Arizona Department of Environmental Quality

2021 Regional Haze Four Factor Initial Control Determination

Facility: CalPortland Company, Rillito Cement Plant

Air Quality Division
November 23, 2020

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1.1 ADEQ Initial Control Determination for CPC Rillito Cement Plant

ADEQ's initial determination is to find that it is reasonable to require additional controls on CPC Rillito Cement Plant during this planning period in order to make reasonable progress toward natural visibility conditions. ADEQ is proposing implementing an enforceable permit condition for CalPortland's iron stockpile. The emission source was moved to a location with an artificial windbreak. Currently, this is not required by the permit and was done voluntarily.

1.2 ADEQ Control Determination Finalization Timeline

In order to meet the State rulemaking process timeframe for proposed rule inclusion in the July 31st, 2021 Regional Haze state implementation plan (SIP) submittal, ADEQ must finalize all four factor analyses as expeditiously as possible. To provide an opportunity for interested stakeholders to review and comment on ADEQ's initial decision prior to finalization, the department intends to post initial decisions on the agency webpage along with the original source submitted four factor analyses. Once ADEQ has reviewed relevant stakeholder comments, the agency will revise its initial decisions if necessary and post final decisions (see Figure 1). ADEQ welcomes feedback on these initial decisions and invites any interested party to send their comments by **December 31st, 2020** to:

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Please note that this review and feedback opportunity does not constitute an official state implementation plan or state rulemaking comment period. The agency intends to provide an official 30 day comment period on any proposed SIP or rulemaking action in accordance with Arizona Revised Statutes §§ 41-1023, 49-425, and 49-444.

Figure 1: Four Factor Control Determination Process Map

2 ADEQ Four Factor Analysis

2.1 Summary

ADEQ is proposing implementing an enforceable permit condition for CalPortland's iron stockpile (Table 1). The emission source was moved to a location with an artificial windbreak. Currently, this is not required by the permit and was done voluntarily. Twelve additional emission sources were evaluated for technically feasibility or cost effectiveness for any additional control technologies or measures that could be implemented. Nineteen possible control technologies or measures were evaluated for these twelve emissions source. All of these evaluated were found to be not reasonable based on the review of the statutory four factors.

Table 1: Proposed Emission Source Controls

Source	Unit / Process	Pollutant	Corresponding Control Technology
WIND EROSION	11	PM_{10}	Artificial Wind Break

2.2 Facility Overview

2.2.1 Process Description

An open pit quarry is mined for limestone, shale, and dolomite for use in cement production. Operations at the quarry include drilling, blasting, truck loading, truck hauling, and truck unloading. Kiln grade material is hauled to the quarry crusher area for size reduction. Overburden/waste rock, unsuitable for use in cement manufacturing, is hauled to the waste rock/overburden storage area adjacent to the quarry. A portion of this material is processed at the Twin Peaks Rock and Stone Aggregate plant which produces aggregate for sale in the local markets.

Haul trucks rear-dump limestone from the quarry into the truck dump hopper at the Quarry Crusher Building. Rock is fed to a vibrating grizzly where oversize rock is sent to an impact crusher. Undersize rock from the vibrating grizzly along with the rock processed by the impact crusher is transported via the belt conveyor to the Screen Building for sizing by the primary screen. The undersize rock from the primary screen is then conveyed to the Surge Storage Building while oversize rock is returned to the impact crusher for further processing. From the Surge Storage Building, limestone is transported to the cement plant by an overland conveyor. The overland conveyor system is also used to convey various additives stored at the quarry to various locations at the cement plant.

Material transported from the quarry by the overland conveyor is stored at the cement plant in either the Stacker/Reclaim Building or the Rock Storage Building. Material stored in the Stacker/Reclaim Building is transported to two 250-ton surge bins prior to being introduced to the Roller Mill. Material stored in the Rock Storage Building is processed by the 4 mills.

Various additives (iron oxide, alumina, silica etc.) are combined with limestone to produce raw cement mix. At the quarry, the additives are introduced into the process through a mixing process at the quarry face. At the cement plant, additives are introduced into the process through the raw mill system via four additive bins at the roller mill and two Feed Hoppers at the AC Mills.

Limestone and additives are mixed in desired quantities and are processed by the roller mill and 4 AC mills to produce raw mix for the kilns. The raw materials processed by the roller mill are dried using either the exhaust gas from the Kiln 4 preheater/precalciner or a natural gas heater. The raw materials processed by the AC mills are dried using natural gas heaters.

Feed for Kilns 1, 2 and 3 – The raw mix from the 4 AC mills and some of the raw mix from the roller mill is stored in 12 proportioning silos. The raw mix is subsequently transferred to 6 kiln feed silos followed by the 3 kiln feed bins for delivery to Kilns 1, 2 and 3.

Feed for Kiln 4 - The raw mix from the roller mill is delivered to a homogenizing silo. From the homogenizing silo, it is delivered to either two kiln feed storage silos for conveying to Kiln 4 or 12 proportioning silos for eventual processing by Kilns 1-3.

F2 Dust bin - The particulate matter emissions from Kiln 4 are controlled by the H5-GB baghouse. The collected kiln dust is stored in the H5 dust bin before being recycled back to the kiln using the kiln dust processing system consisting of a 300 ton dust bin and associated transfer system. When the D4 mill is operating, the dust processing system feeds to the homogenizing silo where it is blended with raw mix. When the D4 mill is not operating, the kiln dust is stored in the 300 ton dust bin until the D4 mill commences operating again.

The facility currently includes three long rotary kilns (Kilns 1-3), installed in 1949, 1952, and 1955, and a preheater/precalciner kiln (Kiln 4) constructed in 1971. All four kiln systems include associated coolers and conveying systems used to transport the produced clinker to the Clinker Storage Building. The kilns are capable of using a variety of fuels, including solid fuels (coal, coke), fuel oils (diesel, No.2 fuel oil and bunker C oil) and natural gas. Kiln 4 is also designed to use, and has historically utilized, supplemental fuels such as on-spec used oil, jet fuel, shredded tires, wood chips, and/or pecan shells.

Cement is produced by milling a mixture of approximately 90-95% clinker, 5% gypsum, and up to 5% limestone. Finish milling commences with the reclaim and conveying of clinker, gypsum, and limestone from Clinker Storage Building to either: (a) storage bins associated with the D2 finish mill; or (b) hoppers that feed the seven CM finish mills and the D3 finish mill. The finish mills grind the clinker and the added materials into a powder product.

Finished cement product is pneumatically conveyed from the finish mills to the cement storage silos. Cement shipping is conducted in bulk (via trucks or railcars) or by sacks. If sacks are used, they are filled and prepared for shipment in the Cement Packhouse.

2.2.2 Baseline Emission Calculations

Table 2 Historical Emissions

Year	Clinker Production (Tons)	NO_x (tpy)	SO_2 (tpy)	PM (tpy)
2016	690,390	1,443	5	207
2017	913,599	2,167	5	222
2018	1,050,120	2,804	6	249

2.3 ADEQ Screening Methodology

The screening methodology used by the ADEQ relies on the emissions inventory data from ADEQ State and Local Emissions Inventory System (SLEIS). The method used emissions data from 2015 – 2017 and throughput data from 2016 – 2018 for the 2028 emissions projections. The projected air pollutants include PM, SO_2, and NO_X. Quality assured 2018 emissions data were not available at the time of the analysis which is why 2015-2017 emissions datasets were utilized. Emission units, unit processes, process throughputs (inputs or outputs), and emissions for pollutants were reviewed for CalPortland.

A scaling factor was determined for each pollutant and emission unit by dividing the annual emissions by the annual throughput. Then the average scaling factor over the three-year period (2015-2017) was calculated. In addition, the average process throughput for the three-year period (2016-2018) was calculated. The projected annual emissions for each unit process was determined by multiplying the average scaling factor (2015-2017) by the average process throughput (2016-2018).

Then the ADEQ applied a screening process to determine which emission units would undergo four factor analysis. Any processes that were identified as being effectively controlled were deferred from consideration for the current implementation period[1]. Four factor analysis would be conducted on the remaining processes that make up the top 80% of emissions at the source.

The projected 2028 emissions for PM, SO_2, and NO_X CalPortland for top 80% sources are presented in Table 3 below.

[1] Effective control determination is discussed in "ADEQ 2021 Regional Haze State Implementation Plan Source Screening Methodology" (March 2021). https://static.azdeq.gov/aqd/haze/4_factor_screening_approach.pdf

Table 3: Top 80% of emission sources

EMISSION UNIT	PROCESS ID	Pollutant	Pollutant TPY	Status
PREHEATER & KILN 4	6	NO_X	1,530.5	Effectively Controlled
CLINKER TO OH CRANE BLDG	2	PM_{10}	66.9	Top 80%
VEHICULAR TRAFFIC	4	PM_{10}	29.3	Top 80%
VEHICULAR TRAFFIC	1	PM_{10}	26.0	Top 80%
MATERIAL DROPS	2	PM_{10}	13.3	Top 80%
FINISH MILLING - D2 AREA	3	PM_{10}	12.8	Top 80%
WIND EROSION	11	PM_{10}	8.4	Top 80%
FINISH MILLING - D3 AREA	2	PM_{10}	8.1	Top 80%
COOLER - KILN 4	1	PM_{10}	7.7	Top 80%
MINING OPERATIONS	1	NO_X	7.1	Top 80%
MATERIAL DROPS	1	PM_{10}	7.0	Top 80%
QUARRY CRUSHER SYSTEM	1	PM_{10}	5.8	Top 80%
VEHICULAR TRAFFIC	2	PM_{10}	4.3	Top 80%

2.4 Proposed Control Methodology

2.4.1 Baseline Control Scenario (Projected 2028 Emissions Profile)

The ADEQ relied upon guidance from the Western Regional Air Partnership (WRAP) regarding the use of a "Q/d > 10" threshold to screen out sources from the four-factor analysis. To accomplish this, the ADEQ reviewed historical emission inventory data for sources of PM_{10}, NO_X, and SO_2.

To determine the "Q" value, the facility-wide PM_{10} primary, nitrogen oxide, and sulfur dioxide annual emissions were totaled. Since Phoenix Cement station had a "Q" value greater than 10, it was isolated by the ADEQ.

To determine the distance ("d") value, the ADEQ used GIS to plot the location of Calportland and the boundary of all Class I areas within Arizona and surrounding States. Then, the distance (the "d" value) from Calportland to the nearest Class I area boundary (in kilometers) was determined.

Once "Q" and "d" had been established, "Q/d" for Calportland was determined to be 30[2]. These results are summarized in Table 4 below.

Table 4: Q/d inputs for CalPortland – Rillito Cement Plant

Facility	Q (tpy)	d (km)	Q/d	Nearest CIA
CalPortland - Rillito Cement Plant (APCC)	246	8	30	Saguaro WA

2.4.2 Evaluated Controls and Emission Estimates

The controls evaluated at CalPortland are identified below.

2.4.2.1 Clinker to Overhead Crane Building

The Clinker to Overhead Crane Building already implements a 3-sided enclosure to control emissions from this source. This control technology achieves a 75% reduction to PM_{10}. Two additional controls were identified for this emission source as described below.

2.4.2.1.1 Full Enclosure

Enclosure is one of the control techniques used for material handling sources. Full enclosure of the building would represent the maximum achievable control for these sources.

Availability:

A full enclosure of this emission source would be available.

Technical Feasibility:

The overhead crane building is designed to allow the overhead crane to exit on either end of the building. In order to implement full enclosure of the building, modifications will have to be made to the overhead crane building while still allowing for maintenance of the crane and loader/haul truck access at either end. Full enclosure of the building is a technically feasible control measure.

Effectiveness:

The clinker to overhead crane building is currently contained by a 3-sided building. A full enclosure is assumed to have a control efficiency of 90%.

[2] Source screening is discussed in further detail in "ADEQ 2021 Regional Haze State Implementation Plan Source Screening Methodology" (March 2020). https://static.azdeq.gov/aqd/haze/4_factor_screening_approach.pdf

2.4.2.1.2 Fabric Filter Baghouse

Fabric filter baghouses work by filtering fugitive PM_{10} emissions through a filter bag. The collected particles are periodically removed from the bag through a pulsejet or reverse flow mechanism.

Availability:

Baghouses are an available control option and are currently in use at CalPortland.

Technical Feasibility:

The building structure cannot safely support or house a baghouse, and the building is not currently full enclosed. As noted in section 4.1.2.1 above, even after restructuring the building to allow for a full enclosure, it will not be structurally capable of accommodating a baghouse. Therefore, installing a new baghouse is not a technically feasible option for this analysis.

2.4.2.2 Unpaved Road Vehicular Traffic

CalPortland currently implements various measures to control emissions from vehicular traffic on unpaved roads which include; a traffic management plan, road watering, and lignin-based dust suppressant application. Calportland is required to achieve a 65% control efficiency for unpaved roads as approved in their dust control plan per Condition II.B.1.f(1) of Attachment "B." Additional controls were evaluated as described below.

2.4.2.2.1 Traffic Management Plans

Traffic management plans include the implementation of speed limits and the construction of speed bumps or limiting the amount traffic on road to reduce PM_{10} emissions associated with vehicle travel on unpaved roads.

Availability:

Traffic management plans require no additional equipment and can be readily applied. This control measure is readily available.

Technical Feasibility:

A traffic management plan is already in effect at CalPortland. CalPortland is already using the most efficient traffic patterns and roadways possible. Additional restrictions would impede facility operation and bottleneck facility processes. Additional speed restrictions would also require more vehicles than are currently in use, representing an increase in not only PM_{10} emissions, but also NO_x and sulfur oxide (SO_x) emissions. Therefore, the current control methodology is a technically feasible option, but no additional changes can be made.

Effectiveness:

Traffic management plans are effective and not a costly way to reduce emissions from vehicular traffic on unpaved roads. However, CalPortland already implements this emission control strategy and no additional changes can be made.

2.4.2.2.2 Additional Watering

Applying additional water to unpaved roads would assist in the reduction of PM_{10} emissions associated with vehicle traffic. Water acts as a dust suppressant by forming cohesive moisture films among the discrete grains of surface material. Moisture content depends on the frequency of water application, the amount of vehicle travel along the routes, the amount of water applied to the surface, and evaporation rates. The current baseline emission rate for road watering has been demonstrated to be a 65% control efficiency.

Availability:

The amount of water that would be required to meet an overall 95% control efficiency is not available at the CalPortland, as the amount of water that can be obtained is limited by the local aquifer, the number of production wells, the wellhead pumps, and existing infrastructure for filling the existing water trucks.

Technical Feasibility:

The current baseline emission rate for road watering has been demonstrated to be a 65% control efficiency. An 86% reduction in PM_{10} emissions can be achieved with additional watering, representing an overall 95% PM_{10} control efficiency. However, the amount of water that would be required to meet an overall 95% control efficiency is not available at the Facility, as the amount of water that can be obtained is limited by the local aquifer, the number of production wells, the wellhead pumps, and existing infrastructure for filling the existing water trucks. As such, additional water application is not a technically feasible control option. If increasing the pumping infrastructure was implemented, this could be a technically feasible option.

Effectiveness:

Applying additional water to unpaved roads could improve the control efficiency from 65% to 95%. However, the amount of water required to achieve this reduction is not available at the facility as mentioned above.

2.4.2.2.3 Surface Gravel

Applying and maintaining surface gravel could assist in the reduction of PM_{10} emissions associated with vehicle travel by reducing the silt content of the traffic routes. Covering the road surface with a material of lower silt content, such as gravel, would result in reduced PM_{10} emissions.

Availability:

Surface gravel is an available control option for unpaved roads.

Technical Feasibility:

The current silt content at CalPortland (6.4%) is equivalent to the silt content that would be achieved by applying gravel to the unpaved road. As such, the application of gravel is a technically feasible option with no associated PM_{10} reduction.

Effectiveness:

The current silt content at CalPortland is 6.4%. This is equivalent to the equilibrium silt content of gravel if applied to the unpaved road. As such, there would be no reduction in PM_{10} emissions.

2.4.2.2.4 Paving

Paving the roads would assist in the reduction of PM_{10} emissions associated with vehicle travel. Pavement reduces PM_{10} emissions by changing the physical characteristics of the existing road surface material and forming a hardened surface that binds particles together.

Availability:

Paving is an available control option for unpaved roads and is required to maintain the quarry road between Twin Peaks Road and the quarry entrance in a paved condition per Condition II.1.e(1) of Attachment "B."

Technical Feasibility:

The quarry roads cannot be paved as the weight and size of the haul trucks would destroy the pavement. In order to accommodate the frequency and weight of the trucks that would need to travel on paved roads, an 18- inch concrete foundation would need to be poured for a rebar supported asphalt roadway. Additionally, haul roads will change as the quarry pit is developed. Therefore, this not a technically feasible control option.

Effectiveness:

Paving can be highly effective control option for unpaved roads.

2.4.2.2.5 Chemical Dust Suppressant

Applying chemical dust suppressant would assist in the reduction of PM_{10} emissions associated with vehicle travel. Chemical dust suppressants may last several months when applied to unpaved roads. When compared to plain water under summertime conditions, the reapplication frequency of water ranges from minutes or hours while the reapplication frequency of chemical dust suppressants ranges from several weeks to a few months. Chemical dust suppressants reduce PM_{10} emissions by changing the physical characteristics of the existing road surface material and forming a hardened surface that binds particles together.

Availability:

Chemical dust suppressant is an available control option that CalPortland already implements and is described in their approved dust control plan.

Technical Feasibility:

The application of chemical dust suppressants would reduce PM_{10} emissions on the unpaved roads. Currently, a high efficiency lignin-based dust suppressant is being applied and alternated with water. Magnesium chloride is another chemical dust suppressant used for unpaved PM_{10} road emission reduction. However, magnesium chloride is corrosive and can damage equipment at the plant. In addition, it less effective at dust control than lignin-based dust suppressant. Therefore, chemical dust suppressant is already implemented and is a technically feasible option.

Effectiveness:

Chemical dust suppressants provide a PM_{10} control efficiency of about 80% when applied at regular intervals of 2 weeks to 1 month

2.4.2.3 Paved Road Vehicular Traffic

CalPortland currently implements various measures to control emissions from vehicular traffic on paved roads which include stabilizing access points and daily cleanup of spills. Additional controls were evaluated as described below.

2.4.2.3.1 Cover Haul Trucks

Covering haul trucks would assist in the reduction of PM_{10} emissions associated with haul truck travel. Haul truck coverage is a preventive control implemented to prevent material from being deposited onto surface.

Availability:

Covers are not available to accommodate the size of the haul trucks at CalPortland.

Technical Feasibility:

Covers are not available to accommodate the size of the haul trucks at CalPortland. In addition, requiring operators to cover haul trucks would pose a safety hazard as they would have to exit the vehicles in order to roll the cover down. There aren't any known implementations of covering haul trucks.

Effectiveness:

Covering haul trucks would assist in the reduction of PM_{10} emissions associated with haul truck travel. Haul truck coverage is a preventive control implemented to prevent material from being deposited onto surface.[3]

[3] WRAP Fugitive Dust Handbook Section 5, Table 5.5

2.4.2.3.2 Stabilize Unpaved Access Points

Paving or vegetating the paved road reduces PM_{10} emissions. Alternatively, oil or chemical suppressants can be applied and maintained.

Availability:

CalPortland has already implemented this control methodology.

Technical Feasibility:

CalPortland has already implemented this control methodology; therefore, is a technically feasible option.

Effectiveness:

This control method limits visible dust opacity emissions to 20%.[4] For the application of this PM_{10} control method, a threshold of an average daily vehicle trips of 500 or more must be met.

2.4.2.3.3 Rapid Cleanup of Spills

Rapidly cleaning up non-preventable dust is an efficient PM_{10} control technology.

Availability:

CalPortland is required by PC MACT to clean-up any clinker spills within three days, but CalPortland conducts clean-up of spills daily, as necessary. Increased clean-up frequencies do not represent a feasible control technology as the implementation of new routes for rerouting traffic would prevent efficient vehicle traffic along the roadways. The paved roadways are in space confined areas as well, which would severely restrict operations if traffic would need to be stopped at an increased frequency in order to clean up dust spills.

Technical Feasibility:

Increased clean-up frequencies does not represent a feasible control technology as the implementation of new routes for rerouting traffic would prevent efficient vehicle traffic along the roadways.

Effectiveness:

If the wind or water born deposition is cleaned up within 24 hours, a 100% control efficiency can be applied.[5] This assumes that before traffic resumes the entire spill is cleaned up.

2.4.2.3.4 Curb or Pave Shoulders

An average shoulder width of either 4ft or 8ft can be required to reduce PM_{10} emissions. Alternatively, curbing adjacent to and contiguous with a paved lane or shoulder can be applied.

[4] WRAP Fugitive Dust Handbook Section 5, Table 5.6
[5] Ibid, Table 5.5

The third control option is construction of intersections, auxiliary entry and exit lanes adjacent and contiguous with a paved roadway.

Availability:

Curbing or paving shoulders is an available emission control technique.

Technical Feasibility:

The weight and intensity of haul truck traffic would quickly destroy any stabilizing shoulders on paved roads. As such, frequent replacement of the pavement or stabilization of the shoulders would be required since it would be quickly degraded by the weight and movement of the trucks. Due to these considerations, this is not a technically feasible control option.

Effectiveness:

These controls will limit visible dust emissions to 20% dust opacity and maintain stabilize surface.

2.4.2.3.5 Street Sweepers

Implementing street sweeping programs with PM_{10} efficient vacuum units (14-day frequency) can reduce paved road PM_{10} emissions. PM_{10} vacuum sweeping is a mitigative control that removes surface deposition by entraining particles in a moving air stream. The removed particles are collected in a hopper and a filter system in an open loop exhausts the air.

Availability:

Street sweepers are an available option to control emissions from paved roads at CalPortland.

Technical Feasibility:

Application of PM_{10} certified street sweepers is a technically feasible option and can be implemented to reduce PM_{10} emissions. However, PM_{10} certified street sweepers can have internal cementation issues with the addition of water to the dry materials normally present at cement plants.

Effectiveness:

Implementing street sweeping programs with PM10 efficient vacuum units (14-day frequency) can reduce paved road PM10 emissions by up to 26%.[6]

2.4.2.4 Material Handling

Three control options for material handling operations at CalPortland were evaluated as described below.

[6] Ibid

2.4.2.4.1 Water Sprays

Water Sprays are commonly used to increase the moisture content of the material. If continuously applied the moisture content will increase leading to a reduction of ambient PM_{10} concentrations.

Availability:

Water sprays are a widely available control technology.

Technical Feasibility:

The location and operations of the material drops impedes the ability to apply additional controls. Water sprays are not a technically feasible control for this analysis. The materials without control cannot become damp because the material will clump and cause issues with operations. Additional moisture affects the quality of the product, it causes plugging in the pre-heater tower, and causes other process related difficulties that in the long run will add more NO_x and SO_x due to the moisture that would have to be driven off and additional process upsets that cause excess emissions with a breakdown.

Effectiveness:

Water Sprays are commonly used to increase the moisture content of the material. If continuously applied the moisture content will increase leading to a reduction of ambient PM_{10} concentrations.

2.4.2.4.2 Enclosures

Full or partial enclosure is commonly applied as a control measure for material drops. This control method can be as efficient as 90% at reducing PM_{10} emissions.

Availability:

Constructing enclosures are an available control measure.

Technical Feasibility:

The location of the material drops impedes the ability to apply additional controls. This is not technically feasible control for this analysis. For example, the Alumina at Plant (Loader) – Loader to D4 Hopper transfer point cannot be enclosed, as enclosing this process for a baghouse is not physically feasible as there would be no way to get the material into the hopper.

Effectiveness:

Full or partial enclosure is commonly applied as a control measure for material drops. This control method can be as efficient as 90% at reducing PM_{10} emissions.

2.4.2.4.3 Baghouse

Availability:

Baghouses are an available control measure.

Technical Feasibility:

The location and operations of the material drops impedes the ability to install a baghouse. This is not technically feasible control for this analysis.

Effectiveness:

Fabric filters can achieve an effectiveness of over 99% for PM_{10}.[7]

2.4.2.5 Iron Stockpile

Six control options for the Iron Stockpile at CalPortland were evaluated as described below.

2.4.2.5.1 Water Application

Applying additional water to the stockpile would assist in the reduction of PM_{10} emissions associated with wind erosion. Applying water to the surface of the stockpile stabilizes the erodible surface by increasing the moisture content of the material being stored.

Availability:

Watering is a widely available resource for emission control.

Technical Feasibility:

Sonoran hematite is a very fine material, and water application would cause clumping of the material. Clumping causes operational issues, such as clogging and plugging of process equipment. Therefore, water application is not a technically feasible control method.

Effectiveness:

Watering the pile can reduce the PM_{10} emissions by 90%.

2.4.2.5.2 Chemical Dust Suppressant

Applying chemical dust suppressant would assist in the reduction of PM_{10} emissions associated with wind erosion. The chemical dust suppressant stabilizes the surface of the material, reducing the amount of windblown dust that is generated.

Availability:

Chemical dust suppressant is available and currently used on unpaved roads at CalPortland.

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[7] EPA Air Pollution Control Cost Manual

Technical Feasibility:

Sonoran hematite is a very fine material, and chemical dust suppressant application would cause clumping of the material. Clumping causes operational issues, such as clogging and plugging of process equipment. Therefore, chemical dust suppressant application is not a technically feasible control method.

Effectiveness:

Applying chemical dust suppressant can reduce the PM_{10} emissions by 90%.

2.4.2.5.3 Artificial Wind Break

Erecting an artificial windbreak would assist in the reduction of PM_{10} emissions associated with windblown dust from the stockpile.

Availability:

Artificial wind breaks are available.

Technical Feasibility:

The iron stockpile was moved to a horseshoe pit with windbreak on three sides and this control is currently being implemented. Therefore, this is a technically feasible control option. This would need to be an enforceable condition in the permit.

Effectiveness:

A three-sided enclosure with 50% porosity shields the pile from the ambient wind and reduces PM_{10} emissions by 75%.[8]

2.4.2.5.4 Vegetative Wind Break

Planting trees or shrubs as windbreaks would assist in the reduction of PM_{10} emissions associated with windblown dust from the stockpile.

Availability:

This control option is available.

Technical Feasibility:

The artificial windbreak represents a 75% control at no cost, making it the most cost-effective control technology. Planting trees or shrubs as a windbreak would represent a 25% control efficiency at a greater cost. Therefore, planting trees or shrubs is not evaluated further as a technically feasible control option as a windbreak since a more effective windbreak control technology has already been implemented.

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[8] WRAP Fugitive Dust Handbook (2006)

Effectiveness:

Planting trees or shrubs as a windbreak would represent a 25% control efficiency.

2.4.2.5.5 Compact Piles

Compacting the pile could assist in the reduction of PM_{10} emissions associated with windblown dust from the stockpile.

Availability:

Compacting pile is available as a control option.

Technical Feasibility:

The iron stockpile is actively used with material being added to and removed from the area. This makes pile compaction operationally infeasible to implement thereby rendering it a technically infeasible

Effectiveness:

Compacting the pile could assist in the reduction of PM_{10} emissions associated with windblown dust from the stockpile.

2.4.2.5.6 Covering with Tarps

Covering the stockpile would assist in the reduction of PM_{10} emissions associated with windblown dust.

Availability:

Tarps are available as a control measure.

Technical Feasibility:

The iron stockpile is actively used with material being added to and removed from the area. Coverage of the pile with a tarp or other means will impede with operational activities at CalPortland; therefore, this is not a feasible control technology.

Effectiveness:

Utilizing tarps to cover piles provides shelter from the ambient wind and can provide a control efficiency of 90% for PM_{10} emissions.

2.4.2.6 Finish Mill

Emissions from the finish mill is already controlled by a baghouse. The only control option evaluated is an improved baghouse with a lower loading rate.

2.4.2.6.1 Improved Baghouses

Fabric filter baghouses work by filtering fugitive PM_{10} emissions through a filter bag. The collected particles are periodically removed from the bag through a pulse jet or reverse flow mechanism.

Availability:

Baghouses are an available control option and are currently in use at CalPortland.

Technical Feasibility:

CalPortland already utilizes baghouses for the finish mills. Therefore, replacing the baghouses is a technically feasible option.

Effectiveness:

The current baghouse has a guaranteed loading rate of 0.01 gr/dscf. The replacement baghouse would have a grain loading of 0.005 gr/dscf.

2.4.2.7 Clinker Cooler

Emissions from the clinker cooler is already controlled by a baghouse. The only control option evaluated is an improved baghouse with a lower loading rate.

2.4.2.7.1 Improved Baghouses

Fabric filter baghouses work by filtering fugitive PM_{10} emissions through a filter bag. The collected particles are periodically removed from the bag through a pulse jet or reverse flow mechanism.

Availability:

Baghouses are an available control option and are currently in use at CalPortland.

Technical Feasibility:

CalPortland already utilizes baghouses for the clinker cooler. Therefore, replacing the baghouses is a technically feasible option.

Effectiveness:

The current baghouse has a guaranteed loading rate of 0.01 gr/dscf. The replacement baghouse would have a grain loading of 0.005 gr/dscf.

2.4.2.8 Quarry Crusher

Emissions from the quarry crusher is already controlled by a baghouse. The only control option evaluated is an improved baghouse with a lower loading rate.

2.4.2.8.1 Improved Baghouses

Fabric filter baghouses work by filtering fugitive PM10 emissions through a filter bag. The collected particles are periodically removed from the bag through a pulse jet or reverse flow mechanism.

Availability:

Baghouses are an available control option and are currently in use at CalPortland.

Technical Feasibility:

CalPortland already utilizes baghouses for the quarry crusher. Therefore, replacing the baghouses is a technically feasible option.

Effectiveness:

The current baghouse has a guaranteed loading rate of 0.05 gr/dscf. The replacement baghouse would have a grain loading of 0.005 gr/dscf

2.4.2.9 Blasting

CalPortland hires contractors to do the mixing and preparation of the blasting medium. The blasting medium is pre-mixed, and the formula cannot be altered by CalPortland. Additionally, there are safety concerns with regards to implementing controls during the blasting operations. There are no technically feasible NOx control options for quarry blasting.

Table 5 below summarizes the technical feasibility and effectiveness of each control evaluated.

Table 5 Evaluated Controls

Source	Control Option	Technically Feasible (Y/N)	Pollutant Impacted	Control Effectiveness (%)
Clinker to Overhead Crane Building	Fabric Filter Baghouse	N	PM_{10}	N/A
Clinker to Overhead Crane Building	Full Enclosure	Y	PM_{10}	90%
Unpaved Road Vehicular Traffic	Traffic Management Plans	N	PM_{10}	N/A
Unpaved Road Vehicular Traffic	Additional Watering	Y	PM_{10}	95%

Source	Control Option	Technically Feasible (Y/N)	Pollutant Impacted	Control Effectiveness (%)
Unpaved Road Vehicular Traffic	Surface Gravel	N	PM_{10}	N/A
Unpaved Road Vehicular Traffic	Paving	N	PM_{10}	N/A
Unpaved Road Vehicular Traffic	Chemical Dust Suppressant	N	PM_{10}	N/A
Paved Road Vehicular Traffic	Cover Haul Trucks	N	PM_{10}	N/A
Paved Road Vehicular Traffic	Stabilize Unpaved Points	Y	PM_{10}	In Use
Paved Road Vehicular Traffic	Rapid Cleanup of Spills	Y	PM_{10}	In Use
Paved Road Vehicular Traffic	Curb or Pave Shoulders	N	PM_{10}	N/A
Paved Road Vehicular Traffic	Street Sweepers	Y	PM_{10}	26%
Material Handling	Water Sprays	N	PM_{10}	N/A
Material Handling	Baghouse	N	PM_{10}	N/A
Material Handling	Enclosures	N	PM_{10}	N/A
Iron Stockpile	Water Application	N	PM_{10}	N/A
Iron Stockpile	Chemical Dust Suppressant	N	PM_{10}	N/A
Iron Stockpile	Artificial Wind Break	Y	PM_{10}	75%
Iron Stockpile	Vegetative Wind Break	Y	PM_{10}	25%
Iron Stockpile	Compact Piles	N	PM_{10}	N/A

Source	Control Option	Technically Feasible (Y/N)	Pollutant Impacted	Control Effectiveness (%)
Iron Stockpile	Cover with Tarps	N	PM_{10}	N/A
Finish Mill	Improved Baghouses	Y	PM_{10}	0.005 gr/dscf
Clinker Cooler	Improved Baghouses	Y	PM_{10}	0.005 gr/dscf
Quarry Crusher	Improved Baghouses	Y	PM_{10}	0.005 gr/dscf
Blasting	N/A	N/A	NO_X	N/A

2.5 Four Factor Analysis Review

2.5.1 Cost of Compliance

The cost of compliance for technically feasible options are evaluated below. The cost of compliance for these control technologies is summarize in Table 7. The interest assumed was 4.75% APR for all cost estimates in 2018 dollars.

2.5.1.1 Clinker to Overhead Crane Building

2.5.1.2 Full Enclosure

The only additional technically feasible control technology for this source is fully enclosing the structure. CalPortand originally assumed in interest rate of 7%, but later updated it to 4.75% based on ADEQ guidance. ADEQ updated the submitted calculations to reflect such. ADEQ review the calculation methodology and approach for the calculations provided. The crane building is currently enclosed on three sides and would require reconstructing the east and west ends of the building.

The capital cost associated with reconstructing the overhead crane build is $1,076,037. This cost is annuitized over 20 years at 4.75% to yield an annual cost of $84,523[9]. Additional operating costs include administration, taxes, and insurance. These costs contribute $43,041 based on 4% of the capital cost per EPA Air Pollution Control Cost Manual, Sixth Ed., 2002, Sect. 2.5.5.8, pg 2-34. Accounting for all these factors, the total annual cost for reconstructing the overhead crane building at CalPortland is estimated to be $42,138.

[9] ADEQ utilized an interest rate of 4.75% which is consistent with the average three year bank prime rate at the time of this analysis. EPA recommends the use of the bank prime rate in the EPA Cost Control Manual when firm specific nominal interest rates are not available.

The full enclosure estimated to have an additional 24% control efficiency resulting in a reduction of 16.06 tpy from the current controls. This results in a cost effectiveness of $7,945 per ton of PM_{10} reduced.

2.5.1.3 Unpaved Road Vehicular Traffic

2.5.1.3.1 Additional Water

The only possible additional technically feasible control measure for unpaved roads would be to apply additional water to increase the control efficiency from 65% to 95%. CalPortand originally assumed in interest rate of 7%, but later updated it to 4.75% based on ADEQ guidance. ADEQ updated the submitted calculations to reflect such. ADEQ review the calculation methodology and approach for the calculations provided.

To increase watering to a level to achieve a 95% reduction, eight (8) new trucks would need to be purchased. The capital costs for purchasing 8 new trucks would be $3,160,000 based on vendor quotes. This cost is annuitized over 20 years at 4.75% to yield an annual cost of $248,219[10]. Fixed operating costs are estimated at $687,567 based on additional water required, operating costs, and an estimate 5% annual maintenance cost based on vehicle capital costs. Additional operating costs include administration, taxes, and insurance. These costs contribute $126,401 based on 4% of the capital cost per EPA Air Pollution Control Cost Manual, Sixth Ed., 2002, Sect. 2.5.5.8, pg 2-34. Accounting for all these factors, the total annual cost for additional watering to maintain a 95% control efficiency at CalPortland is estimated to be $1,062,186.

Additional watering estimated to increase the control efficiency from 65% to 95%, resulting in a reduction of 50.37 tpy of PM_{10}. This results in a cost effectiveness of $21,086 per ton of PM_{10} reduced.

2.5.1.4 Paved Road Vehicular Traffic

2.5.1.4.1 Street Sweepers

The only additional technically feasible control technology not already implemented at CalPortland were implementing street sweepers. CalPortand originally assumed in interest rate of 7%, but later updated it to 4.75% based on ADEQ guidance. ADEQ updated the submitted calculations to reflect such. ADEQ reviewed the calculation methodology and approach for implementing street sweepers and agrees with the calculations provided.

The street sweepers are estimated at a capital cost of $250,000 based on a vender quote. This cost is annuitized over 20 years at 4.75% to yield an annual cost of $19,638[11]. Additional operating costs include administration, taxes, and insurance. These costs contribute $10,000 based on 4% of the capital cost per EPA Air Pollution Control Cost Manual, Sixth Ed., 2002, Sect.

[10] ADEQ utilized an interest rate of 4.75% which is consistent with the average three year bank prime rate at the time of this analysis. EPA recommends the use of the bank prime rate in the EPA Cost Control Manual when firm specific nominal interest rates are not available.
[11] ibid

2.5.5.8, pg 2-34. The annual operation costed is estimated at 5% of the capital cost. Accounting for all these factors, the total annual cost for implementing a street sweeper at CalPortland is estimated to be $42,138.

The street sweepers are estimated to have a 26% control efficiency based on the control efficiency based on WRAP Fugitive Dust Guidance, Table 5-5 for 14-day frequency street sweeping at arterial/collector streets, reducing emissions from paved road by 2.75 tpy. The results in a cost effectiveness of $15,333 per ton of PM_{10} reduced.

2.5.1.5 Material Handling

There were no technically feasible control options for the emission source. Therefore, the cost of compliance was not evaluated for this source.

2.5.1.6 Iron Stockpile

2.5.1.6.1 Artificial Wind Break

The artificial wind break has already been implemented at CalPortland and has no additional costs associated with this control method. This control is cost effective.

2.5.1.7 Finish Mill

2.5.1.7.1 Improved Baghouses

The only technically feasible control technology for this emission source is replacing the current baghouses with better rated baghouses. CalPortand originally assumed in interest rate of 7%, but later updated it to 4.75% based on ADEQ guidance. ADEQ updated the submitted calculations to reflect such. ADEQ reviewed the calculation methodology and approach for the calculations provided.

The current baghouses at the finish mill have a vender guaranteed rating of 0.01 gr/dscf. A replacement baghouse with a vender guaranteed rating of 0.005 gr/dscf existed and is evaluated for cost effectiveness. Though performance testing shows the current baghouses have lower emissions than the rated guarantee, the equipment rating is used to emphasize the best case emission reduction.

The cost estimates are based on installing new baghouses and their associated annual costs. The total annual cost of operating a new baghouse with a lower grain loading rate is estimated at $1,442,683 in 2018 dollars. These calculations are based on Section 6, Chapter 1 of EPA's Control Cost Manual for Baghouses and Filters. CalPortland estimated the costs in 1998 dollars, and adjusted the final annuitized cost to 2018 dollars. Both methods yielded the same results. This resulted in an annuitized cost of $296,474 at 4.75% over 20 years for the capital costs.

Additional operating costs include administration, taxes, and insurance, and annual operating costs. These costs contribute $238,756 based on the methodology presented in Section 6, Chapter 1 of EPA's Control Cost Manual for Baghouses and Filters. The total annualized cost for replacing the baghouses is estimated at $535,231 per year.

The PM_{10} emissions from this emission source is based on the specification of the equipment. All of the operating parameters pertinent to emissions (flowrate and operating hours) are assumed to be identical for emission projections between the potential replacement baghouses and the current baghouses. 6,087 operating hours are assumed based on the average annual operating hours for these units from 2016-2018. The flowrate of the equipment is rated at 140,000 dscfm. This resulted in a potential emission reduction of 18.26 tpy and a cost effectiveness of $29,311 per ton of PM_{10} reduced.

2.5.1.8 Clinker Cooler

2.5.1.8.1 Improved Baghouses

The only technically feasible control technology for this emission source is replacing the current baghouses with better rated baghouses. CalPortand originally assumed in interest rate of 7%, but later updated it to 4.75% based on ADEQ guidance. ADEQ updated the submitted calculations to reflect such. ADEQ reviewed the calculation methodology and approach for implementing an improved baghouse and agrees with the calculations provided.

The current baghouses at the clinker cooler have a vender guaranteed rating of 0.01 gr/dscf. A replacement baghouse with a vender guaranteed rating of 0.005 gr/dscf existed and is evaluated for cost effectiveness. Though performance testing shows the current baghouses have lower emissions than the rated guarantee, the equipment rating is used to emphasize the best case emission reduction.

The cost estimates are based on installing new baghouses and their associated annual costs. The total annual cost of operating a new baghouse with a lower grain loading rate is estimated at $1,566,489 in 2018 dollars. These calculations are based on Section 6, Chapter 1 of EPA’s Control Cost Manual for Baghouses and Filters. CalPortland estimated the costs in 1998 dollars, and adjusted the final annuitized cost to 2018 dollars. Both methods yielded the same results. This resulted in an annuitized cost of $365,678 at 4.75% over 20 years for the capital costs.

Additional operating costs include administration, taxes, and insurance, and annual operating costs. These costs contribute $273,527 based on the methodology presented in Section 6, Chapter 1 of EPA’s Control Cost Manual for Baghouses and Filters. The total annualized cost for replacing the baghouses is estimated at $639,206 per year.

The PM_{10} emissions from this emission source is based on the specification of the equipment. All of the operating parameters pertinent to emissions (flowrate and operating hours) are assumed to be identical for emission projections between the potential replacement baghouses and the current baghouses. 8,600 operating hours are assumed based on the average annual operating hours for these units from 2016-2018. The flowrate of the equipment is rated at 115,000 dscfm. This resulted in a potential emission reduction of 21.19 tpy and a cost effectiveness of $30,165 per ton of PM_{10} reduced.

2.5.1.9 Quarry Crusher

2.5.1.9.1 Improved Baghouses

The only technically feasible control technology for this emission source is replacing the current baghouses with better rated baghouses. CalPortand originally assumed in interest rate of 7%, but later updated it to 4.75% based on ADEQ guidance. ADEQ updated the submitted calculations to reflect such. ADEQ reviewed the calculation methodology and approach for implementing improved baghouses and agrees with the calculations provided.

The current baghouses at the quarry crusher have a vender guaranteed rating of 0.05 gr/dscf. A replacement baghouse with a vender guaranteed rating of 0.005 gr/dscf existed and is evaluated for cost effectiveness. Though performance testing shows the current baghouses have lower emissions than the rated guarantee, the equipment rating is used to emphasize the best case emission reduction.

The cost estimates are based on installing new baghouses and their associated annual costs. The total annual cost of operating a new baghouse with a lower grain loading rate is estimated at $379,602 in 2018 dollars. These calculations are based on Section 6, Chapter 1 of EPA's Control Cost Manual for Baghouses and Filters. CalPortland estimated the costs in 1998 dollars, and adjusted the final annuitized cost to 2018 dollars. Both methods yielded the same results. This resulted in an annuitized cost of $92,350 at 4.75% over 20 years for the capital costs.

Additional operating costs include administration, taxes, and insurance, and annual operating costs. These costs contribute $273,527 based on the methodology presented in Section 6, Chapter 1 of EPA's Control Cost Manual for Baghouses and Filters. The total annualized cost for replacing the baghouses is estimated at $171,346 per year.

The PM_{10} emissions from this emission source are based on the specification of the equipment. All of the operating parameters pertinent to emissions (flowrate and operating hours) are assumed to be identical for emission projections between the potential replacement baghouses and the current baghouses. 1,621 operating hours are assumed based on the average annual operating hours for these units from 2016-2018. The flowrate of the equipment is rated at 18,922 dscfm. This resulted in a potential emission reduction of 5.92 tpy and a cost effectiveness of $28,944 per ton of PM_{10} reduced.

2.5.1.10 Blasting

There were no technically feasible control options for the emission source.

Table 6: Control Option Cost Effectiveness of Technically Feasible Controls

Emission Source	Control option	Capital cost	Annualized capital cost	Annual operating & maintenance cost	Total annual cost ($/yr)	Emission reduction (tpy)	Cost-effectiveness ($/ton)
Clinker to Overhead	Full Enclosure	$1,076,037	$84,523	$43,041	$127,565	16.06	$7,943

Emission Source	Control option	Capital cost	Annualized capital cost	Annual operating & maintenance cost	Total annual cost ($/yr)	Emission reduction (tpy)	Cost-effectiveness ($/ton)
Crane Building							
Unpaved Road Vehicular Traffic	Additional Watering	$3,160,000	$248,219	$813,967	$1,062,186	50.37	$21,086
Paved Road Vehicular Traffic	Street Sweepers	$250,000	$19,638	$22,500	$42,138	2.75	$15,333
Iron Stockpile	Artificial Wind Break	$0	$0	$0	$0	6.31	$0
Finish Mill	Improved Baghouses	$1,442,683	$296,474	$238,756	$535,231	18.26	$29,311
Clinker Cooler	Improved Baghouses	$1,566,489	$365,678	$273,527	$639,206	21.19	$30,165
Quarry Crusher	Improved Baghouses	$379,602	$78,996	$92,350	$171,346	5.92	$28,944

2.5.2 Time Necessary for Compliance

2.5.2.1 Clinker to Overhead Crane Building

2.5.2.1.1 Full Enclosure

There were no cost effective control technologies for this source. CalPortland did provided time necessary for compliance, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.2.2 Unpaved Road Vehicular Traffic

2.5.2.2.1 Additional Watering

There were no cost effective control technologies for this source. CalPortland did provided time necessary for compliance, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.2.3 Paved Road Vehicular Traffic

2.5.2.3.1 Street Sweepers

There were no cost effective control technologies for this source. CalPortland did provided time necessary for compliance, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.2.4 Material Handling

There were no technically feasible control options for the emission source.

2.5.2.5 Iron Stockpile

2.5.2.5.1 Artificial Wind Break

This control method is already in place at CalPortland.

2.5.2.6 Finish Mill

2.5.2.6.1 Improved Baghouses

There were no cost effective control technologies for this source. CalPortland did provided time necessary for compliance, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.2.7 Clinker Cooler

2.5.2.7.1 Improved Baghouses

There were no cost effective control technologies for this source. CalPortland did provided time necessary for compliance, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.2.8 Quarry Crusher

2.5.2.8.1 Improved Baghouses

There were no cost effective control technologies for this source. CalPortland did provided time necessary for compliance, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.2.9 Blasting

There were no technically feasible control options for the emission source.

2.5.3 Energy and Non-Air Quality Environmental Impacts

2.5.3.1 Clinker to Overhead Crane Building

2.5.3.1.1 Full Enclosure

There were no cost effective control technologies for this source. CalPortland did provided an energy and non-air quality impact evaluation, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.3.2 Unpaved Road Vehicular Traffic

2.5.3.2.1 Additional Watering

There were no technically feasible control options for the emission source.

2.5.3.3 Paved Road Vehicular Traffic

2.5.3.3.1 Street Sweepers

There were no cost effective control technologies for this source. CalPortland did provided an energy and non-air quality impact evaluation, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.3.4 Material Handling

There were no technically feasible control options for the emission source.

2.5.3.5 Iron Stockpile

2.5.3.5.1 Artificial Wind Break

There is no energy and non-air quality impacts with implementing the artificial windbreak.

2.5.3.6 Finish Mill

2.5.3.6.1 Improved Baghouses

There were no cost effective control technologies for this source. CalPortland did provided an energy and non-air quality impact evaluation, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.3.7 Clinker Cooler

2.5.3.7.1 Improved Baghouses

There were no cost effective control technologies for this source. CalPortland did provided an energy and non-air quality impact evaluation, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.3.8 Quarry Crusher

2.5.3.8.1 Improved Baghouses

There were no cost effective control technologies for this source. CalPortland did provided an energy and non-air quality impact evaluation, but since no cost effective controls were identified, it was unnecessary for ADEQ to evaluate this factor.

2.5.3.9 Blasting

There were no technically feasible control options for the emission source.

2.5.4 Remaining Useful Life of Source

We consider each source's "remaining useful life" as one element of the overall cost analysis as allowed by the BART Guidelines. In cases where we are not aware of any enforceable shut-down date for a particular source or unit, we use a 20- year amortization period as the remaining useful life per the EPA Cost Control Manual.

2.5.4.1 Clinker to Overhead Crane Building

2.5.4.1.1 Full Enclosure

It is estimated that the source and controls will remain in service for a 20-year amortization period.

2.5.4.2 Unpaved Road Vehicular Traffic

2.5.4.2.1 Additional Watering

It is estimated that the source and controls will remain in service for a 20-year amortization period.

2.5.4.3 Paved Road Vehicular Traffic

2.5.4.3.1 Street Sweepers

It is estimated that the source and controls will remain in service for a 20-year amortization period.

2.5.4.4 Material Handling

There were no technically feasible control options for the emission source.

2.5.4.5 Iron Stockpile

2.5.4.5.1 Artificial Wind Break

This control measure has already been implemented.

2.5.4.6 Finish Mill

2.5.4.6.1 Improved Baghouses

It is estimated that the source and controls will remain in service for a 20-year amortization period.

2.5.4.7 Clinker Cooler

2.5.4.7.1 Improved Baghouses

It is estimated that the source and controls will remain in service for a 20-year amortization period.

2.5.4.8 Quarry Crusher

2.5.4.8.1 Improved Baghouses

It is estimated that the source and controls will remain in service for a 20-year amortization period.

2.5.4.9 Blasting

There were no technically feasible control options for the emission source.