. Dozers at each of the tailings storage facilities and rock storage facilities shall limit the operating hours to 12 hours per location per day.

B. Emission Limits

The permit contains the following voluntary emission limits and standards in Table 4. These limits were all incorporated into Permit No. 96653.

Table 4: Voluntary Emission Limitations

Equipment ID Number	Description	Emission Limits
Dust Collectors		
DC-1	21200-DCD-001 Coarse Ore Dust Collection System	PM_{10}: 0.002 gr/dscf
DC-2	21300-DCD-002 Coarse Ore Silo Collection System	PM_{10}: 0.002 gr/dscf
DC-3	21300-DCD-003 Coarse Ore Silo Collection System	PM_{10}: 0.002 gr/dscf
DC-4	21300-DCD-004 Coarse Ore Silo Collection System	PM_{10}: 0.002 gr/dscf
DC-5	21300-DCD-005 Coarse Ore Silo Collection System	PM_{10}: 0.002 gr/dscf
DC-6	21300-DCD-006 Silo Discharge Dust Collection System	PM_{10}: 0.002 gr/dscf
DC-7	Coarse Ore Dust Collection System, 23100-FAN-0001	PM_{10}: 0.001 gr/dscf
DC-8	Coarse Ore Dust Collection System, 23100-FAN-0002	PM_{10}: 0.001 gr/dscf
DC-10	Coarse Ore Dust Collection System, 23100-DCD-0005	PM_{10}: 0.001 gr/dscf
DC-11	21300-DCD-005 Coarse Ore Silo Collection System	PM_{10}: 0.002 gr/dscf
Diesel Engines		
HS_1 - HS_6	Diesel Engine CAT XQ1140	NO_X: 129.3 Lb/hr and 40.5 Ton/year; CO: 138.1 Lb/hr and 79.2 Ton/year; VOC: 10.4 Lb/hr and 17.2 Ton/year
ENG5	Diesel Engine C200D2RE	
ENG9 - ENG13	Diesel Engine CAT C175	
Natural Gas Engines		
T_ENG or T_ENG_ALT	Natural Gas Engine CAT 3520 DSL or Natural Gas Engine JGC 624	NO_X: 37.4 Lb/hr and 163.9 Ton/year; CO: 16.6 Lb/hr and 72.8 Ton/year;

		VOC: 19.3 Lb/hr and 84.3 Ton/year

VII. APPLICABLE REGULATIONS

Table 5 identifies applicable regulations and verification as to why that standard applies. The table also contains a discussion of any regulations the emission unit is exempt from.

Table 5: Applicable Regulations

Process Unit	Control Device	Rule	Discussion
Metallic Mineral Processing Equipment	Dust Collectors, Water Sprays	40 CFR Part 60 Subpart LL	40 CFR Part 60 Subpart LL "Standards of Performance for Metallic Mineral Processing Plants" is applicable to affected facilities in aboveground metallic mineral processing plants.
		A.A.C. R18-2-721	A.A.C. R18-2-721 "Standards of Performance for Existing Nonferrous Metals Industry Sources" is applicable to existing nonferrous metals industry sources including underground mining operations except for new equipment subject to 40 CFR Part 60 Subpart LL.

Process Unit	Control Device	Rule	Discussion
Internal Combustion Engines	Selective catalytic reduction (SCR) and oxidation catalysts (OxCat)	40 CFR Part 60 Subpart IIII	40 CFR Part 60 Subpart IIII "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" is applicable to stationary compression ignition (CI) internal combustion engines (ICE) – the diesel engines.
		40 CFR Part 60 Subpart JJJJ	40 CFR Part 60 Subpart JJJJ "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines" is applicable to stationary spark ignition (SI) internal combustion engines (ICE) – the natural gas engines.
		40 CFR Part 63 Subpart ZZZZ	40 CFR Part 63 Subpart ZZZZ "National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" is applicable. For the new non-emergency diesel engines with site rating of more than 500 brake HP, and new non-emergency natural gas engines, if operating under POS or AOS 2 (major HAP source), 40 CFR Part 63 Subpart ZZZZ requirements need to be met; if operating under AOS 1 (area HAP source), 40 CFR Part 63 Subpart ZZZZ requirements can be met by complying with 40 CFR Part 60 Subpart IIII or JJJJ. For the new non-emergency diesel engines with a site rating of equal to or less than 500 brake HP, 40 CFR Part 63 Subpart ZZZZ requirements can be met by complying with 40 CFR Part 60 Subpart IIII under all the operating scenarios.

Process Unit	Control Device	Rule	Discussion
Gasoline and Diesel Storage Tanks	N/A	A.A.C. R18-2-710 40 CFR Part 63 Subpart CCCCCC	For gasoline storage tanks, when operating under POS or AOS 2 (major HAP source) the A.A.C. R18-2-710 requirements "Standards of Performance for Existing Storage Vessels for Petroleum Liquids" shall be met; when operating under AOS 1 (area HAP source) the 40 CFR Part 63 Subpart CCCCCC requirements "National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities" shall be met. The operation of diesel storage tanks shall always comply with A.A.C. R18-2-710.
Concrete Batch Plant	Wet Suppressant	A.A.C. R18-2-723	Concrete batch plants are subject to Standards of Performance for Existing Concrete Batch Plants under A.A.C. R18-2-723 "Standards of Performance for Existing Concrete Batch Plants".
Unclassified Sources Subject to A.A.C. R18-2-730 (Cooling Towers, Evaporators, Wastewater treatment, Refrigeration Plants, Process Tanks, Chemical Storage)	Dust Collectors Installed on Paste Plants	A.A.C. R18-2-730	These standards apply to unclassified sources.
Fugitive Dust	Water Trucks, Dust Suppressants	A.A.C. R18-2 Article 6 A.A.C. R18-2-702	These standards are applicable to all fugitive dust sources at the facility.
Abrasive Blasting	Wet blasting; Dust Collecting Equipment; Other Approved Methods	A.A.C. R-18-2-702 A.A.C. R-18-2-726	These standards are applicable to any abrasive blasting operation.
Spray Painting	Enclosures	A.A.C. R18-2-702 A.A.C. R-18-2-727	These standards are applicable to any spray painting operation.
Demolition/Renovation	N/A	A.A.C. R18-2-1101.A.12	This standard is applicable to any asbestos related demolition or renovation operations.

VIII. MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

Table 6 contains an inclusive but not an exhaustive list of the monitoring, recordkeeping and reporting requirements prescribed by the air quality permit. The table below is intended to provide insight to the public for how the facility is required to demonstrate compliance with the emission limits in the permit. Records are required to be kept for a minimum of 5 years as outlined in Section XII of Attachment "A" of the permit.

Table 6: Permit No. 96653

Emission Unit	Pollutant	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
Metallic Mineral Processing Operations	PM (underground)	Underground: if process rate ≤ 30 tons/hr, PM ≤ $4.10P^{0.67}$; if process rate > 30 tons/hr, PM ≤ $55.0P^{0.11}$–40. P = the process weight rate in tons-mass per hour.	N/A	Record daily process rates and hours of operation of all material handling facilities.	Report excess emissions and deviations if applicable.
	Opacity (underground)	20% (determined at the vent raise, shaft, or decline)	Conduct weekly opacity monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
	PM (aboveground)	0.05 g/dscm	Conduct annual performance tests.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	Opacity (aboveground)	7% (after performance test completed); 10% (after 60th day after achieving the	Weekly visible emission monitoring and		

			maximum production rate and no later than 180 days after initial startup)	annual performance tests		
		PM_{10}	Dust Collectors DC-1, DC-2, DC-3, DC-4, DC-5, DC-6, DC-11 ≤ 0.002 gr/dscf, DC-7, DC-8, DC-10 ≤ 0.001 gr/dscf	Conduct annual performance test and weekly inspections.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
Internal Combustion Engines	New Non-Emergency Diesel Engines (NSPS Subpart IIII)	NO_X	When displacement < 10 liters per cylinder, certify. When displacement < 30 liters per cylinder, meet the not-to-exceed standards when conducting performance tests in-use. 129.3 lb/hr and 40.5 tons/year.	When displacement < 30 liters per cylinder, purchase certified engine and install and configure according to the manufacturer's specifications, or conduct initial performance test. Conduct annual performance tests for the lb/hr and tons/year limits.	Keep records of performance test results if applicable. When displacement ≥ 10 liters per cylinder, keep compliance notifications, maintenance records, engine certification, or documentation that the engine meets the emission standards if not certified.	Submit performance test reports if applicable. When displacement ≥ 10 liters per cylinder, submit initial notification.
		CO	138.1 lb/hr and 79.2 tons/year.			
		VOC	10.4 lb/hr and 17.2 tons/year.			
		PM	When displacement < 10 liters per cylinder, certify. When displacement < 30 liters per cylinder,			

			meet the not-to-exceed standards when conducting performance tests in-use.			
	New Non-Emergency Natural Gas (NG) Engines (NSPS Subpart JJJJ)	NO_X	1.0 g/HP-hr; or 37.4 lb/hr and 163.9 tons/year, whichever is more stringent.	Conduct annual performance tests.	Keep records of notifications and maintenance. If certified, keep the engine certification document. If not certified, keep documentation that the engine meets the emission standards. Keep performance test results.	If not certified, submit initial notification. Submit performance test results.
		CO	2.0 g/HP-hr; or 16.6 lb/hr and 72.8 tons/year, whichever is more stringent.			
		VOC	0.7 g/HP-hr; or 19.3 lb/hr and 84.3 tons/year, whichever is more stringent.			
	New Non-Emergency Diesel Engines with Site Rating of more than 500 Brake HP, New Non-Emergency Natural Gas (NG) Engines	CO	Diesel: reduce by ≥ 70% NG: reduce by ≥ 93%	Conduct initial performance test. If not using CEMS conduct subsequent performance tests semiannually. After compliance for two consecutive tests, may reduce the subsequent tests to annually. If any subsequent	Keep CPMS or CEMS records.	Submit initial notification, notification of intent to conduct a performance test, Notification of Compliance Status, and semiannual compliance report. Report excess emissions and deviations if applicable.
		Formaldehyde	Diesel: 580 ppbvd NG: 14 ppmvd			

(NESHAP Subpart ZZZZ)			annual test result is not in compliance, or any deviation from operating limitations, resume semiannual tests. Install and operate CPMS or CEMS.		
Concrete Batch Plant	Opacity	20%	Conduct bi-weekly visible emission monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
Unclassified Sources	PM	If process rate $\leq$ 30 tons/hr, PM $\leq 4.10P^{0.67}$; if process rate > 30 tons/hr, PM $\leq 55.0P^{0.11} - 40$. P = the process weight rate in tons-mass per hour.	N/A	Record the daily process rates and hours of operation of all material handling facilities.	Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct monthly visible emission monitoring.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
	SO_2	600 ppm	N/A	N/A	N/A
	NO_X	500 ppm	N/A	N/A	N/A
Fugitive Dust	PM	40% Opacity	A Method 9 observer is required to	Record of the dates and types of dust control measures	Report excess emissions and

			conduct a survey of visible emissions twice daily from mineral tailings and weekly from the other fugitive sources.	employed, and if applicable, the results of any Method 9 observations, and any corrective action taken to lower the opacity of any excess emissions. Record results of the required monitoring in Tailings Management Plan. When the wind speeds ≥ 15 mph, or gusts ≥ 20 mph, maintain a record of all meteorological data, all tailings inspections, all control measures used and corrective action(s) taken to demonstrate compliance with the opacity limitations. Maintain a copy of watering schedules per shift basis.	deviations if applicable.
Abrasive Blasting	PM	20% Opacity	Monitor visible emissions if abrasive blasting is conducted.	Record the date, duration and pollution control measures of any abrasive blasting project.	Report excess emissions and deviations if applicable
Spray Painting	VOC	20% Opacity	Monitor visible emissions if spray	Maintain records of the date, duration, quantity of paint used,	Report excess emissions and

		Control 96% of the Overspray	painting is conducted.	any applicable material data safety sheets, and pollution control measures of any spray painting project.	deviations if applicable
Demolition/Renovation	Asbestos	N/A	N/A	Maintain records of all asbestos related demolition or renovation projects including the "NESHAP Notification for Renovation and Demolition Activities" form and all supporting documents.	N/A

IX. COMPLIANCE ASSURANCE MONITORING (CAM)

The CAM rule applies to pollutant-specific emission units (PSEU) at a major Title V source if the unit meets all of the following criteria:

A. The unit is subject to an emission limit or standard for the applicable regulated air pollutant;

B. The unit uses a control device to achieve compliance with the emission limit or standard; and

C. The unit has "potential pre-control device emissions" of the applicable regulated air pollutant equal to or greater than 100% of the amount (tons/year) required for a source to be classified as a major source. "Potential pre-control device emissions" means potential to emit (PTE, as defined in Title V) except emissions reductions achieved by the applicable control device are not taken into account.

This facility is not subject to the CAM rule. This is because it does not have an emission unit with the potential pre-control device emissions equal to or greater than the major source thresholds. Table 7 shows the potential pre-control emissions for all the emission units with a control device to achieve compliance with an emission limit or standard. The other emissions units are not subject to CAM because CAM does not apply to emissions units subject to an emission limitation or standard proposed after November 15, 1990 pursuant to Section 111 or 112 of the Clean Air Act or the emissions units employ no controls, inherent controls, or control measures that do not meet the definition of a control device per 40 CFR 64.1.

Table 7: Potential Pre-Control Emissions for All the Emission Units with a Control Device to Achieve Compliance with an Emission Limit or Standard

Emission Unit	Control Device	PM (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)	Major Source Thresholds (PM_{10}/$PM_{2.5}$ TPY)	Below Major Source Thresholds?
Drop from 21200-FOR-001 Mine Shaft Ore Discharge Feeder to 21200-GAT-001 Mine Shaft Diverter Gate (Taylor)*	Dust Collector (DC-1)	13.24	6.26	0.95	100	Yes
Drop from 21200-GAT-001 Mine Shaft Discharge Gate to 21200-CVR-001 Coarse Ore Overland Conveyor (Taylor)		13.24	6.26	0.95	100	Yes
Drop from 21200-CVR-001 Coarse Ore		13.24	6.26	0.95	100	Yes

Overland Conveyor to 21300-CHU-001 3-Way Shuttle Chute (Taylor)	Dust Collector (DC-2)					
Drop from 21300-CHU-001 3-Way Shuttle Chute to 21300-CVB-005 Coarse Ore Silo No. 1 Feed Conveyor (Taylor)		3.31	1.57	0.24	100	Yes
Drop from 21300-CHU-001 3-Way Shuttle Chute to 21300-CVB-006 Coarse Ore Silo No. 2 Feed Conveyor (Taylor)		3.31	1.57	0.24	100	Yes
Drop from 21300-CVB-005 Coarse Ore Silo No. 1 Feed Conveyor to 21500-SLO-001 Coarse Ore Silo No. 1 (Taylor)	Dust Collector (DC-3)	3.31	1.57	0.24	100	Yes
Drop from 21300-CVB-006 Coarse Ore Silo No. 2 Feed Conveyor to 21500-SLO-002 Coarse Ore Silo No. 2 (Taylor)	Dust Collector (DC-4)	3.31	1.57	0.24	100	Yes
Drop from 21300-CHU-001 3-Way Shuttle Chute to 21500-SLO-003 Coarse Ore Silo No. 3 (Taylor)	Dust Collector (DC-5)	3.31	1.57	0.24	100	Yes
Drop to Coarse Ore Silo No. 4 (Taylor)	Dust Collector (DC-11)	3.31	1.57	0.24	100	Yes
Drop from 21700-FOR-002 Coarse Ore Silo Discharge Feeder No. 1 to 21700-SCB-002 Discharge Feeder Belt Scale No. 1 (Taylor)	Dust Collector (DC-6)	3.31	1.57	0.24	100	Yes
Drop from 21700-FOR-004 Coarse Ore		3.31	1.57	0.24	100	Yes

Silo Discharge Feeder No. 2 to 21700-SCB-004 Discharge Feeder Belt Scale No. 2 (Taylor)						
Drop from 21700-FOR-006 Coarse Ore Silo Discharge Feeder No. 3 to 21700-SCB-006 Discharge Feeder Belt Scale No. 3 (Taylor)		3.31	1.57	0.24	100	Yes
Drop from Coarse Ore Silo No. 4 to Coarse Ore Silo No. 4 Discharge Feeder (Taylor)		3.31	1.57	0.24	100	Yes
Drop from 21700-SCB-002 Discharge Feeder Belt Scale No. 1 to 21700-CVR-008 Primary Mill Feed Conveyor (Taylor)		3.31	1.57	0.24	100	Yes
Drop from 21700-SCB-004 Discharge Feeder Belt Scale No. 2 to 21700-CVR-008 Primary Mill Feed Conveyor		3.31	1.57	0.24	100	Yes
Drop from 21700-SCB-006 Discharge Feeder Belt Scale No. 3 to 21700-CVR-008 Primary Mill Feed Conveyor (Taylor)		3.31	1.57	0.24	100	Yes
Drop from Coarse Ore Silo No. 4 Discharge Feeder to 21700-CVR-008 Primary Mill Feed Conveyor (Taylor)		3.31	1.57	0.24	100	Yes
Paste Plant Module 1 Mixer (Taylor)	Dust Collector (DC-PPM1M)	24.52	6.69	1.76	100	Yes
Paste Plant Module 2 Mixer (Taylor)	Dust Collector	24.52	6.69	1.76	100	Yes

	(DC-PPM2M)					
Drop from 23100-CRU-0001 Primary Crusher to 23100-CVR-0001 Primary Crusher Discharge Conveyor (Clark)*	Dust Collector (DC-7)	1.93	0.91	0.14	100	Yes
Drop from 23100-CVR-0001 Primary Crusher Discharge Conveyor to 23100-CVR-0002 Coarse Ore Conveyor (Clark)		1.93	0.91	0.14	100	Yes
Coarse Ore Dust Collection System,23100-FAN-0001 (Clark)		1.98	0.88	0.88	100	Yes
Drop from 23100-CVR-0002 Coarse Ore Conveyor to 23100-SILO-0003 Coarse Ore Silo (Clark)	Dust Collector (DC-8)	1.93	0.91	0.14	100	Yes
Drop from 23100-SLO-0003 Coarse Ore Silo to 23100-FDR-0003 Coarse Ore Discharge Feeder (Clark)	Dust Collector (DC-10)	1.93	0.91	0.14	100	Yes
Drop from 23100-FDR-0003 Coarse Ore Discharge Feeder to 23100-CVR-0008 Primary Mill Feed Conveyor (Clark)		1.93	0.91	0.14	100	Yes
Paste Plant Module 1 Mixer (Clark)	Dust Collector (DC-CPPM1M)	12.26	3.34	0.88	100	Yes
Paste Plant Module 2 Mixer (Clark)	Dust Collector (DC-CPPM2M)	12.26	3.34	0.88	100	Yes

* (Taylor) means this emission unit is at the Taylor site. (Clark) means this emission unit is at the Clark site.

X. ENVIRONMENTAL JUSTICE ANALYSIS

The Environmental Protection Agency (EPA) defines Environmental Justice (EJ) to include the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices. The goal of completing an EJ assessment in permitting is to provide an opportunity for overburdened populations or communities to allow for meaningful participation in the permitting process. Overburdened is used to describe the minority, low-income, tribal and indigenous populations or communities that potentially experience disproportionate environmental harms and risks due to exposures or cumulative impacts or greater vulnerability to environmental hazards.

The EPA developed EJSCREEN, a publicly available tool that uses nationally consistent data, to produce maps and reports detailing environmental and demographic indicators that can be used to evaluate EJ concerns. In the EJSCREEN tool guidance, a 90th percentile threshold was selected to evaluate the potential for EJ concerns in a community, meaning that if the area of interest exceeds the 90th percentile for one or more of the EJ indexes, that area is considered to have a high potential for EJ concerns. Using the EJSCREEN tool, ADEQ mapped the location of South32 Hermosa – Hermosa Project and reviewed a five-mile radius around the facility for potential environmental justice concerns (see Figure 1 below).

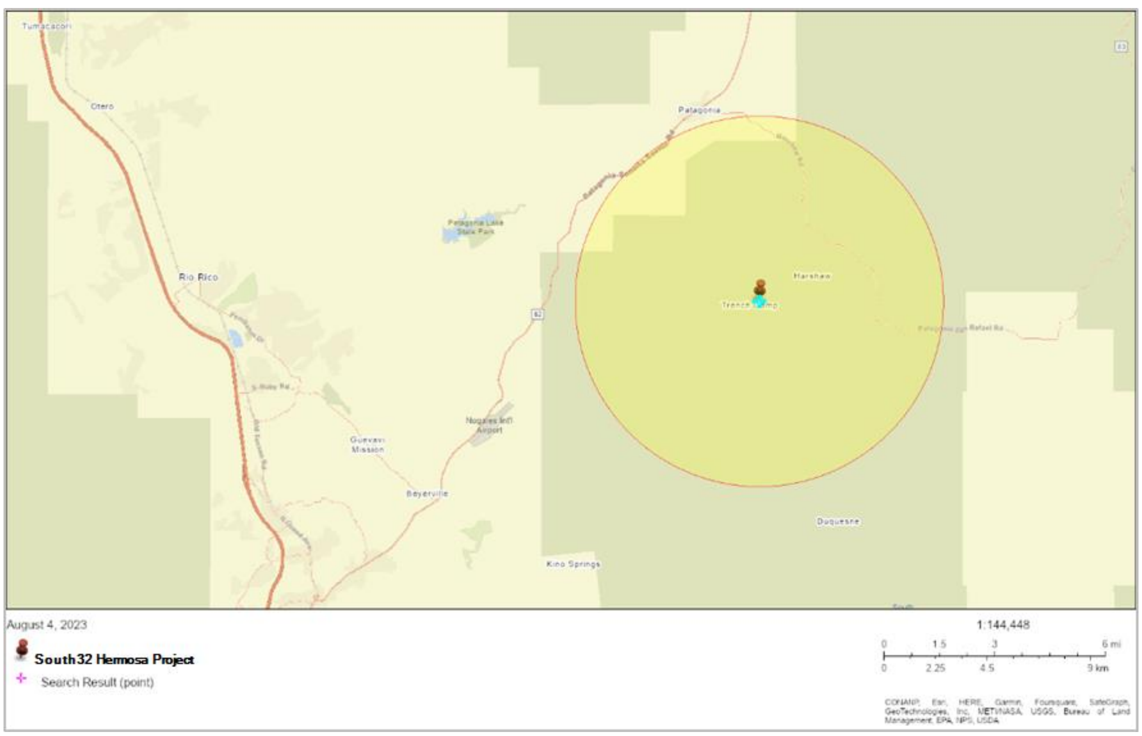

Figure 1: 5-Mile Radius Around South32 Hermosa Project

A. Demographics

The ADEQ relied on data from the EPA EJ Screen tool to assess the demographics of the communities near the initial location for this proposed facility. The EJSCREEN report shows that the Demographic Indicators; People of Color, Low Income Population, Unemployment Rate, Limited English-Speaking Households, Population with Less than High School Education, Population under Age 5 are all below the 90th percentile threshold, except Population Over Age 64. ADEQ performed air quality dispersion modeling to ensure that the emissions from the facility do not contribute to any exceedances of the National Ambient Air Quality Standards (NAAQS). Additionally, ADEQ posts a notice in two newspapers of general circulation within the surrounding community, as well as publishes the notice electronically to ensure that the community has ample opportunity to provide comments on the draft documents prior to a final permitting decision.

B. Summary of Air Quality

All air quality related environmental indicators within a 5-miles radius of the facility were below the 90th percentile for both Arizona and the USA averages, except Population Over Age 64. Additionally, ADEQ conducted air quality dispersion modeling to determine if emissions from South32 Hermosa – Hermosa Project will contribute to a NAAQS exceedance. A complete review of the air quality analysis can be found in Section XI below. Based on the modeling analysis results, ADEQ has determined that the issuance of the South32 Hermosa – Hermosa Project air quality permit will not interfere with attainment of the NAAQS, and will not have an adverse impact on the community.

C. Conclusion

The ADEQ concludes that the protections afforded by Arizona Revised Statutes (A.R.S.) § 49-426, which is imposed through the permit, ensure that the public health and environment in Arizona are protected and that the public notice and comment opportunities afforded to the community on this new permit application satisfy the public participation component of the EPA EJ Guidance. The dispersion modeling ADEQ conducted further concludes that South32 Hermosa – Hermosa Project demonstrates compliance with the NAAQS and that the emissions from the facility will not result in any significant environmental or public health impacts.

XI. AMBIENT AIR IMPACT ANALYSIS

This section summarizes ADEQ's findings regarding the ambient assessment submitted by South32 Hermosa Inc. (South32 Hermosa) in support of its Class I Air Quality Permit. Based on the potential-to-emit (PTE) South32 presented in the application, this project is not a Prevention of Significant Deterioration (PSD) source and does not trigger the PSD review. Instead, the proposed project was reviewed as part of the minor New Source Review (mNSR) process. According to Arizona Administrative Code (A.A.C.) R18-2-334, ADEQ required South32 Hermosa to conduct an ambient air quality assessment via air dispersion modeling to demonstrate that potential impacts from the Hermosa Project will not interfere with attainment or maintenance of any National Ambient Air Quality Standard (NAAQS). The NAAQS are maximum concentration "ceilings" measured in terms of the total concentration of a pollutant in the atmosphere. For a new or modified source, compliance with any NAAQS is based upon the total estimated air quality, which is the sum of the background concentrations and the estimated ambient impacts of the applicant's proposed emissions.

For the South32 Hermosa Project, the pollutants subject to the ambient assessment are particulate matter with an aerodynamic diameter no larger than 10 microns (PM_{10}), particulate matter with an aerodynamic diameter no larger than 2.5 microns ($PM_{2.5}$), nitrogen oxides (NO_X), carbon monoxide (CO), Lead (Pb), and ozone (O_3). No modeling was done for SO_2 as it is not subject to the mNSR review.

Guidance for performing air quality dispersion modeling analyses is set forth in the EPA's Guideline on Air Quality Models (40 CFR Part 51 Appendix W)[4], and in the Air Dispersion Modeling Guidelines for Arizona Air Quality Permits, November 1, 2019.[5]

A. Model Selection

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) model is the EPA-preferred model for estimating impacts at receptors located in simple terrain and complex terrain (within 50 kilometers of a source) due to emissions from industrial sources. South32 Hermosa used AERMOD for the ambient impact analysis.

The AERMOD modeling system consists of three major components: AERMAP, used to process terrain data and develop elevations for receptors; AERMET, used to process the meteorological data; and the AERMOD dispersion model, used to estimate the ambient pollutant concentrations. South32 Hermosa used AERMAP version 18081; AERMET version 22112; and AERMOD version 22112. These were the latest versions of the AERMOD modeling system at the time of South32 Hermosa's application submission. The Department has reviewed the recent updates to AERMOD, dated October 12, 2023, and has determined that these updates are unlikely to impact the modeling analysis for the proposed South32 Hermosa project.

B. Source Inputs

This section provides a discussion on source characterization to develop appropriate source inputs, including modeling scenarios, modeled emission rates, source configuration and source types, and off-site sources.

1. Project Overview

The proposed South32 Hermosa Project involves the development of two separate deposits, Taylor and Clark, each with its dedicated access infrastructure. Taylor will utilize a vertical shaft for access, while Clark will rely on a decline. Tailings and rock management will be a joint effort, whereas ore handling will be distinct for each deposit. Beneficiation processes will be carried out, with Taylor involving underground crushing, milling, screening, froth flotation, and regrind to produce a zinc/lead concentrate. Clark will undergo above-ground crushing, yielding crushed

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4 US. EPA. 2017. Guidelines on Air Quality Models. https://www.epa.gov/sites/default/files/2020-09/documents/appw_17.pdf
5 Arizona Department of Environmental Quality. 2019. Air Quality Modeling Guidelines for Arizona Air Quality Permits. http://static.azdeq.gov/aqd/modeling_guidance.pdf

ore. All resulting products will be shipped off-site for further processing. Tailings from Taylor will be thickened, filtered, and either used as cemented paste backfill or dry stacked in a potential on-site lined tailings storage facility (TSF1) or off-site lined tailings storage facility (TSF2). As discussed in the Application, the "base case" (TSF1-only operations) is referenced as Plan I, while the operation involving TSF2 is referenced as Plan II.

Although the proposed South32 Hermosa project may use supplied line power when it becomes available, the project includes sufficient onsite power to meet project needs utilizing natural-gas and diesel fired reciprocating engines and both an onsite and off-site TSF. There are two power generation options: i) fifty-eight 2.6 MW natural gas engines and ii) twenty-seven 4.4 MW natural gas engines. Therefore, South32 Hermosa modeled four scenarios as summarized in Table 8.

Table 8: Modeling Scenarios for South32 Hermosa Project

Options	Plan	Power Generation
Option 1	Plan I	58 2.6 MW natural gas engines
Option 2	Plan II	58 2.6 MW natural gas engines
Option 3	Plan I	27 4.4 MW natural gas engines
Option 4	Plan II	27 4.4 MW natural gas engines

2. Sources of Emissions

Emissions are produced throughout underground mining activities, encompassing drilling, blasting, loading, hoisting, and hauling, as well as during ore processing operations, which involve crushing, milling, flotation, concentrate and tailings filtration/management. Additional sources of emissions include natural gas and diesel engines, dust collectors, vehicles operating on unpaved roads, wind erosion from tailings storage facilities and stockpiles, loading/unloading and conveying transfer points, cooling towers, and mechanical evaporators.

Direct (i.e. tailpipe) emissions from nonroad engines and vehicles are not addressed by the proposed permit. ADEQ’s air quality permit program is designed to satisfy the requirements of various federal Clean Air Act (CAA) permit programs for “stationary sources” of air pollution, including major and minor NSR and Title V. See CAA §§ 110(a)(2)(C), 165, 173, 502. Under section 302(z) of the CAA, a stationary source does not include “emissions resulting directly from an internal combustion engine for transportation purposes or from a nonroad engine or nonroad vehicle as defined in section 7550 of” the Act. EPA, the courts, and environmental organizations have recognized that under § 302(z), “NNSR permit programs generally do not regulate emissions from ‘nonroad engines’.” Center for Biological Diversity v. United States, No. 22-9546, 2023 U.S. App. LEXIS 24725, *23 (10th Cir. Sep. 18, 2023).

Section § 49-104(A)(16) of A.R.S. Annotated provides that:

> Unless specifically authorized by the legislature, [ADEQ shall] ensure that state laws, rules, standards, permits, variances and orders are adopted and construed to be consistent with and no more stringent than the corresponding federal law that addresses the same subject matter.

The legislature has not specifically authorized ADEQ to apply the state air quality permit program to nonroad engines and vehicles. ADEQ therefore is precluded from modeling or otherwise subjecting direct nonroad engine or vehicle emissions to the requirements of air quality permits.

3. Modeled Emission Rates

South32 Hermosa calculated the maximum potential short-term emission rates in pounds per hour (lb/hr) and pounds per day (lb/day) based on either the maximum equipment design rates or the highest short-term activity rates specified in the permit conditions. Generally, these maximum potential short-term emission rates were modeled to ensure compliance with short-term NAAQs. Specifically, the maximum hourly average emission rates were modeled to demonstrate compliance with 1-hour NO_2, 1-hour CO, and 8-hour CO standards, while the maximum 24-hour average emission rates were modeled to demonstrate compliance with 24-hour PM_{10} and $PM_{2.5}$ standards. An exception was made for five internal combustion engine (ICEs), which are subject to a voluntary limit of 500 hours/year to provide backup power for the Hermosa Project. These engines will operate intermittently the same as traditional emergency incinerators and only for backup or emergency. Therefore, the annualized emission rates (calculated as the maximum hourly rates multiplied by 500/8,760) for these engines were used for modeling compliance with the 1-hour NO_2 NAAQS in accordance with EPA guidance.[6]

South32 Hermosa calculated the maximum potential long-term average emission rates using the highest monthly or annual activity rates as stipulated in the permit conditions. The monthly average emission rates were modeled to ensure compliance with the 3-month lead (Pb) standard, while the annual average emission rates were modeled to demonstrate compliance with the annual standards for NO_2 and $PM_{2.5}$.

4. Source Characterization

a. Point Sources

Vent raises/shafts, natural gas and diesel engines, dust collector exhausts, and cooling towers were modeled as individual point sources. Release

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6 U.S. EPA. 2011. Additional Clarification Regarding the Application of Appendix W Modeling Guidance for the 1-hour NO 2 National Ambient Air Quality Standard.
https://www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf

parameters (stack height, stack diameter, gas temperature, and volumetric flow rate) for these point sources were derived from a combination of testing data, vendor specifications, or engineering estimations. Additional considerations associated with the point sources are discussed below.

Vent Raises/Shafts: The emissions from the ventilation shafts and raises include underground emissions associated with blasting, drilling, material transfer, hauling/underground traffic, and underground crushing for Taylor Deposit**.** A fixed gas temperature was modeled based on the estimate from South32 Hermosa engineering.

Natural Gas Engines for Power Generation: As these engines may operate under a variety of conditions that could affect emission rates and dispersion characteristics, South32 Hermosa conducted a load analysis at 100% and 75% capacity to determine which combination leads to the highest modeled impact. The stack parameters of various load levels that result in the highest impact are used in compliance demonstration.

Cooling Towers: Cooling towers are modeled as a series of point sources, one for each cooling cell. The cooling tower stack parameters were based on the characteristics of the cooling tower fan. Because the plume is released at ambient temperature, a stack exit temperature of 0 K is used so that the model adjusts the hourly exit temperature to be equal to the ambient temperature.

b. Volume Sources

South32 Hermosa characterized the emissions from roadways, material loading/unloading, material transfer points, concrete batch plants, dozers, pebble crusher, mechanical evaporators and rock breaker as volume sources. The volume source parameters, including initial lateral dimension (σy_0), initial vertical dimension (σz_0) and release height, were estimated based on the horizontal and vertical dimensions of the volume source, following the guidance from ADEQ and the AERMOD User's Guide. Additional considerations associated with the volume sources are discussed below.

Roadways: To appropriately allocate the calculated emissions for different trucks using these plant roads, the roads were divided into segments. Each road segment represents a portion of the road that accommodates the transportation of at least one type of material. To determine a representative vehicle height for each segment, a weighted average was computed based on the frequency of trips made by different vehicles on these road segments.

Dozers: For short-term NAAQS, South32 Hermosa conducted a sensitivity study to identify the worst-case dozer volume source locations by running a model with six to seven source locations around the perimeter of the piles. The source locations with the highest offsite impacts were used in the site wide modeling.

c. Area Sources

The tailings storage facilities, and stockpiles were modeled as area sources. South32 Hermosa performed a sensitivity model run with various base elevations for the piles representing the pile height changes over time. Tailings and rock piles used a worst-case base elevation for modeling purposes as these piles will grow and rise in height over time.

Road segments that were within the exclusion zone of a defined volume source were modeled as an area source. Emissions for the area source segment were calculated as the total of the emissions from the volume source segments within that area source zone. In accordance with the ADEQ's recommendation, receptors situated within 1 meter of an area source were relocated to a distance of 1 meter away from the area source.

5. Off-site Nearby Sources

The EPA recommends that all nearby sources that are not adequately represented by background ambient monitoring data should be explicitly modeled as part of the NAAQS analysis. To determine which nearby sources should be explicitly modeled in the air quality analysis, the EPA has established "a significant concentration gradient in the vicinity of the source under consideration" as the sole criterion for this determination. There are no off-site stationary sources near South32 Hermosa that would cause a significant concentration gradient within the vicinity of the project site. Therefore, there are no near-by sources that should be explicitly modeled. The impact from distant off-site sources are represented by background ambient monitoring data as discussed in Section XI.G.

C. Meteorological Data

1. Meteorological Data Selection

For regulatory dispersion modeling analyses, 5 years of National Weather Station (NWS) meteorological data, or at least 1 year of site-specific meteorological data, or at least 3 years of prognostic meteorological data should be used. Per Appendix W Section 8.4.2.d, "*If 1 year or more, up to 5 years, of site specific data are available, these data are preferred for use in air quality analyses*".

South32 Hermosa collected site-specific meteorological data from 2018 to 2022 at the Trench meteorological station, located within the Hermosa Project area. For this analysis, data collected at the Trench Station from January 1, 2019, to December 31, 2021, was utilized. This selection was made due to the Trench Station's exposure to localized meteorological conditions and its alignment with the criteria of being "representative" and in close proximity to the emission sources. It's worth noting that the site siting, data collection methods, and quality assurance/quality control (QA/QC) procedures were approved by ADEQ as part of the Quality Assurance Project Plan (QAPP) submission. The meteorological data collected from the site-specific station adhered to EPA recommendations for instrumentation and data completeness.

2. Meteorological Data Processing

South32 Hermosa used the most recent version of AERMET meteorological preprocessor (v22112) to process three-years of site-specific data along with cloud cover data from the U.S. National Climatic Data Center (NCDC) for the Nogales International Airport (KOLS), and upper air radiosonde data from the Tucson station within the NWS Rawinsonde Network. South32 Hermosa also used the EPA's AERSURFACE tool (v20060) to calculate surface characteristic parameters (albedo, Bowen ration and surface roughness) required by AERMET.

AERSURFACE requires the users to specify whether the project site is in an arid region or a non-arid region. Considering precipitation and land cover at the project area, the designation "non-arid" was chosen. To assess moisture conditions (dry, wet, or normal), South32 Hermosa compared the annual precipitation for each modeled year (2019, 2020, or 2021) to the 30-year climatological record of annual precipitation for Nogales, Arizona (KOLS).

South32 Hermosa implemented the adjusted surface friction (ADJ_U*) option when processing meteorological data. South32 Hermosa provided justification for the use of the ADJ_U* option in AERMET and also justified the exclusion of partial turbulence data to prevent the underestimation of impacts. The Department reviewed this justification and found it sufficient, thus granting approval for the utilization of the ADJ_U* option.

D. Ambient Air Boundary and Receptor Network

The applicants are required to demonstrate modeled compliance with NAAQS at receptors spaced along and outside the ambient air boundary (AAB). According to the EPA's revised policy on exclusion from "Ambient Air", "*the atmosphere over land owned or controlled by the stationary source may be excluded from ambient air where the source employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public*".[7] The general public may not include mail carriers, equipment and product suppliers, maintenance and repair persons, as well as persons who are permitted to enter restricted land for the business benefit of the person who has the power to control access to the land.[8]

The Hermosa Project site is situated in a remote area, enclosed by ridges and hills, which poses limitations on access. The primary entry point is via Harshaw Road, and the segment

7 U.S. EPA. 2019. Revised Policy on Exclusion from "Ambient Air" https://www.epa.gov/sites/default/files/2019-12/documents/ambient_air2019.pdf

8 U.S. EPA. 2007. Interpretation of "Ambient Air" In Situations Involving Leased Land Under the Regulations for Prevention of Significant Deterioration (PSD). Stephen D. Page Memorandum dated June 22, 2007. Research Triangle Park, North Carolina 27711.

of this road passing through the Hermosa Project will be considered “ambient air”. Access to Flux Canyon Road within South32 Hermosa’s patented lands is controlled by a gate at the northern entrance. Apart from the section of Harshaw Road passing through the property, the entire site is either already fenced or will be, with no trespassing signs and security monitoring. These measures effectively prevent general public access. South32 Hermosa will provide the Department with a Public Access Restriction Plan before commencing operations, as required in the Draft Permit Section IX - PUBLIC ACCESS RESTRICTIONS.

Following the Department’s recommendations, South32 Hermosa set up a receptor network, encompassing a region extending up to 10 km from AAB and covering the town of Patagonia. The grid spacing utilized for the receptors are as follows:

- AAB set at 25 m intervals;
- Fine receptor grid of 100 m extending from AAB to 1 km and 200 m extending from 1 km to 3 km;
- Medium receptor grid of 400 m, extending from 3 km to 5 km; and
- Coarse grid receptor grid of 800 m, extending from 5 km to 10 km.

Discrete receptors at 25 m intervals were also placed along Harshaw Road within the AAB. For hot-spot areas located between AAB and 1 km, ADEQ added additional fine receptors with 25-meter spacing and performed additional analysis. South32 Hermosa used the AERMAP terrain processor to process the National Elevation Data (NED) data to generate the receptor elevations and hill heights.

E. Downwash and Good Engineering Practice (GEP)

All the facility stacks are subject to downwash. All stacks are also below the minimum 65-meter allowable GEP height, therefore all stack heights are fully creditable for air quality modeling. South32 Hermosa evaluated building downwash effects based on building and stack location and dimensions, and the EPA’s Building Profile Input Program Plume Rise Model Enhancements (BPIP-PRME).

F. Land Use Classification

The rural/urban classification of an area is determined by either the dominance of a specific land use or by population data in the study area. The land-use procedure specifies that the land-use within a three-kilometer radius of the source should be determined using the typing scheme developed by Auer.[9] South32 Hermosa determined the project site area as “Rural” based on the land use method.

G. Background Concentration

Background concentrations should be representative of regional air quality in the vicinity of a facility. Typically, background concentrations should be determined based on the air

9 Auer, A.H. 1978. Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology, 17:636-643.

quality data collected in the vicinity of the proposed project site. However, if there are no monitors located in the vicinity of the project, a "regional site" may be used to determine background concentrations. Per Appendix W Section 8.3.2 b, a regional site is "*one that is located away from the area of interest but is impacted by similar or adequately representative sources*." There is no cutoff of distance between the project site and the regional monitor. The key criterion is that the project site and the regional monitor should have a similar source impact.

1. Background Concentrations for Particulate Matters (PM_{10} and $PM_{2.5}$)

The PM monitoring data in Arizona are strongly influenced by climate conditions, elevation variations, precipitation patterns, and the degree of localized emissions of coarse particles at monitoring station sites. The anticipated background concentration of PM_{10} and $PM_{2.5}$ at the Hermosa Project area is projected to be low as the area is located in a mountainous region and local anthropogenic sources are negligible.

The Nogales Post Office monitor is the nearest PM_{10} and $PM_{2.5}$ monitor to the Hermosa Project site. However, the monitoring concentrations are heavily influenced by urban and international sources that do not impact the area surrounding the Hermosa Project. As required by the Department, South32 Hermosa conducted a Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model analysis, which revealed that the air located in the Nogales area very rarely is advected to the Hermosa Project area. Therefore, the Nogales Post Office monitor was rejected as the background determination.

South32 Hermosa selected the Saguaro East monitor from the Interagency Monitoring of Protected Visual Environments (IMPROVE) program for assessing background levels of PM_{10} and $PM_{2.5}$. Upon reviewing the monitoring data from monitors located within a 100-kilometer radius of the Hermosa Project, the Department concurs with South32 Hermosa's determination that the Saguaro East monitor best represents the background conditions in the Hermosa Project area.

2. Background Concentrations for NO_2

There are no monitoring sites in the immediate vicinity of the proposed Hermosa site. Therefore, a "regional site" must be selected to determine the background concentrations based on similar/representative source impacts. There are very limited NO_2 monitoring sites in Arizona and all monitoring sites are currently located in the Phoenix/Tucson metropolitan area. These urban monitors are significantly influenced by emissions from heavy vehicular traffic and industrial sources that do not exist near the Hermosa Project area.

ADEQ has collected two-year hourly NO_2 ambient air monitoring data at Alamo Lake site from July 2014 to June 2016. Based on the two-year data, the Department recommends using 20 $\mu g/m^3$ as the 1-hour background concentration for areas where local anthropogenic NO_X sources are negligible. As the Hermosa Project is located in a rural area with no other nearby anthropogenic sources of NO_X, South32

Hermosa selected the Alamo Lake site as a representative site for the background determination.

3. Background Concentrations for CO

All active CO monitors in Arizona are in urban areas. South32 Hermosa opted to utilize the 22nd & Alvernon monitor in Tucson to establish the background concentration. The Department has evaluated this approach and deems it conservative and acceptable.

4. Background Concentrations for Pb

All active lead monitors in Arizona are source-oriented monitors which are close to large lead sources (smelters). Therefore, they are not representative of background concentrations for the Hermosa Project area. South32 Hermosa reviewed all inactive lead monitors and selected the Children's Park Monitor in Tucson for the background determination. The Department has evaluated this approach and deems it conservative and acceptable.

South32 Hermosa calculated background concentrations following the methods as described in Table 7 in ADEQ's Guidance.[10]

H. One - Hour NO_2 Modeling Methodology

Per Appendix W Section 4.2.3.4-d, the EPA recommends three-tiered approach for 1-hour NO_2 modeling. Plume Volume Molar Ratio Method (PVMRM) and Ozone Limiting Method (OLM) are available as regulatory options in AERMOD as preferred Tier 3 screening methods for NO_2 modeling. In general, the Department recommends using PVMRM for relatively isolated and elevated point sources, and using OLM for large groups of sources, area sources, and near-surface releases (including roadway sources). Since the dominated emission sources for the Hermosa project are natural gas engines for power generalization, South32 Hermosa selected PVMRM for 1-hour NO_2 modeling. Two key model inputs for PVMRM, namely in-stack ratios (ISR) of NO_2/NO_X emissions and background ozone concentrations, are discussed as follows.

1. In-Stack Ratio

For the natural gas engines for power generation, South32 Hermosa used ISRs based on vendor supplied stack testing data. Specifically, an ISR of 0.095 was used for 2.6 MW natural gas engines and an ISR of 0.35 was used for 4.4 MW natural gas engines. For the other stationary engines and raises/shafts, South32 Hermosa used a default ISR of 0.5.

2. Ozone Data

10 Arizona Department of Environmental Quality. 2019. Air Quality Modeling Guidelines for Arizona Air Quality Permits. http://static.azdeq.gov/aqd/modeling_guidance.pdf

South32 Hermosa used the hourly ozone background concentrations obtained from the Fairgrounds monitor as well as the Saguaro East monitor near Tucson. The ozone concentrations from both monitors are impacted by ozone and its precursors from the Tucson metropolitan area. The Department has evaluated the two datasets and deems them conservative and acceptable. Following the ADEQ's Guidance, for a single missing hour, South32 Hermosa used linear interpolations to fill in the missing concentrations based on the previous and subsequent hour concentrations. For multiple missing hours, South32 Hermosa calculated the maximum ozone concentration for each diurnal hour for each month and use these hourly maximum concentrations to fill in their corresponding missing diurnal hours.

I. Methodology for Ozone and Secondary $PM_{2.5}$ Impacts Analysis

Per Appendix W, Section 5.3.2 and Section 5.4.2, the EPA recommends a two-tiered demonstration approach for addressing single-source impacts on ozone and secondary $PM_{2.5}$. The first tier involves use of technically credible relationships between precursor emissions and a source's impacts that may be published in the peer-reviewed literature; developed from modeling that was previously conducted for an area by a source, a governmental agency, or some other entity and that is deemed sufficient; or generated by a peer-reviewed reduced form model. The second tier involves application of more sophisticated case-specific chemical transport models (e.g., photochemical grid models) to be determined in consultation with the EPA Regional Office and conducted consistent with new EPA single-source modeling guidance. It is anticipated that the case for using a full quantitative chemical transport model is rare.

One of the first-tier demonstration tools is Model Emissions Rates for Precursors (MERPs). The MERPs can be described as an emission rate of a precursor that is expected to result in a change in ambient ozone (O_3) or fine particulate matter ($PM_{2.5}$) that would be less than a specific air quality concentration threshold such as a significant impact level (SIL). Basically, if the emission rates of precursors for a proposed source are less than MERPs, it is concluded that the proposed source will not cause or contribute to a violation of the NAAQS for ozone or the secondary formation of $PM_{2.5}$ from the proposed source will be insignificant. For $PM_{2.5}$, the SILs the EPA recommends are 0.2 $\mu g/m^3$ and 1.2 $\mu g/m^3$ for annual NAAQS and 24-hour NAAQS, respectively.

The EPA has established empirical relationships between individual sources and their impacts on O_3 and $PM_{2.5}$ for hundreds of hypothetical sources, including three sources in Arizona and fifteen sources in the Southwest region (including Arizona, Colorado, New Mexico, and Utah)[11]. During their assessment, South32 Hermosa examined the three hypothetical sources in Arizona and concluded that Source 17 in La Paz County best represents the Hermosa site. Table 9 summarizes these MERP values.

Table 9: MEPR Values for Source 17

11 U.S. EPA. MERPs View Qlik. https://www.epa.gov/scram/merps-view-qlik

Pollutants	**Precursors**	**MERPs Values (TPY)**
Annual $PM_{2.5}$	SO_2	31,245
Annual $PM_{2.5}$	NO_X	243,487
Daily $PM_{2.5}$	SO_2	1,918
Daily $PM_{2.5}$	NO_X	15,260
O_3	VOCs	4,553
O_3	NO_X	214

South32 Hermosa conducted ozone and secondary $PM_{2.5}$ impact analysis following the EPA July 2022 Guidance.[12] The methods are briefly discussed below.

1. Ozone Impact Analysis

The O_3 impacts for the source impact assessment are calculated as the sum of the ratio of precursor emissions to the MERPs. If the sum of the ratios is less than 1, then the O_3 impacts are below the O_3 SIL and no cumulative analysis is necessary. If the sum of the ratios is greater than 1, the combined O_3 impacts are above the SIL. Therefore, a cumulative O_3 analysis is needed. This incorporates background O_3 levels and compares the cumulative impacts to the NAAQS.

For the Hermosa Project, the sum of the ratios is calculated as follows:

= NO_X Emissions/NO_X MERP + VOC Emissions/VOC MERP
= 205.61/214 + 107.94/4,553
= 0.985 < 1

Therefore, the O_3 impacts from the South32 Hermosa Hermosa project are below the O_3 SIL of 1 ppb and no cumulative analysis is required.

2. Secondary $PM_{2.5}$ Impact Analysis

The combined primary and secondary impacts of $PM_{2.5}$ for the source impact analysis are assessed using the highest (AERMOD) modeled primary $PM_{2.5}$ concentration (HMC), the Class II SIL, precursor emissions, and the MERPs. If the sum of the ratios is less than 1, then the combined $PM_{2.5}$ impacts are below the $PM_{2.5}$ SIL and no additional analyses are necessary. However, if the ratio is greater than 1, a cumulative analysis is needed. This incorporates background $PM_{2.5}$ levels and compares the cumulative impacts to the NAAQS.

12 U.S. EPA. 2022. Guidance for Ozone and Fine Particulate Matter Permit Modeling. https://www.epa.gov/system/files/documents/2022-07/Guidance_for_O3_PM25_Permit_Modeling.pdf

Because the sum of the ratios is above 1 for the Hermosa Project, South32 Hermosa performed a cumulative impact analysis. The secondary impact for 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ are calculated as follows.

Secondary Impact for 24-hour $PM_{2.5}$:

= (NO_X Emissions/NO_X MERP + SO_2 Emissions/SO_2 MERP) * SIL
= (205.61/15,260 + 6.45/1,918)*1.2
= 0.02 $\mu g/m^3$

Secondary Impact for Annual $PM_{2.5}$:

= (NO_X Emissions/NO_X MERP + SO_2 Emissions/SO_2 MERP) * SIL
= (205.61/243,387 + 6.45/31,245)*0.13
= 0.00014 $\mu g/m^3$

The secondary impacts above were incorporated with the primary impacts from AERMOD and the background concentrations. The resulting total concentrations were subsequently assessed against the NAAQS. For more specific information, please refer to Section XI.J.

J. Model Results

Table 10 to Table 13 summarizes the modeled results for PM_{10}, $PM_{2.5}$, NO_2, CO and Pb. Representative background concentrations were added to modeled impacts and the total concentrations were then compared to the NAAQS. It should be addressed that, the modeled impacts for $PM_{2.5}$ included the primary modeled concentrations from AERMOD, and the secondary impacts as calculated in Section I. As shown in the table, emissions from the Hermosa Project will not cause or contribute to a violation of the NAAQS under the operation limits/conditions as proposed in the draft permit. The AERMOD modeling analysis also revealed that the modeled impacts from the Hermosa were limited to near-field areas. Indeed, all modeled maximum concentrations for all pollutants occurred in or near the ambient air boundary. Because PM_{10} and $PM_{2.5}$ are the primary pollutant of concern, the Department requires South32 Hermosa to install and operate a PM_{10} and $PM_{2.5}$ monitor in the area, providing additional assurances that the mine's operations are protective of the health of local communities.

Table 10: NAAQS Impact Analysis for Option 1 (Plan I and 2.6 MW Engines)

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
CO	1-hour	11,017	2,058	13,075	40,000
	8-hour	2,428	1,000	3,428	10,000
NO_2	1-hour	148	20	168	188
	Annual	10.41	2.08	12.49	100
Pb	3-month rolling	0.091	0.005	0.096	0.15
PM_{10}	24-hour	106.14	28	134.14	150
$PM_{2.5}$	24-hour	16.30	8.6	24.9	35

	Annual	4.70	3.76	8.46	9

Table 11: NAAQS Impact Analysis for Option 2 (Plan II and 2.6 MW Engines)

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
CO	1-hour	10,900	2,058	12,958	40,000
	8-hour	2,423	1,000	3,423	10,000
NO_2	1-hour	145	20	165	188
	Annual	10.40	2.08	12.48	100
Pb	3-month rolling	0.086	0.005	0.091	0.15
PM_{10}	24-hour	104.16	28	132.16	150
$PM_{2.5}$	24-hour	16.72	8.6	25.32	35
	Annual	5.03	3.76	8.79	9

Table 12: NAAQS Impact Analysis for Option 3 (Plan I and 4.4 MW Engines)

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
CO	1-hour	11,022	2,058	13,080	40,000
	8-hour	2,430	1,000	3,430	10,000
NO_2	1-hour	101	20	121	188
	Annual	4.32	2.08	6.40	100
Pb	3-month rolling	0.091	0.005	0.096	0.15
PM_{10}	24-hour	106.01	28	134.01	150
$PM_{2.5}$	24-hour	15.46	8.6	24.06	35
	Annual	4.67	3.76	8.43	9

Table 13: NAAQS Impact Analysis for Option 4 (Plan II and 4.4 MW Engines)

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
CO	1-hour	10,900	2,058	12,958	40,000
	8-hour	2,425	1,000	3,425	10,000
NO_2	1-hour	102	20	122	188
	Annual	4.32	2.08	6.40	100
Pb	3-month rolling	0.086	0.005	0.091	0.15
PM_{10}	24-hour	104.12	28	132.12	150
$PM_{2.5}$	24-hour	15.42	8.6	24.02	35
	Annual	5.01	3.76	8.77	9

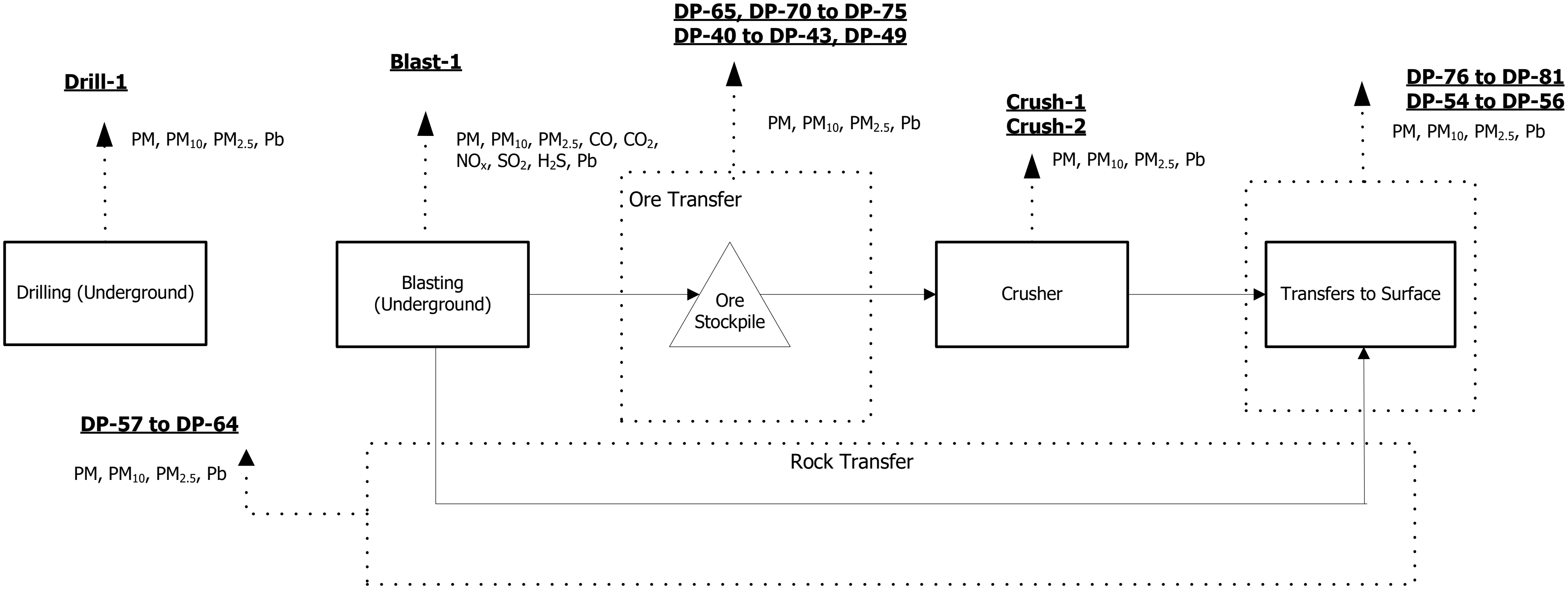
XII. LIST OF ABBREVIATIONS

AAB .... Ambient Air Boundary
A.A.C. .... Arizona Administrative Code
ADEQ .... Arizona Department of Environmental Quality
AERMAP .... Terrain data preprocessor for AERMOD
AERMET .... Meteorological data preprocessor for AERMOD
AERMOD .... AMS/EPA Regulatory Model
AERSURFACE .... Surface characteristics preprocessor for AERMOD
ADJ_U* .... Adjusted Surface Friction
AG mill .... Autogenous mill
AMS .... American Meteorological Society
AOS .... Alternate Operating Scenario
AQD .... Air Quality Division
A.R.S. .... Arizona Revised Statutes
BPIP .... Building Profile Input Program
CAA .... Clean Air Act
CAM .... Compliance Assurance Monitoring
CBP .... Concrete Batch Plants
CEMS .... Continuous Emissions Monitoring System
CFR .... Code of Federal Regulations
CO .... Carbon Monoxide
CNG .... Compressed Natural Gas
CO_2 .... Carbon Dioxide
CO_2e .... CO_2 equivalent basis
EJ .... Environmental Justice
EPA .... Environmental Protection Agency
GHG .... Greenhouse Gases
HAP .... Hazardous Air Pollutant
HP .... Horsepower
HMC .... Highest Modeled Concentration
hr .... Hour
HYSPLIT .... Hybrid Single-Particle Lagrangian Integrated Trajectory
IC .... Internal Combustion
IMPROVE .... Interagency Monitoring of Protected Visual Environments
kW .... Kilowatt
lb .... Pound
LNG .... Liquified Natural Gas
MERPs .... Model Emissions Rates for Precursors
mNSR .... Minor New Source Review
MW .... Megawatts
MPO .... Mine Plan of Operations
NAAQS .... National Ambient Air Quality Standard
NCDC .... National Climatic Data Center
NED .... National Elevation Dataset
NG .... Natural Gas
NO_X .... Nitrogen Oxides
NO_2 .... Nitrogen Dioxide

NSPS .... New Source Performance Standards
NWS .... National Weather Service
O_3 .... Ozone
OLM .... Ozone Limiting Method
OxCat .... Oxidation catalysts
PET .... Permitting exemption threshold
Pb .... Lead
PM .... Particulate Matter
PM_{10} .... Particulate Matter no larger than 10 µm nominal aerodynamic diameter
$PM_{2.5}$ .... Particulate Matter no larger than 2.5 µm nominal aerodynamic diameter
POS .... Primary Operating Scenario
PSD .... Prevention of Significant Deterioration
PSEU .... Pollutant-specific Emission Units
PRIME .... Plume Rise Model Enhancements
PTE .... Potential to Emit
PVMRM .... Plume Volume Molar Ratio Method
QAPP .... Quality Assurance Project Plan
QA/QC .... Quality Assurance/Quality Control
RACT .... Reasonably Available Control Technology
ROM .... Run-of-mine
SCR .... Selective catalytic reduction
SIL .... Significant Impact Level
SMBS .... Sodium Metabisulfite
SO_2 .... Sulfur Dioxide
TPY .... Tons per Year
TSF .... Tailings Storage Facility
VOC .... Volatile Organic Compound
VTM .... Vertical Tower Mill
WTP1 .... Water Treatment Plant No. 1
WTP2 .... Water Treatment Plant No. 2
yr .... Year

APPENDIX A. PROCESS FLOW DIAGRAM

Drilling, Blasting, and Crushing for Taylor Deposit



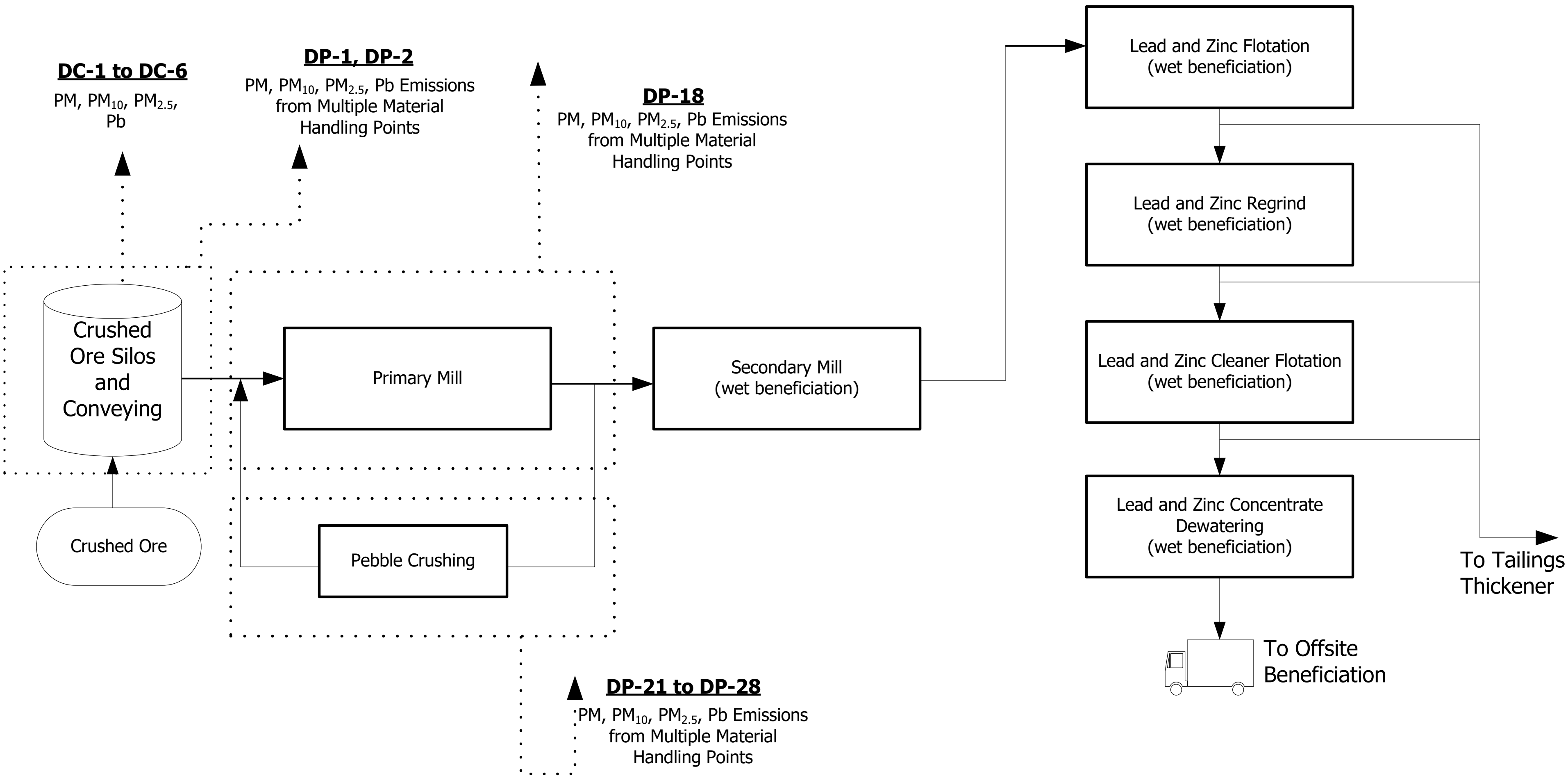
Legend

Material Flow

Air Emissions

South32 Hermosa Inc.	
Process Flow Diagrams Drilling, Blasting, and Crushing - Taylor	
Trinity Consultants	November 2023

Ore Beneficiation for Taylor Deposit



Legend

Material Flow

Air Emissions

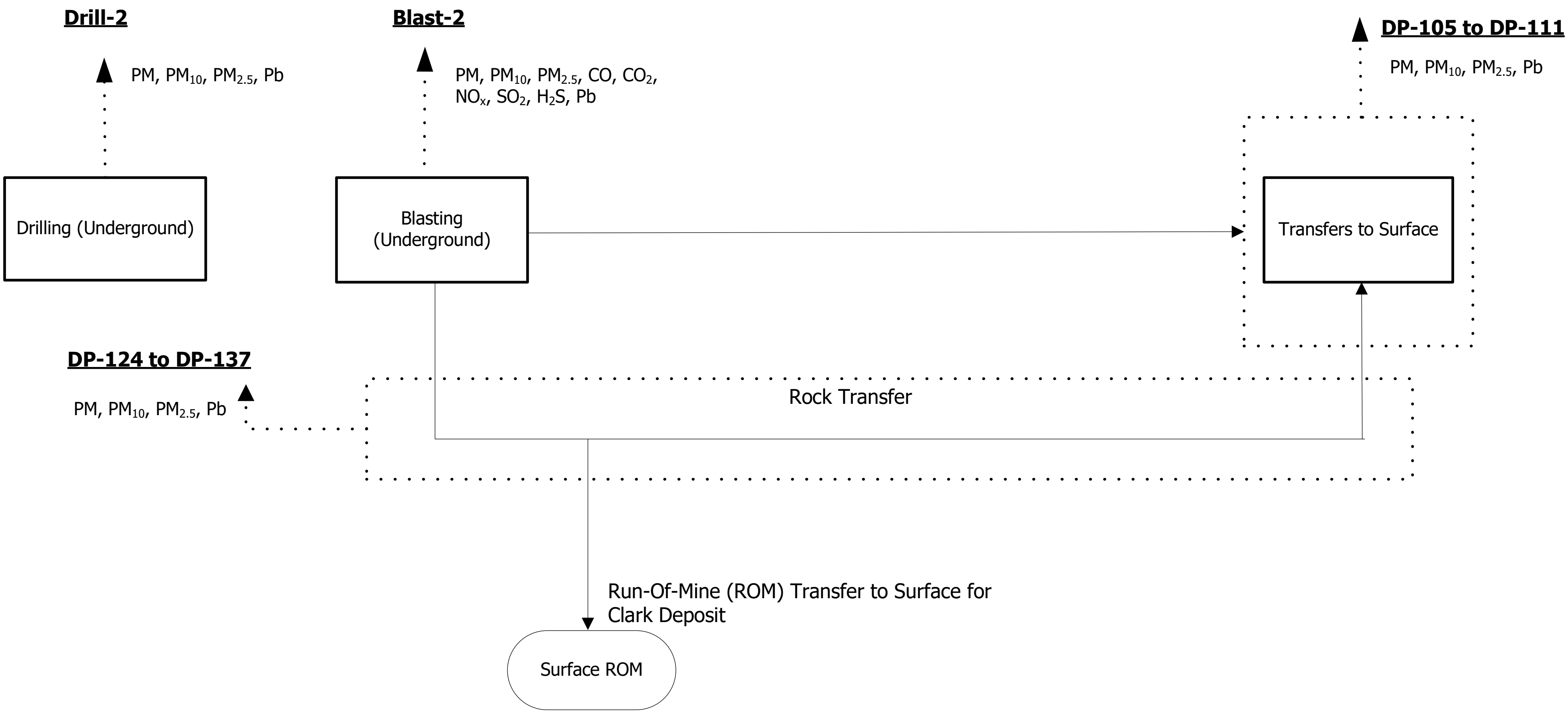
South32 Hermosa Inc.

Process Flow Diagrams
Ore Beneficiation - Taylor

Trinity Consultants

November 2023

Drilling and Blasting for Clark Deposit



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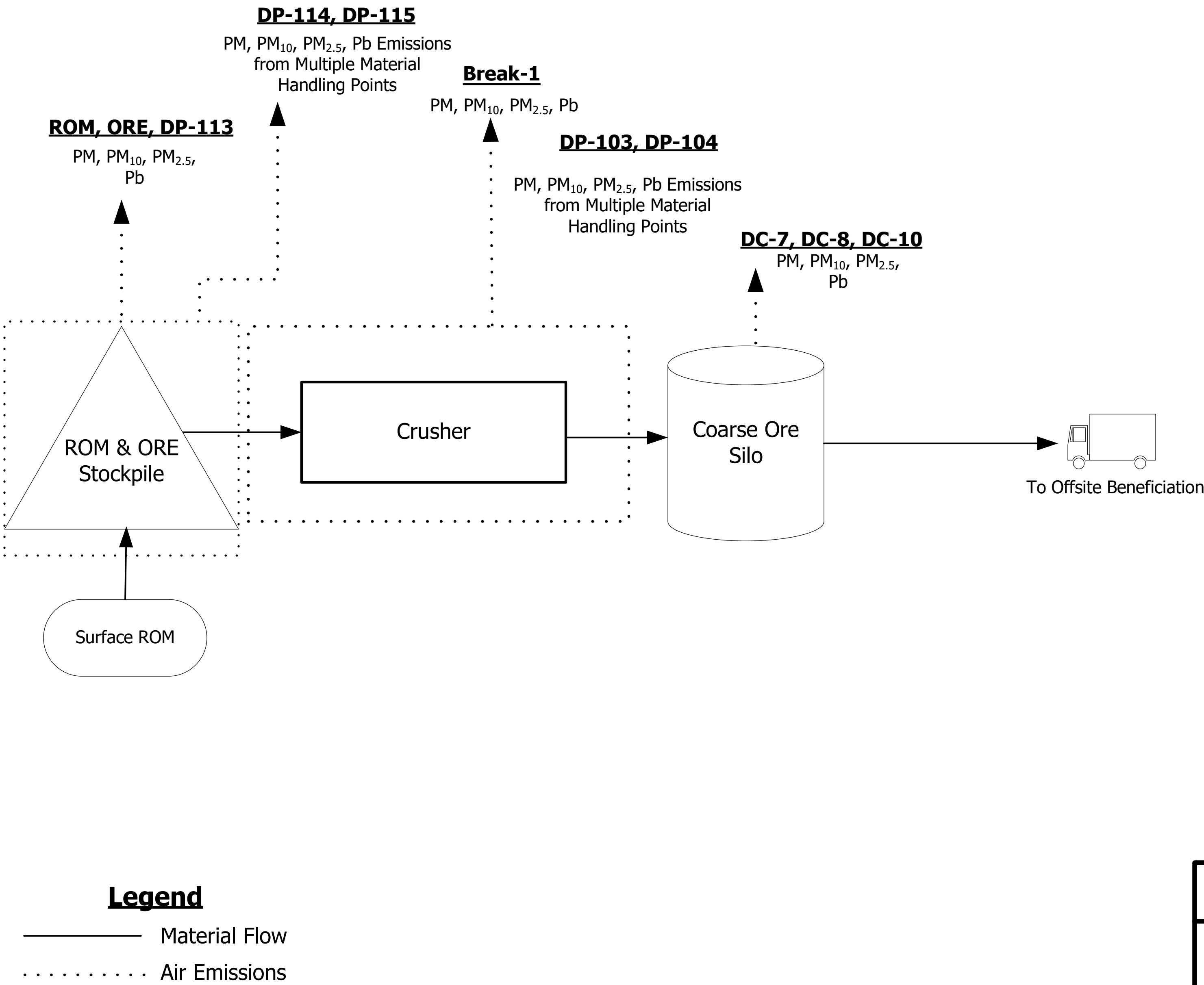
Material Flow

Air Emissions

South32 Hermosa Inc.	
Process Flow Diagrams Drilling and Blasting - Clark	
Trinity Consultants	January 2024

Clark Ore Crushing



South32 Hermosa Inc.	
Process Flow Diagrams Clark Ore Crushing	
Trinity Consultants	January 2024