APPENDIX H

Operation & Maintenance (O&M) Plan

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SAC

SUWANNEE
AMERICAN CEMENT
COMPANY

BRANFORD CEMENT PLANT

OPERATION & MAINTENANCE PLAN
Per 40 CFR 63.1347

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SECTION 1 – INTRODUCTION

1.1 Facility Description

Suwannee American Cement (SAC) operates a limestone quarry and a cement production facility in Branford, Florida. Limestone is mined, stockpiled and then mixed with other raw materials which provide an additional source of iron and aluminum, in designed proportions, to produce a ground mixture of kiln feed (or raw meal). The additional raw materials used may include but are not limited to coal ash, bauxite, sand, and mill scale. The kiln feed has sufficient chemical properties to produce clinker when it is subjected to high temperatures of the preheater, precalciner, and rotary kiln. The clinker is produced by the pyroprocessing system. As the clinker is introduced into the finish (grinding) mill a small percentage of additive material, such as gypsum or limestone, are added to produce Portland cement.

1.2 Scope of Operation and Maintenance Plan (O&M Plan)

This purposed and extent of scope of this O&M Plan is to address the requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAP) from the Portland Cement Manufacturing Industry (40 CFR 63 Subpart LLL) section 40 CFR 63.1347. This Section specifies the extent of requirements for SAC to address in the O&M Plan. The language of the rule states:

> *40 CFR 63.1347 Operation and maintenance plan requirements.*
>
> *(a) You must prepare, for each affected source subject to the provisions of this subpart, a written operations and maintenance plan. The plan must be submitted to the Administrator for review and approval as part of the application for a part 70 permit and must include the following information:*
>
> *(1) Procedures for proper operation and maintenance of the affected source and air pollution control devices in order to meet the emissions limits and operating limits, including fugitive dust control measures for open clinker piles, of §§63.1343 through 63.1348. Your operations and maintenance plan must address periods of startup and shutdown;*
>
> *(2) Corrective actions to be taken when required by paragraph §63.1350(f)(3);*
>
> *(3) Procedures to be used during an inspection of the components of the combustion system of each kiln and each in-line kiln raw mill located at the facility at least once per year.*
>
> *[75 FR 55054, Sept. 9, 2010, as amended at 78 FR 10040, Feb. 12, 2013]*

Per 40 CFR 63.1347(a), the potential affected sources at SAC covered by this plan are designated by 40 CFR 63.1340. The list of potential NESHAP sources and the applicable emissions unit in

NESHAP LLL: Descriptions of affected Sources

(1) Each in-line kiln/raw mill
(2) Each clinker cooler

(3) Each raw mill
(4) Each finish mill
(5) Each raw material dryer
(6) Each raw material, clinker, or finished product storage bin
(7) Each conveying system transfer point
(8) Each bagging system; and
(9) Each bulk loading or unloading system.

NOTE: NESHAP emission limits are the same for source types (6) through (9), 10% opacity.

Each affected sources at SAC subject to NESHAP is shown below which are also listed in the current Title V Air Operating Permit No. 1210465-019-AV. The Title V permit will be renewed prior to expiration of the current permit in July, 2015. Because of upcoming revised NESHAP conditions in 2015, this O&M Plan addresses the current and future NESHAP issues related O&M Plan requirements.

Per 40 CFR 63.1347(a)(1), this O&M Plan provides procedures for proper operation and maintenance of each affected source listed above and related air pollution control devices (if present) in order to meet the current and upcoming NESHAP emissions limits and operating limits, including fugitive dust control measures for open clinker piles. NESHAP emission limits and operating limits are listed in 40 CFR 63.1343 through 63.1348. SAC will follow the recommendation of manufacturers but reserves the right to modify the recommended schedule based on experience, technological advancements, or related improved O&M procedures. This O&M Plan addresses periods of startup and shutdown of these NESHAP affected sources. See Section 2. Clinker piles are discussed in Section 6.

Per 40 CFR 63.1347(a)(2), this O&M Plan addresses corrective actions to be taken in case Method 22 VEs, as required by 40 CFR 63.1350(f)(1) and (f)(2), show visible emissions are observed. The corrective actions are required under 40 CFR 63.1350(f)(3). See Section 5.

Per 40 CFR 63.1347(a)(3), this O&M Plan provides procedures to be used during an inspection of the components of the combustion system of each kiln and each in-line kiln raw mill located at the facility at least once per year. See Section 2.

Safety is a critical component of plant operation and maintenance, and is not specifically addressed in this plan. Existing site-specific safety procedures supersede any general guidance within this plan.

Table 1. NESHAP Sources at SAC

E.U. ID No.	TV permit Description (NESHAP affected source Description)	Emission Points
002	Raw material processing operations controlled by baghouses ((6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point)	E-28, E-34, G-07, H-08 & U02-01
003	Raw material processing – unenclosed conveyor transfer points – D conveyors ((6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point)	Fugitive
004	In line kiln/raw mill controlled by baghouse – main stack ((1) Each in-line kiln/raw mill)	E-21
005	Clinker cooler controlled by ESP ((2) Each clinker cooler)	K-15
006	Clinker and cement processing operations controlled by baghouses ((4) Each finish mill (6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point) (8) Each bagging system; and (9) Each bulk loading or unloading system.	L-03,L-06, L-25, M-08, M-09, N-09, N-12, N-36, N-91, Q-14, Q-17, P-03, P-11, & Q-24
007	Clinker and cement processing – unenclosed conveyor transfer points – M conveyors ((6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point) (8) Each bagging system; and (9) Each bulk loading or unloading system.	Fugitive

SECTION 2 – EMISSION UNITS O&M

SAC is subject to NESHAP LLL emission and operation limits for affected sources. The number of affected sources varies within each emissions unit. The emissions units and the affected sources are listed in Table 1. This section categorizes each emissions unit for its current and future emissions and operation limits and the procedures for proper operation and maintenance of each affect source and related APCD, if present.

The NESHAP affected sources in Table 1 were constructed on or prior to December 2, 2005 and are currently subject to the emissions and operations limits as specified in the current Title V permit. SAC has an air construction permit (1210645-032-AC) which includes a new NESHAP source that, when completed, will be a new source for purposes of NESHAP. That air construction permit is to be included in the O&M Plan once the AC permit is completed. The future NESHAP emissions limit and operations limits are addressed for each currently affected source.

2.1 Emissions Unit 002 Raw Materials Processing: Baghouses

E.U. ID No.	Title V Permit Description (NESHAP source Description)	Emission Points
002	Raw material processing operations controlled by baghouses ((6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point)	E-28, E-34, G-07, H-08 & U02-01

Current NESHAP Emission and Operations Limit

pollutant	monitoring	Control Device	Emission or operation limit
opacity	Method 9 M22 1-min monthly/semi-ann/annual	Pulse jet baghouse	10% opacity Visible emissions

Future NESHAP Emission and Operations Limit (begins 9/9/2015)

pollutant	monitoring	Control Device	Emission or operation limit
opacity	Method 9 M22 10-min monthly/semi-ann/annual	PJ baghouse	10% opacity Visible emissions

All affected source equipment is operated and maintained using the guidelines of manufacturers recommendations.

Baghouses are operated and maintained in accordance with Section 3. In order to demonstrate continuous compliance during source startup and shutdown, all air pollution control devices must be operating.

2.2 Emissions Unit 003 Raw Material Processing: Unenclosed

E.U. ID No.	Title V Permit Description (NESHAP source Description)	Emission Points
003	Raw material processing – unenclosed conveyor transfer points – D conveyors ((6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point)	Fugitive

Current NESHAP Emission and Operations Limit

pollutant	monitoring	Control Device	Emission or operations limit
opacity	M22 1-min monthly/semi-ann/annual	None	10% opacity

Future NESHAP Emission and Operations Limit (begins 9/9/2015)

pollutant	monitoring	Control Device	Emission or operations limit
opacity	M22 10-min monthly/semi-ann/annual	None	10% opacity

All affected source equipment is operated and maintained using the guidelines of manufacturers specifications.

Best management Practices for fugitive emissions are described in the Title V permit section, *Emissions of Unconfined Particulate Matter*.

2.2.1 Maintenance of EU003

The following is a checklist of typical inspection and action items for predictive maintenance for the affected sources in this EU.

- ☐ Inspect and adjust all belt conveyors and their skirting rubber and dust seals
- ☐ Replace torn or defective conveyor belts
- ☐ Inspect belt conveyor idlers and nonmoving idlers
- ☐ Remove and replace missing or broken idlers
- ☐ Inspect all belt conveyor training idlers, adjust as necessary
- ☐ Inspect belt scrapers on belt conveyors and adjust, replace worn-out components
- ☐ Inspect all pneumatic lines and pumps for cracks
- ☐ Inspect rubber boots for cracks and tears

2.3 Emissions Unit 004 In-Line Kiln/Raw Mill

E.U. ID No.	Title V Permit Description (NESHAP source Description)	Emission Points
004	In line kiln/raw mill controlled by baghouse – main stack ((1) Each in-line kiln/raw mill)	E-21

Current NESHAP Emission and Operations Limit

	Testing/monitoring	***Control Device***	***Your emissions and operation limits are:***	***And the units of the emissions limit are:***
Existing kiln	*Method 5-annual*	*Reverse Air Baghouse*	*PM 0.3*	*lb/ton feed*
	COM-continous	*Baghouse*	*Opacity 20*	*percent*
	Method 23-30 month/		*D/F[2] 0.2*	*ng/dscm (TEQ) 7% O2*
	Continuous temperature monitoring		*BH inlet temperature set during M23 testing*	*deg F*
	CEMS-continuous	*NA*	*THC[3 4] 50*	*ppmvd 7% O2*

Future NESHAP Emission and Operations Limit (begins 9/9/2015)

	Testing/monitoring	***Control Device***	***Your emissions and operation limits are:***	***And the units of the emissions limit are:***
Existing kiln	*Method 5-annual /PM-CPMS*	*Baghouse*	*PM[1] 0.07*	*lb/ton clinker*
	Method 23-30 month/		*D/F[2] 0.2*	*ng/dscm (TEQ) 7% O2*
	Continuous temperature monitoring		*BH inlet temperature set during M23 testing*	*deg F*
	Hg-CEMs/sorbent trap	*Dust shuttling*	*Hg 55*	*lb/mmton clinker*
	CEMS-continuous	*NA*	*HCl 3*	*ppmvd 7% O2*

	CEMS-continuous	*NA*	*THC[3 4] 24*	*ppmvd 7% O2*

[1]The initial and subsequent PM performance tests are performed using Method 5 or 5I and consist of three 1-hr tests.
[2]If the average temperature at the inlet to the first PM control device (fabric filter or electrostatic precipitator) during the D/F performance test is 400 °F or less this limit is changed to 0.40 ng/dscm (TEQ).
[3]Measured as propane.
[4]Any source subject to the 24 ppmvd THC limit may elect to meet an alternative limit of 12 ppmvd for total organic HAP.

All equipment is operated and maintained using the guidelines of manufacturer's specifications.

In order to demonstrate continuous compliance during startup and shutdown, all air pollution control devices must be operating.

O&M for Emissions Limit PM/opacity and operations limit by CPMS, CPMS after 9/8/15: Baghouses are operated and maintained in accordance with Section 3.

O&M for emissions limit D/F and operations limit by BH inlet Temperature: Baghouse inlet temperature is a surrogate monitor for D/F and is continually monitored as required per 40 CFR 63.1350(g). BH inlet temperature operating limits are established during D/F testing for a temperature limit during raw mill up and one during raw mill down per 40 CFR 63.1349(b)(3). Adjusting kiln conditions to adjust exhaust temperatures and residence times is used to control D/F emissions.

O&M for emission limit THC: THC generates from either organics in fuel or feed. Modifying kiln feed and fuel type input and kiln operations are used to control THC.

O&M for emission limit HCl after 9/8/2015: HCl generates from either chloride in fuel or feed. Modifying kiln feed and fuel type input and kiln operations are used to control HCl. In addition, SAC can use lime injection and SO2 monitoring. SAC has yet to define its HCl compliance method.

O&M for emission limit Hg after 9/8/2015: Hg generates from either fuel or feed. Kiln feed and fuel type input and kiln operations are used to control Hg. A baghouse dust transfer (dust shuttling) system may be used to control Hg emissions by removing kiln baghouse dust which concentrates Hg.

2.3.1 – Kiln Procedures for Startup and Shutdown

Work practices apply per 63.1346(f) during kiln startup and shutdown. The condition 63.1346(f) restricts SAC from using fly ash with high mercury above baseline Hg emissions. This only applies until the HG emission limit must be met.

A Startup is defined as follows under 40 CFR 63.1341 Definitions:

> *Startup means the time from when a shutdown kiln first begins firing fuel until it begins producing clinker. Startup begins when a shutdown kiln turns on the*

induced draft fan and begins firing fuel in the main burner. Startup ends when feed is being continuously introduced into the kiln for at least 120 minutes or when the feed rate exceeds 60 percent of the kiln design limitation rate, whichever occurs first.

SAC's kiln feed limit is 210 [tons/hour dry preheater feed]. Therefore, 60 percent of the kiln feed rate is 126 [tons/hour dry preheater feed].

A Shutdown is defined as follows under 40 CFR 63.1341 Definitions:

Shutdown means the cessation of kiln operation. Shutdown begins when feed to the kiln is halted and ends when continuous kiln rotation ceases.

Additional guidance that is not part of this O&M Plan regarding details of kiln startup and shutdown are found in the appended document, Attachment 1 and 2. These attachments are not part of the O&M Plan.

2.3.2 - Kiln Procedures for Annual Combustion Inspection

An inspection of the components of the combustion system of the in-line kiln raw mill shall be conducted at least once per year. Most items inspected during a traditional annual combustion system inspection are now monitored continuously and automated interlocks are in place to take an associated process down in the event that a critical threshold is exceeded. Interlock systems help to prevent potential operation beyond environmental or equipment thresholds.

All monitoring systems such as thermocouples, pressure transducers, flow meters, level gauges, etc. are all monitored continuously. These devices measure opacity, temperature, pressure, current, carbon monoxide, oxygen, velocity, torque, level, etc.; and they are monitoring both material and gas flows at temperatures typically ranging from 250 deg F to 3000 deg F throughout the combustion process. The monitoring of the process by the control room operator is carried out 24 hours per day 7 days per week all year regardless if the kiln is operating or not. A control room operator is onsite at nearly all times (even during extended outages). Furthermore, all critical process monitoring devices capture the data in real time, are calibrated at planned intervals, and are provided at a minimum in duplicate for real time verification or can be corroborated with other instruments and information available. Also production results are verified against periodic silo and pile inventory surveys, product shipments and product quality results, etc. daily, weekly, monthly and annually. These results are generally kept in a daily production report and inventory data is kept by the financial software SAP. This information is not part of the NESHAP-required annual combustion inspection. The required inspection is shown in the following checklist.

ANNNUAL COMBUSTION SYSTEM INSPECTION ITEMS (40 CFR 63.1347(a)(2))

At a minimum, an inspection includes the following:

- ☐ **Inspect all burners, pilot assemblies, and pilot sensing devices for proper operations; clean pilot flame sensor; as necessary;**
- ☐ **Ensure proper adjustment of primary and secondary combustion air, and adjust as necessary;**
- ☐ **Inspect dampers, fans, and blowers for proper operation;**
- ☐ **Inspect door and door gaskets for proper sealing;**
- ☐ **Inspect motors for proper operation;**
- ☐ **Inspect refractory lining; clean and repair/replace lining as necessary;**
  .
- ☐ **Inspect kiln shell for corrosion and/or hot spots;**
- ☐ **Inspect kiln, preheater, and stack, clean as necessary;**
  .
- ☐ **Inspect fuel supply systems, for proper operation;**
- ☐ **For the burning that follows the inspection, document that the combustion system is operating properly and make any necessary adjustments;**
- ☐ **Inspect gas conditioning systems to ensure proper operation;**
- ☐ **Ensure proper operation of thermocouples;**

2.3.3 - Procedures for Dioxin/Furan (D/F), Particulate Matter (PM), Mercury (Hg), and Hydrochloric Acid (HCl) Testing and Periodic Monitoring

Prior to 9/9/2015, Dioxin/Furan (D/F) and Particulate Matter (PM) emissions are required to be tested periodically and BH inlet temperature and THC are monitored continuously in accordance with 40 CFR 63 Subpart LLL.

After to 9/8/2015, Dioxin/Furan (D/F) and Particulate Matter (PM) emissions are required to be tested periodically. BH inlet temperature, CPMS for PM, HCl (unless lime

injection use per LLL), THC and Hg are monitored continuously in accordance with 40 CFR 63 Subpart LLL. The requirements for monitoring in SAC's Emissions Monitoring Plan are developed in accordance with paragraphs 40 CFR 63.1350 (p)(1) through (p)(4) of this section.

2.3.4 Operation and Maintenance of Air Pollution Control Device

The baghouse is the only APCD used to comply to NESHAP conditions. The filter equipment will be operated and maintained following the guidelines of the manufacturer's recommendations. See Section 3 for details of baghouse O&M.

OPERATIONAL PARAMETERS FOR Kiln BAGHOUSE

Type of control device	**Baghouse**
Stack height (ft)	250
Exit diameter (ft)	9.42
Nominal Stack Flow Rate (kacfm)	225 to 275
Nominal Stack Temperature (^{o} F)	250 to 450
Nominal Percent Water Vapor (%)	10 to 20
Cleaning Type	Reverse Air

2.3.5 Maintenance of Kiln EU004 - Affected Source

The kiln is the main machine in the cement manufacturing process. Kiln repair and maintenance are critical components in assuring the efficiency of the cement manufacturing plant. Maintenance procedures performed according to prescribed instructions will significantly improve the performance of the kiln and increase plant efficiency.

Proper kiln maintenance techniques ensure desirable operating efficiency. Alignment and ovality measurements can help prevent breakdowns. Inspection and maintenance of the clinker cooler are also important.

Vibration analysis and monitoring is a part of the preventive maintenance program. Unplanned maintenance on a continuous process line can result in higher costs per ton of clinker. Vibration analysis identifies potential problems and corrective actions can be initiated to eliminate the influence on the component from other sources, such as imbalance or misalignment.

Predictive maintenance can reduce the systematic replacement of components, regardless of their condition. Individual job requests are initiated when there is evidence that a component is deteriorating. This information is used to determine a plan of action to

carry out repairs at the most convenient time, allowing lead time for planning and ordering of parts, labor resources.

An effective maintenance program looks at the rate of change over a period of time with a set of machinery components, using specific criteria to assess the various individual components that make up a particular machine. Another benefit of predictive maintenance is inventory stock control of mechanical components. The following is a checklist of items for predictive maintenance of the kiln.

- ☐ Inspect preheater system
- ☐ Inspect kiln shell
- ☐ Inspect kiln supports
- ☐ Inspect kiln drive
- ☐ Evaluate alignment and mechanical balance of kiln
- ☐ Inspect kiln lining at regular intervals
- ☐ Check the kiln shell temperature. Special attention must be focused on the covered areas in the burning zone where high surface temperatures may occur
- ☐ The clearance between the kiln shell and kiln riding-rings must be checked at regular intervals

2.4 Emissions Unit 005 Clinker Cooler

E.U. ID No.	Title V Permit Description (NESHAP source Description)	Emission Points
005	Clinker cooler controlled by ESP ((2) Each clinker cooler)	K-15

Current NESHAP Emission and Operations Limit

	Testing/monitoring	***Control Device***	***Your emissions limits are:***	***And the units of the emissions limit are:***
Existing clinker cooler	*COMs*	*ESP*	*PM[1] 0.1* *Opacity 10*	*lb/ton feed* *percent*

Future NESHAP Emission and Operations Limit (begins 9/9/2015)

	Testing/monitoring	***Control Device***	***Your emissions limits are:***	***And the units of the emissions limit are:***
Existing clinker cooler	*Method 5/CPMS*	*ESP*	*PM 0.07* *Operating limit on CPMS**	*lb/ton clinker* *milliamps or equiv.*

* Operating limit established during PM testing

All production equipment is operated and maintained using the guidelines of manufacturers specifications.

In order to demonstrate continuous compliance during startup and shutdown, all air pollution control devices must be operating.

2.4.1 Maintenance of Clinker Cooler EU005 – Affected Source

Inspection and maintenance of the clinker cooler helps to ensure desirable operating efficiency. Vibration analysis and monitoring is a part of the preventive maintenance program. Unplanned maintenance on a continuous process line can result in higher costs per ton of clinker. Vibration analysis identifies potential problems and corrective actions can be initiated to eliminate the influence on the component from other sources, such as imbalance or misalignment.

Predictive maintenance can reduce the systematic replacement of components, regardless of their condition. Individual job requests are initiated when there is evidence that a component is deteriorating. This information is used to determine a plan of action to carry out repairs at the most convenient time, allowing lead time for planning and ordering of parts, labor resources.

An effective predictive maintenance program looks at the rate of change over a period of time with a set of machinery components, using specific criteria to assess the various individual components that make up a particular machine. Another benefit of predictive maintenance is inventory stock control of mechanical components.

2.4.1 – Kiln Procedures for Startup and Shutdown

Work practices apply per 63.1348(b)(9) during cooler startup and shutdown. In order to demonstrate continuous compliance during startup and shutdown, all air pollution control devices must be operating.

Additional guidance that is not part of this O&M Plan regarding details of clinker cooler startup and shutdown are found in the appended document, Attachment 1 and 2. These attachments are not part of the O&M Plan.

2.4.2 Operation and Maintenance of Air Pollution Control Device

The electo-static precipitator (ESP) will be operated and maintained following the guidelines of the manufacturer's recommendation. Attachment 3 provides guidance for additional O&M. Attachment 3 is not part of this NESHAP O&M Plan.

Operators are familiar with startup and shutdown procedures of dust control systems. All dust control systems should be in operation before any processing equipment is started. Certain units are equipped with an alarm to sound when a dust collector stops operating.

OPERATIONAL PARAMETERS FOR ESP

Identification of control device	K-13
Type of control device	ESP
Stack height (ft)	115

Exit diameter (ft)	7.0
Nominal volumetric flow rate (dscfm)	55,000
Nominal Gas temperature (^{o}F)	500
Nominal percent water vapor (%)	8.0

2.5 Emissions Unit 006 Clinker & Cement Processing: Baghouses

E.U. ID No.	Title V Permit Description (NESHAP source Description)	Emission Points
006	Clinker and cement processing operations controlled by baghouses ((4) Each finish mill (6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point, and (9) Each bulk loading or unloading system.)	L-03,L-06, L-25, M-08, M-09, N-09, N-12, N-36, N-91, Q-14, Q-17, P-03, P-11, & Q-24

Current NESHAP Emission and Operations Limit

pollutant	monitoring	Control Device	Emission limit
opacity	Finish mill - COMS All other baghouses M22 1-min monthly/semi-ann/annual	baghouse	10% opacity Visible emissions

Future NESHAP Emission and Operations Limit (begins 9/9/2015)

pollutant	monitoring	Control Device	Emission limit
opacity	Finish mill - COMS All other baghouses M22 10-min monthly/semi-ann/annual	baghouse	10% opacity Visible emissions

All equipment is operated and maintained using the guidelines of manufacturers recommendations.

Baghouses are operated and maintained in accordance with Section 3. In order to demonstrate continuous compliance during startup and shutdown, all air pollution control devices must be operating.

2.6 Emissions Unit 007 Clinker & Cement Processing: Unenclosed

E.U. ID No.	Title V Permit Description (NESHAP source Description)	Emission Points
007	Clinker and cement processing – unenclosed conveyor transfer points – M conveyors ((6) Each raw material, clinker, or finished product storage bin (7) Each conveying system transfer point, and (9) Each bulk loading or unloading system.)	Fugitive

Current NESHAP Emission and Operations Limit

pollutant	monitoring	Control Device	Emission limit
opacity	Method 9 M22 1-min monthly/semi-ann/annual	None	10% opacity Visible emissions

Future NESHAP Emission and Operations Limit (begins 9/9/2015)

pollutant	monitoring	Control Device	Emission limit
opacity	Method 9 M22 10-min monthly/semi-ann/annual	None	10% opacity Visible emissions

All equipment is operated and maintained following the guidelines of manufacturers recommendations.

Best management Practices for fugitive emissions are described in the Title V permit section, *Emissions of Unconfined Particulate Matter.*

2.6.1 Maintenance of EU007

The following is a checklist of typical inspection and action items for predictive maintenance for the affected sources in this EU.

- ☐ Inspect and adjust all belt conveyors and their skirting rubber and dust seals
- ☐ Replace torn or defective conveyor belts
- ☐ Inspect belt conveyor idlers and nonmoving idlers
- ☐ Remove and replace missing or broken idlers
- ☐ Inspect all belt conveyor training idlers, adjust as necessary
- ☐ Inspect belt scrapers on belt conveyors and adjust, replace worn-out components
- ☐ Inspect all pneumatic lines and pumps for cracks
- ☐ Inspect rubber boots for cracks and tears

SECTION 3 – BAGHOUSE OPERATION AND MAINTENANCE PROCEDURES

3.1 – Fabric Filter Dust Collectors (Baghouses)

The facility has several permitted point sources (emission points), the majority of which are fabric filter dust collectors (baghouses). This section applies to the following emission units controlled by dust collectors:

E.U. ID No.	Title V Permit Description	Emission Points
002	Raw material processing operations controlled by baghouses –pulse jet	E-28, E-34, G-07, H-08 & U02-01
004	In line kiln/raw mill controlled by baghouse – main stack – reverse air	E-21
006	Clinker and cement processing operations controlled by baghouses – pulse jet	L-03,L-06, L-25, M-08, M-09, N-09, N-12, N-36, N-91, Q-14, Q-17, P-03, P-11, & Q-24

This program has been established based on manufacturer's suggested maintenance and the process experience of SAC personnel.

3.1.1 Baghouse (Dust Collector) Operating Principle

Baghouses work on the simple principle of filtration and they are mechanically straightforward in design. As the gas stream passes through the baghouse, a clean side and a dirty side is established as the gas filters through the bag. Conceptually, baghouses operate with a "clean side" and a "dirty side" in terms of air handling. Keeping them separate will ensure that unit will perform up to its maximum efficiency. Baghouses have a typical collection efficiency of 99+%. The dirty side of the bag is the side exposed to the gas stream as it enters the unit and the clean side is the side of the bag exposed to the gas stream, as it exits the unit. The filtered/clean air is discharged to the atmosphere.

As the dust-laden gas enters the unit, the gas stream slows down and a baffle causes dispersion of the particles and turbulence in the gas stream. Larger particles will settle out due to velocity reduction, impingement, and directional changes. The finer dust particles will follow the gas stream and impact on the filter bag outer-surface of the pulse jet units and on the inner-surface of the reverse air unit. The primary and most efficient filtering of the gas stream is accomplished by a thin dust coating on the surface of the bag, not the bag itself. For this reason, new filter bags can initially have an excess emission or "bleed-through" of sub-micron size particles if proper start-up procedures are not used. However, this bleed-through will decrease as a dust cake is formed on the filtering surface of the bag. This thin layer of dust cake will not, and should not, be

removed during the normal cleaning process. Excessive cleaning may partially remove this dust cake and cause bleed-through of sub-micron size particles.

The filter bags are cleaned by one of two methods, pulse jet or reverse flow. All of the baghouses in the facility are pulse jet type except for the kiln/raw mill baghouse. The kiln/raw mill baghouse uses reverse air flow to clean the bags. The pulse jet type units clean the bags by allowing a jet of compressed air to blow into a tube (blow tube) with outlet holes that are centered above each bag in the row of bags along the tube. The jet of air enters the bag through a venturi, which increases the speed of the air. As the jet of air expands, it flexes the surface of the bag as it flows down the length of the bag causing accumulated dust to fall away. There is some additional cleaning of dust-laden surfaces caused by the sonic and ultrasonic sound produced by the jet of compressed air. The compressed air is supplied through a header and blow tubes along each row of bags. The blow tube/header connection has a diaphragm that controls the release of compressed air into each blow tube, via a timer. The on and off time of the cleaning cycles and the duration of the pulse jet for each row of bags, is controlled by a timer and solenoids. This method of cleaning is continuous and only the row(s) being cleaned are momentarily offline.

The kiln/raw mill baghouse is a reverse air unit and removes dust from the gas stream using the same principles mentioned above, however, the dust is collected on the inner surface of the filter bags. This unit is made up of eight individual compartments that can be mechanically isolated from the flow of the gas stream when the bags are cleaned. On a timed and sequenced basis each compartment is cleaned using dampers to isolate the compartment and reversing the direction of the airflow through the compartmental bags. The cleaning operation begins with the closing of the compartment outlet damper. This stops the flow of gases into/through the compartment. Next, the reverse air damper is opened and the reverse air re-circulation damper closes and the bags are subjected to a reverse flow (clean-side to dirty-side), supplied by the reverse air fan. The reverse air flow causes a partial collapse/flexing of the bags to remove the accumulated dust cake. After a few seconds, the reverse air damper closes and a null period (no air flow) begins. During this time both the outlet and reverse dampers are closed. The null period allows entrained or suspended dust particles to settle into the compartment hopper. This process is completed for all eight (8) compartments. Following the null period a soft re-infiltration period is initiated, where the compartment is slowly brought back on line by opening the outlet damper very slowly. When a compartment is cleaned it is off-line and this removes a significant amount of cloth area from the gas filtering process for a short period of time. Therefore, this type unit is designed to operate with essentially excess available cloth area when all eight compartments are on line, so that when a compartment is taken off-line for cleaning there is sufficient cloth area remaining to control emissions. Due to the available cloth area, for all 8 compartments, this unit will operate as designed to control emissions with one or two compartments off-line for an extended period.

3.1.2 Cleaning Cycle

The cleaning cycle is very important to the effectiveness of a dust collector. If the bags of a dust collector are not periodically cleaned, the dust collector will gradually lose its ability to capture emissions as the air flow through the system decreases. All of the baghouses at the facility are self-cleaning, pulse jet and reverse air. Through this self-cleaning capability, the equipment is able to operate continuously, without losing collection efficiency, because, only a row or a limited number of rows at any given time in the pulsejet units and one compartment in the reverse flow unit are off-line. When the cleaning cycle is initiated on a pulse jet unit, the pulse valve of one or more rows opens to inject a short blast of compressed air through blow tubes, along the row of bags and down into the bags from the clean side. This pulse of compressed air sends shock waves along the length of the filter bag surfaces, flexing and expanding each bag to break loose accumulated dust on the outer surface. The duration of this pulse is extremely brief, typically less than 100 milliseconds.

The frequency in which the cleaning cycle is repeated is a function of settings made at the timer and of the external controls connected to the timer. The total time that is required to clean a complete dust collector is dependent upon the number of rows in the baghouse and the time interval between the cleaning of each row(s). The frequency of cleaning for the bags will be a function of the air volume, process conditions, characteristics of dust, grain loading, material density, and bag wear. After the baghouse has operated, with factory settings, in its normal environment, the differential pressure gauge (Magnehelic or Photohelic) should be observed for correct pressure drop. The timer on/off setting may be adjusted as necessary to obtain the desired results. A typical range of operating pressure drop is two (2") inches to ten (l0") inches across the baghouse. However, there are many process variables that may cause the baghouse to operate outside this range and still effectively control emissions.

3.1.3 Timer/Controls

The function of the timer is (1) to automatically sequence the cleaning of the rows in the pulse jet dust collector or compartments of the reverse unit, (2) to control the time period that a pulse valve or damper is open, and (3) to control the time interval between cleaning events. In performing this function, the timer activates the solenoid(s), which control a pulse valve or damper on a predetermined time period. The timer can be connected to operate in either of two modes: on a continuously cycling basis (standard), or in conjunction with a differential pressure switch. In the first mode, the timer operates on predefined cycle, continuously, as long as power is applied to the timer. The cleaning cycle progresses from one row, group of rows, or compartment to the next until the entire collector (all bags) has been cleaned.

In the second mode the cleaning cycle is controlled by a differential pressure switch (photohelic), the timer is started whenever the pressure drop across the dust collector exceeds a preset value. The switch is wired to the timer, and when the high differential

pressure contacts close, the timer starts the cleaning cycle. The cleaning cycle will continue until the differential pressure across the baghouse is sufficiently reduced.

The differential pressure switch measures and provides a visual indication of the pressure drop across the dust collector. It is used, in conjunction with a timer, to establish the intervals in the cleaning cycle so that the optimum combination of cleaning frequency and pressure differential can be achieved.

Pressure differential taps for the connections for either gauge, negative and positive are located directly may be the first signal of operational problems. The Magnehelic gauge is an indicator only; it has no capacity to control the operation of the timer/cleaning cycle.

3.1.4 Pulse Valve

The pulse valve, of a pulse jet baghouse, introduces the blast of compressed air through the blow tube and into the clean air side of the bags to dislodge the dust from the outer surface of the bags. The timer determines on/off cycling of the valve and the duration of the pulse. The pulse valve is an internally ported diaphragm valve. Control air acts on the larger, upper surface of the diaphragm to keep the valve closed against the air from the compressed air manifold. When the solenoid is energized, the control air on the topside of the valve is vented to the atmosphere and the force is no longer sufficient to hold the valve closed against the air acting from below. The diaphragm is forced to the open position and the air blasts through the valve into the blow tube. When the timer de-energizes the solenoid, the topside of the valve is no longer vented, so the force immediately builds sufficiently to close the diaphragm and stop the flow of compressed air through the valve. The operation takes place in a fraction of a second. Solenoid valves may be remotely located in a common junction box or boxes, or integrally mounted to the diaphragm valves.

3.1.5 Compressed Air Header

The function of the compressed air header is to distribute an adequate supply of compressed air to the pulse valves. The header for each unit has been designed to be compatible in size with the compressed air demand for each unit and is located as close as possible to the pulse valves to minimize the pressure drop from the header to the points of use. The air header is equipped with a pressure gauge and a drain valve.

3.1.6 Blowtube

The blowtube is a length of pipe located at the discharge side of the pulse valve/air header, centered above a row of bags, with orifice holes spaced equally along the underside of the pipe at the approximate center of each bag. When the pulse valve diaphragm opens, a surge of compressed air is expelled into the blowtube and discharges through the orifice holes at high velocities. This high velocity air from each orifice sets up an induced secondary airflow as it passes through the venturi. The airflow into the bag causes a combination of an instantaneous shock wave and reverse air flow down the

length of the bag, releasing the collected dust. In a top-access dust collector, the blowtubes are removable to permit installation or removal of the filter bags and cages.

3.1.7 Initial Baghouse Start-Up (With New Filter Bags)

After an inspection of the baghouse system has verified that all bags are installed, covers, doors, access hatches are in place, the compressed air supplied is on and the ID (induced draft) is operable; the APCD start-up sequence may begin. The baghouse material handling devices should be started first.

During the start-up sequence the timer should be turned off until desired pressure drop is achieved and the unit is operating at the expected flow rate. If the bags have been pre-coated, or if the bags do not require a pre-coating to function properly, the baghouse system would not require any stepped sequence for start-up other than those associated with process/operation start-up sequence.

3.1.8 Baghouse Shut Down Sequence

The shut down sequence is the reverse of the start-up. The process/material flow should be shut down first and the baghouse system is shut down last. Under a controlled shut down, when the potential for process emissions have sufficiently diminished the baghouse should be allowed to run, with the cleaning cycle turned off, for approximately one (1) hour, where the system is venting an operation that has the potential to produce a steam plume, and approximately 15-minutes on other units. This will allow the system sufficient time to evacuate any moisture laden gases that may cause condensation and possible bag damage and increased pressure drop at start-up. Prior to final shut down, make sure that the bags are cleaned and the hopper and conveying devices are emptied, if practical.

3.1.9 Filter Bag Replacement

Filter bags, may have a useful life of one (1) to five (5) years.. Bag wear is usually gradual and through routine inspections expected bag life for specific baghouse units can be established. Premature bag failure is usually attributable to either chemical attack, degradation due to high temperature, physical damage or imperfection in the bag material. Abnormal wear can be caused by a number of factors. It may be due to very abrasive materials, excessive cleaning, or incorrect fabric type. Operating a baghouse with broken/failed bags can cause excess emissions into the atmosphere, it will also cause abrading/failure of adjacent bags and may damage the ID fan. Once the expected bag life of each unit has been determined, through operating experience, the bags in the units can be changed out on a predetermined schedule to minimize the potential of bag failure due to age alone. Prior to a scheduled bag change out of a unit, damaged or broken bags will be changed/replaced as needed.

Established safety precautions should always be taken during the replacement of bags and/or baghouse entry. Precautions must be taken to minimize employee exposure to

potential hazards with routine energy isolation, as required, and personal protective equipment.

Pulse Jet Baghouse - Bag Replacement

The pulse jet baghouses have top entry/access for the inspection and/or replacement of filter bags. Visible emissions from the baghouse vent fan are a sign of bag leakage. To inspect for the source of bag leakage or bag replacement, the doors/covers at the access point of the unit must be opened or removed for access to the bags.

To remove and/or replace a bag the blowtube must be removed. When a bag is replaced, care must be taken to insure that the bag collar is properly seated in the tube sheet to prevent dust leaks during operation. In the pulse jet units, the edge of opening in the tube sheet must fit firmly into the groove in the bag collar. Each bag is seated in the tubesheet by a snap ring that is sewn into the bag collar. This snap ring must be flexed inward to remove or replace a bag in the pulse jet units. The bag cage for the pulse jet units, which keeps the bag from collapsing, has a built in venturi. The cage must be removed to replace the bag. When a bag is installed, the bag is inserted into the hole of the tube sheet and slowly fed down until the collar of the bag is at the tube sheet opening. The new bag is flat when it is unrolled and should be folded together, to minimize scraping the surface of the bag on the edges of the tube sheet opening, as you feed it into the hole. When the collar of the bag reaches the tube sheet, flex the snap ring inward to allow the collar to fit into the hole, however, you should always set the seam of the bag against the tube sheet when the snap ring is flexed. The snap ring has a small groove that must mate with the edge of the tubesheet as you release the flex in the snap ring. The collar of the bag must fit snugly against the entire circumference of the tube sheet opening; if not the dirty air will leak through to the clean air side/plenum. The snap ring-tubesheet interface is the dirty air seal between the baghouse interior and the clean air plenum. If the snap ring does not fit snugly against the tubesheet (has a small bulge in the snap ring), tap on the inside surface of the snap ring with your hand or a small rubber mallet to force the snap ring against the tube sheet.

After the bag(s) is installed and properly seated in the tube sheet, the cage may be inserted into the bag. If the cage is difficult to fit into the bag it is likely that the snap ring is not properly seated and the opening at the bag collar is too small for the cage to fit. When the cage is installed, lower the cage gently into the bag until the flange of the cage is in contact with the tube sheet. In the reverse airflow unit, the snap ring/collar of the bag fits over the stub-ups in the tube sheet.

Reverse Air Bag House - Bag Replacement

The reverse-flow baghouse has side entry doors and walk-in plenums for the inspection and/or replacement of bags. To inspect for bag leakage or bag replacement the door(s) and/or cover(s), the access point of the unit must be opened or removed. In the reverse airflow unit, the groove in the bag collar must fit firmly in the convex ring of the thimbles of the tube sheet and secured in place with a strap clamp. The other end of the bag, with

the J-hook, is attached to the hanger spring assembly suspended from the bar grating at the top of the plenum. The bag should be attached to the thimble first and then the other end of the bag should be hoisted up and attached to the hanger assembly. A bag tension tool should be used to set adequate tension. New bags need to be re-tensioned after initial operation.

The units should be checked periodically for performance and operation effectiveness. A zero Delta P reading on an operating baghouse may be an indication of a plugged line, typically on the dirty side of the baghouse, the upstream or underside of the tube sheet. When both lines are clear, and the gauge is operating normally, there will be a slight positive deflection in the reading each time a row is cleaned/pulsed, or as a compartment is taken offline in the reverse-flow unit.

During the inspection, also check the pressure at the compressed air header, bleed/drain the compressed air header, and verify that the hopper is empty. Hoppers without an indicator level must be sounded by tapping on the hopper/access door with a metal object to determine the presence or buildup of material. If the unit is insulated you may sound the area of the hopper discharge, screw conveyor inlet point, or check the flop gates (where applicable).

3.1.10 Periodic Baghouse Inspections

Periodic baghouse inspections should inspect the following

- Inspect for Leaks
    - Access doors/hatches
    - Air lines & fittings
- Verify operation of:
    - rotary airlocks,
    - screw conveyor or other associated dust removal devices
    - solenoid valves
    - vent fan

. Since these are typically enclosed systems, check to see that the airlock/motor is turning and the tilt or flop gates are allowing material movement from the hopper.

- Check motor amps and/or temperature
- Check pressure drop across filter media

More thorough inspections are recommended to include:

- leaks and/or corrosion of the housing (interior and exterior);
- for material build up and deterioration;
- condition of bags;
- alignment of blowpipe, poppet valves, dampers;
- the condition and tension of drive belts on the fan and material removal devices;
- verify the cleaning cycle of the baghouse (i.e., is each solenoid firing and is each row or compartment in the unit is being cleaned); and
- perform a general check of the baghouse support structure, access ladders/cages, and the platforms/baghouse roof, and the handrails.

3.1.11 Visible Emission/Opacity

A baghouse system will usually lack sufficient moisture/water vapor to cause a steam plume and should otherwise have virtually no VE from the baghouse discharge point. However, even with low moisture of the hot stack gases, there can be a detached steam plume during ambient conditions of cold temperature and sufficient humidity. Otherwise, the baghouse discharge will remain clear (no VE) unless there is a failure in the filter medium or a leak occurs between the clean and dirty sides of the unit.

NESHAP periodic monitoring required for baghouses is in Section 5.

3.1.12 Troubleshooting (Quick Reference) other than per 40 CFR 63.1350(f)(3)

In addition to corrective actions required in 40 CFR 63.1350(f)(3), the following tips for trouble shooting are provided. The main indicator of potential baghouse problems is the Magnehelic (differential pressure) gauge. Depending on factors such as grain loading, gas temperature, and air-to-cloth ratio, the operating range for pressure drop across the unit will typically be two (2) to six (6) inches of water. In most cases a pressure outside this range will be an indication that an operational problem exists. However, a baghouse with new bags or very low grain loading may have a differential pressure of less than one (1). The following is a brief summary of items or condition to check, as applicable, when a baghouse is not functioning as it should.

A. Excessive Pressure Drop:

- Check the line connections at the differential pressure gauge and at the baghouse. Clean out the lines by blowing compressed air through the lines.
- Check the timer for proper operation/initiation of the cleaning cycle(s).
- Check compressed air header for correct pressure (80 to 100 PSI).
- Check solenoid valves for function and sequencing
- Check for loose wiring
- Check for dirt in solenoid valve
- Check diaphragm valve for dirt or ruptured diaphragm
- Check for excessive moisture in the compressed air system or in the gas steam from condensation or ambient sources (rain or high humidity).
- Check the temperature of the baghouse. Operating below the dew point of the gas stream will cause condensation.

B. Extremely Low Pressure Drop

- Check the line connections at the differential pressure gauge and at the baghouse.
- Clean out the lines by blowing compressed air through the lines.
- Check the fan for proper operation and flow

- Check for leaks in the system, particularly on the clean airside. If the VE on the stack/exit point is in question or excessive, there may be broken bag(s) in the unit or improperly installed bags.

Check bags for proper installation and or broken bags. Ensure that dust spilled on the clean side during maintenance of the baghouse is cleaned up or swept into the dirty side of the baghouse before the last bag is installed.

SECTION 4 – EPA METHOD 22, NESHAP PERIODIC MONITORING

4.1 - Applicability of Periodic Visible Emission Monitoring

The following emission units are subject to the Method 22 periodic monitoring requirements of 40 CFR 63 Subpart LLL

E.U. ID No.	Title V Permit Description	Emission Points
002	Raw material processing operations controlled by baghouses	E-28, E-34, G-07, H-08 & U02-01
003	Raw material processing – unenclosed conveyor transfer points – D conveyors	Fugitive
006	Clinker and cement processing operations controlled by baghouses	L-03,L-06, L-25, M-08, M-09, N-09, N-12, N-36, N-91, Q-14, Q-17, P-03, P-11, & Q-24
007	Clinker and cement processing – unenclosed conveyor transfer points – M conveyors	Fugitive

4.2 - Procedures for Periodic Visible Emission Monitoring

Current Periodic Visible Emission Monitoring

40 CFR 63.1450(a) (4)(i) The owner or operator must conduct a monthly 1-minute visible emissions test of each affected source in accordance with Method 22 of Appendix A to part 60 of this chapter. The test must be conducted while the affected source is in operation.

(a)(4)(ii) If no visible emissions are observed in six consecutive monthly tests for any affected source, the owner or operator may decrease the frequency of testing from monthly to semi-annually for that affected source. If visible emissions are observed during any semi-annual test, the owner or operator must resume testing of that affected source on a monthly basis and maintain that schedule until no visible emissions are observed in six consecutive monthly tests.

(a)(4)(iii) If no visible emissions are observed during the semi-annual test for any affected source, the owner or operator may decrease the frequency of testing from semi-annually to annually for that affected source. If visible emissions are observed during any annual test, the owner or operator must resume testing of that affected source on a monthly basis and maintain that schedule until no visible emissions are observed in six consecutive monthly tests.

(a)(4)(iv) If visible emissions are observed during any Method 22 test, the owner or operator must conduct a 6-minute test of opacity in accordance with Method 9 of appendix A to part 60 of this chapter. The Method 9 test must begin within one hour of any observation of visible emissions.

(a)(4)(v) The requirement to conduct Method 22 visible emissions monitoring under this paragraph shall not apply to any totally enclosed conveying system transfer point, regardless of the location of the transfer point. ``Totally enclosed conveying system transfer point'' shall mean a conveying system transfer point that is enclosed on all sides, top, and bottom. The enclosures for these transfer points shall be operated and maintained as total enclosures on a continuing basis in accordance with the facility operations and maintenance plan.

(a)(4)(vi) If any partially enclosed or unenclosed conveying system transfer point is located in a building, the owner or operator of the portland cement plant shall have the option to conduct a Method 22 visible emissions monitoring test according to the requirements of paragraphs (a)(4)(i) through (iv) of this section for each such conveying system transfer point located within the building, or for the building itself, according to paragraph (a)(4)(vii) of this section.

(a)(4)(vii) If visible emissions from a building are monitored, the requirements of paragraphs (a)(4)(i) through (iv) of this section apply to the monitoring of the building, and you must also test visible emissions from each side, roof and vent of the building for at least 1 minute. The test must be conducted under normal operating conditions.

After 9/8/2015 Periodic Visible Emission Monitoring

The applicable Method 22 procedures beginning in 2015 for existing affected sources. All of the affected sources are existing per NESHAP.

(f) Opacity monitoring requirements. If you are subject to a limitation on opacity under §63.1345, you must conduct required opacity monitoring in accordance with the provisions of paragraphs (f)(1)(i) through (vii) of this section and in accordance with your monitoring plan developed under §63.1350(p). You must also develop an opacity monitoring plan in accordance with paragraphs (p)(1) through (4) and paragraph (o)(5), if applicable, of this section.

(1)(i) You must conduct a monthly 10-minute visible emissions test of each affected source in accordance with Method 22 of appendix A-7 to part 60 of this chapter. The performance test must be conducted while the affected source is in operation.

(ii) If no visible emissions are observed in six consecutive monthly tests for any affected source, the owner or operator may decrease the frequency of performance testing from monthly to semi-annually for that affected source. If visible emissions are observed during any semi-annual test, you must resume performance testing of that affected source on a monthly basis and maintain that schedule until no visible emissions are observed in six consecutive monthly tests.

(iii) If no visible emissions are observed during the semi-annual test for any affected source, you may decrease the frequency of performance testing from semi-annually to annually for that affected source. If visible emissions are observed during any annual performance test, the owner or operator must resume performance testing of that affected source on a monthly basis and maintain that schedule until no visible emissions are observed in six consecutive monthly tests.

(iv) If visible emissions are observed during any Method 22 performance test, of appendix A-7 to part 60 of this chapter, you must conduct 30 minutes of opacity observations, recorded at 15-second intervals, in accordance with Method 9 of appendix A-4 to part 60 of this chapter. The Method 9 performance test, of appendix A-4 to part 60 of this chapter, must begin within 1 hour of any observation of visible emissions.

(v) Any totally enclosed conveying system transfer point, regardless of the location of the transfer point is not required to conduct Method 22 visible emissions monitoring under this paragraph. The enclosures for these transfer points must be operated and maintained as total enclosures on a continuing basis in accordance with the facility operations and maintenance plan.

(vi) If any partially enclosed or unenclosed conveying system transfer point is located in a building, you must conduct a Method 22 performance test, of appendix A-7 to part 60 of this chapter, according to the requirements of paragraphs (f)(1)(i) through (iv) of this section for each such conveying system transfer point located within the building, or for the building itself, according to paragraph (f)(1)(vii) of this section.

(vii) If visible emissions from a building are monitored, the requirements of paragraphs (f)(1)(i) through (f)(1)(iv) of this section apply to the monitoring of the building, and you must also test visible emissions from each side, roof, and vent of the building for at least 10 minutes.

SECTION 5 – CORRECTIVE ACTIONS

Corrective Actions are provided to address potential problems of equipment to comply to the NESHAP emissions limits and operations limits. The section is divided into actions that could impact each emissions or operation limit.

5.1 Corrective actions to be taken in the event Method 22 visible emissions

NESHAP requires corrective actions be made for Method 22 observations per 40 CFR 63.1350(f)(3) for all potential malfunctions that cause observe visible emissions when conducting EPA Method 22 periodic monitoring. These corrective actions must be initiated within one hour of the observed visible emissions by Method 22.

When a unit is out of compliance, to initiate corrective actions per 40 CFR 63.1350(f)(3), it should be taken offline within one (1) hour , where process conditions allow.

Reverse Jet Baghouse Bag Failure

The main baghouse (E-21) controls particulate matter emissions from the kiln & in-line raw mill (EU-004) and is a reverse jet baghouse. It has a series of compartments that contain fabric filters that are suspended from the ceiling and held in tension supported at the bottom by a clamp to a tube sheet. Occasionally these bags can fail in various ways , but most commonly holes or a loosening or slipping off of the tube sheet. Typically the bag life for this type of baghouse is longer (3 to 6 years) due to the gentler cleaning cycles. However, with over 1,400 bags the potential for bag failure is prevalent.

The main baghouse is continuously monitored for dust emissions, and a trip warning is provided to the operator in the event of excess dust emssions. This trip warning provides some time (approximately 5 minutes) to allow the operator to identify and attempt to isolate the compartment in the baghouse for repairs while maintaining operations. However, if the compartment cannot be isolated in time the kiln is interlocked to shut down the system and stop feed to the kiln.

Pulse Jet Baghouse Bag Failure

Below is a list of pulse jet baghouses at SAC subject to 40 CFR 63 Subpart LLL:

E.U. ID No.	Title V Permit Description	Emission Points
002	Raw material processing operations controlled by baghouses	E-28, E-34, G-07, H-08 & U02-01
006	Clinker and cement processing operations controlled by baghouses	L-03,L-06, L-25, M-08, M-09, N-09, N-12, N-36, N-91, Q-14, Q-17, P-03, P-11, & Q-24
008	Coal mill and coal transfer system controlled by baghouses	S-17 East & S-17 West (combined vent), S-21

With the top entry type baghouses, the general area of the bag(s) failure may be determined, relatively quickly, by a visual inspection of the tube sheet. The area of the failure may be indicated by an unusual accumulation of dust on the tube sheet. This inspection in the kiln/raw mill baghouse will take longer to initiate due to the interior temperature of the unit. Failures that produce opacity in the 5% range may not be easily detected with a visual inspection of the tubesheet. It may be necessary to use trace dye and black light to pinpoint small bag leaks. The trace dye must be introduced into the baghouse, upstream of the unit, while it is in operation (see trace dye instructions). For best results, the recommended quantity of trace dye is approximately 0.1 pounds (lb) for every 100 square feet of filter cloth. After introducing the trace dye initiate the associated process shut down. When process emissions are minimized the baghouse can be shut down to perform an inspectionof the clean side of the tubesheet, using the black light. With the black light you may see traces of the dye over a significant area if the bag leak is a large one. However, by shining the black light into the bags or along the bag surface, the bag (s) with the leak/hole will have substantial coating/glow from the trace dye and will be highlighted by the trace dye. When the bag(s)/cage(s) with the indicated leak have been removed, any accumulated dust near the tubesheet cell opening should be pushed into the opening(s) or otherwise removed. After the bags are replaced any accumulated dust in the plenum should be cleaned or vacuumed up. Be sure to remove old bags and any other objects and materials used during the bag change out to avoid the potential of something being pulled into the fan or plugging material outlets. Before the doors are closed make sure that the seal areas for the doors are free of dust build up and channels between door areas are cleaned.

With the bags replaced and the clean up activities completed the baghouse may be closed. Be sure to tighten all of the turn hold-downs for the doors and covers. When the baghouse is brought back on line the doors should be checked for signs of leakage. When the process is back on line, allow the system to run approximately one (1) hour, if the unit is not obviously out of compliance, to allow the new bags to become coated and to also clear out any remaining dust, from the initial leak, downstream of the baghouse. At this point, if the opacity at the baghouse exit is not continuously greater than 5% you should then conduct a ten-(10) minute VE observation. If there are no visible dust emissions no further action is needed. Repeat corrective measures if dust emissions are visible.

5.2 Corrective action to be taken in the event of high THC

High readings of THC are indications that either fuel/feed organic content has increased or that the combustion process has been altered to limit complete combustion. Inadequate combustion air can result from various scenarios identified below, but are not limited to these:

- Fuel starvation
- Fuel surging
- Unexpected material chemistry or process reaction changes
- Feed material plug ups or starvations
- Equipment failures

- Process monitoring equipment malfunction (temperature, pressure, CO, etc.)

Fuel starvation or surging, material plug ups or starvations, equipment failures, or process monitoring equipment malfunction event corrective actions:

If possible, adjust fuel and feed or switch to a different fuel to regain control of the system. If the problems persist, or if it cannot be adjusted to control the system; shut the kiln down and restart after taking corrective action if needed.

5.3 Corrective action to be taken in the event of high Hg after 9/8/2015

High readings of Hg are indications that either the feed or fuel is increased in Hg content or that dust shuttling is not working correctly. If possible, adjust fuel and feed or switch to a different fuel to regain control of the system. Review raw material chemistries, increase frequency of raw material and kiln feed samples, ensure proper burn zone conditions, and adjust raw materials. Try to identify the source of the unexpected chemistry or process reaction change event. If the unexpected material chemistry or process reaction event is causing an excess emission condition, ensure that the appropriate sorbent injection systems such as: Hydrated Lime Injection (HLI) are operating. If the excess emission condition persists, the operator should consider to shut the kiln and raw mill down within one hour and take appropriate corrective actions to avoid a reportable event. Identify the raw material or fuel or conditions causing chemical imbalance, remove those materials from system (if possible), and correct conditions. Consider notifying the Department prior to start up after such an event if the excess emission condition is likely to persist.

5.4 Corrective action to be taken in the event of high D/F

In the event of high readings of D/F results from Method 23 stack testing, SAC must take a steps to reduce D/F emissions which include reviewing temperature data and residence time data. Typical causes of high D/F readings are due to erratic kiln combustion. Exhaust flow can be modified using dampers in the ductwork. the GCT can be used to cool the exhaust gas.

5.5 Corrective action to be taken in the event of high HCl after 9/8/2015

Review raw material chemistries, increase frequency of raw material and kiln feed samples, ensure proper burn zone conditions, and adjust raw materials. Try to identify the source of the unexpected chemistry or process reaction change event. If the unexpected material chemistry or process reaction event is causing an excess emission condition, ensure that the appropriate sorbent injection systems such as: Hydrated Lime Injection (HLI), Gas Conditioning Tower (GCT) are operating. If the excess emission condition persists, the operator should considered to shut the kiln and raw mill down within one hour and take appropriate corrective actions to avoid a reportable event. Identify the raw material or fuel or conditions causing chemical imbalance, remove those

materials from system (if possible), and correct conditions. Consider notifying the Department prior to start up after such an event if the excess emission condition is likely to persist.

SECTION 6 – CLINKER PILES

The compliance date for open clinker storage piles at SAC is February 12, 2014. *Open clinker storage pile* means a clinker storage pile on the ground for more than three days that is not completely enclosed in a building or structure. A pile is defined as greater than 500 tons.

(a) Open clinker storage pile. The owner or operator of an open clinker storage pile must prepare, and operate in accordance with, the fugitive dust emissions control measures, described in their operation and maintenance plan (see §63.1347 of this subpart), that is appropriate for the site conditions as specified in paragraphs (c)(1) through (3) of this section. The operation and maintenance plan must also describe the measures that will be used to minimize fugitive dust emissions from piles of clinker, such as accidental spillage, that are not part of open clinker storage piles.

(1) The operation and maintenance plan must identify and describe the location of each current or future open clinker storage pile and the fugitive dust emissions control measures the owner or operator will use to minimize fugitive dust emissions from each open clinker storage pile.

Currently there are no open clinker piles at SAC.

(2) For open clinker storage piles, the operations and maintenance plan must specify that one or more of the following control measures will be used to minimize to the greatest extent practicable fugitive dust from open clinker storage piles:

a) Locating the source inside a partial enclosure,
b) *installing and operating a water spray or fogging system,* **(most appropriate)**
c) applying appropriate chemical dust suppression agents,
d) use of a wind barrier,
e) compaction,
f) use of tarpaulin or other equally effective cover or
g) use of a vegetative cover.

You must select, for inclusion in the operations and maintenance plan, the fugitive dust control measure or measures listed in this paragraph that are most appropriate for site conditions. The plan must also explain how the measure or measures selected are applicable and appropriate for site conditions. In addition, the plan must be revised as needed to reflect any changing conditions at the source.

SAC believes that water spray systems will be the most appropriate control given the readily available amount of water, all water is stored on site and the resulting shell on clinker piles forms a near solid surface that has extremely low fugitive emissions.

h) Temporary piles of clinker that result from accidental spillage or clinker storage cleaning operations must be cleaned up within 3 days.

[78 FR 10037, Feb. 12, 2013]

ATTACHMENT 1: IN-LINE KILN/RAW MILL/CLINKER COOLER STARTUP PROCEDURES

Kiln Startup Procedures

It is important that ignition be achieved as soon as fuel is injected and, if the flame fails during warm-up, the kiln should be purged with 5 times the volume of kiln, preheater, ducting, and dust collector before re-ignition is attempted. Volatile hydrocarbons accumulate rapidly in the kiln and, if then re-ignited, will potentially explode.

Warm-up follows agreement by production and maintenance management that all work is completed, that all tools and materials have been removed and that all doors are closed. Work may, with discretion, continue in the cooler during warm-up but no workers should remain in the cooler at the time of ignition.

Commonly, warm-up from cold takes 24 hours from ignition to feed-on, but may be increased if extensive refractory work requires curing. The introduction of feed (usually at 30% to 40% of full rate), and the increase of fuel, speed and feed to normal operation can take an additional eight (8) hours from feed-on. The ID fan should be operated at approximately 10% O_2 at the back of the kiln to feed-on whereupon the normal O_2 target is adopted.

For coal fired kilns, warm-up uses gas or oil with switch-over to coal at the time of feed-on. If the coal mill uses hot gas from the cooler, there may be a delay before heat is available from clinker.

Prior to beginning to bring the kiln on-line, the kiln/raw mill I.D. fan and baghouse are powered to normal operating conditions. The kiln is then preheated with start up fuel for a period of up to 24-36 hours; depending upon how long the kiln has been shut down.

Once the kiln is sufficiently hot and while still firing start up fuel, raw meal feed is fed to the preheater at about 30-40 percent of normal feed rate. This material will coat the kiln and will produce clinker that is discharged to the clinker cooler. When there is sufficient heat in the clinker cooler, the coal mill is brought on-line and coal firing to the kiln main burner is initiated. At this point, raw meal feed to the preheater is incrementally increased. As the kiln stabilizes, the raw meal feed is incrementally increased until the system is operating at full capacity. Typically, the time from feed-on to full capacity is three (3) to four (4) hours.

During the startup of the kiln/raw mill, there could be periods when production rate emissions (pounds per ton clinker or feed) are higher than normal due to imbalances of feed and fuel and the lower rate of feed or clinker production being used in the denominator for calculation of the production rate emissions.

This startup sequences below assume that the kiln system has been preheated for desired refractory curing, but the system is still cold. In connection with the normal startup procedure where the linings have been cured, the heat up procedure can be reduced from the stated 72 hours to 24 hours. All fans, conveyors, air purging system, and associated equipment should be run for a minimum of eight hours and all necessary adjustments made prior to startup.

Kiln Heat-Up

1. Start the main dust collector fan with damper closed.
2. Open the main dust collector fan damper gradually so that a negative pressure is generated at the dust collector inlet.
3. Open the damper of the preheater I.D. fan 10%.
4. Start the primary air fan and open the associated damper 10%.
5. Start the kiln burner.
6. Check that the fuel is ignited and if necessary, adjust primary air, fuel rate and draft through kiln so that a stable flame is obtained.
7. Increase the fuel volume gradually and slowly.
8. Adjust the draft level in kiln by means of the preheater I.D. fan damper, and main baghouse fan.
9. CAUTION: The flame must not cause sooting. Quite often, this will require that the O_2 content indicated by the kiln inlet analyzer is 6-8% (adjust as needed to maintain proper combustion conditions).
10. It will normally be necessary to start clinker cooler fans to provide adequate combustion air.
11. Start the preheater I.D. fan, if necessary to maintain proper combustion conditions.
12. Start rotating the kiln in accordance with the manufacturer's rotation schedule.
13. Check the supporting roller lubrication; the journals must not become dry.
14. Continuous rotation on the auxiliary drive is required if the kiln is exposed to cooling, e.g. heavy rain showers.
15. After 16 hours of preheating, the temperature of the kiln lining should be sufficiently high to ensure ignition of the coal at the kiln burner (main burner).

16. After approximately 18 - 20 hours when the kiln is sufficiently hot, raw feed should be introduced to the preheater. A raw feed weight equal to approximately 0.1% of the daily clinker output is a good estimate. When this material gets into the kiln it will help protect the refractory by coating the bricks and filling voids.
17. At the end of the kiln heat-up the remaining clinker cooler fans should be started to protect the grate plates.
18. Start the cooler vent fan to maintain the firing hood pressure by automatic control.
19. Regulate the draft (by adjusting the preheater I.D. fan damper) and the fuel flow to attain an oxygen content of approximately 4 – 6% (adjust as needed to maintain proper combustion conditions) in the kiln inlet.

Kiln Startup

1. Recirculate kiln feed at the desired starting feed rate. It should be a minimum of 50% of feed rate at full production.
2. Start kiln shell cooling fans.
3. Start cooler drives on minimum speed. Increase the air flows on the front fans to normal operating values and put into automatic control. This will provide sufficient combustion air at startup.

4. Start main kiln drive on minimum speed.
5. Perform the following operations in rapid, but correct, sequence:

    A. Start the I.D. fan if not yet started.
    B. Start the feed to the preheater.
    C. Increase the draft when the feed enters the preheater.
    D. Increase the kiln speed to 1 rpm.
    E. Open the primary air fan damper to 40% (approximately).
    F. Gradually increase the fuel to the kiln and simultaneously adjust the draft to obtain proper oxygen level at the inlet to the kiln.
    G. Open the tertiary air damper.
    H. Adjust the draft and tertiary air to balance the oxygen levels at preheater exit and kiln inlet.

6. Personnel should be stationed in the preheater tower in order to monitor the passage of raw meal. If there is any indication of blocking, the control room must be informed immediately and the kiln operation stopped until the blockage is cleared. In-lieu of personnel, level gauge systems on the preheater can provide the necessary monitoring of the passage of raw meal.
7. Increase the feed and speed of kiln as soon as possible. The preheater is more efficient at high feed rates.
8. Increase the cooler undergrate air flow rates.
9. When the material arrives at the burning zone it may be necessary to reduce the kiln speed to prevent the material from passing the burning zone too quickly. It is very important that the initial material charge is well burned so that the visibility in kiln is not lost due to dust formations. The clinker must be well burnt all the time. If not, increase the raw meal temperature by increasing the draft and fuel quantity.
10. Increase the kiln speed and feed gradually so that the exit gas temperature after the preheater does not exceed safe levels.
11. The maximum production rate can generally be achieved within a few hours after the startup.

Raw Mill Startup

Typically, the raw mill is brought on-line during the preheat of the kiln once there is sufficient heat for the raw mill to operate.

The kiln and raw mill usually operate together in what is referred to as the compound mode of operation (raw mill up). This operating mode occurs approximately 90 percent of the time. The remaining 10 percent of the time, the kiln operates alone in what is referred to as the direct operating mode (raw mill down). The raw mill is a source of particulate matter and a source of combustion products when the raw mill heater operates. The raw mill exhaust gases are discharged through the kiln baghouse and main stack (EU004).

With the kiln in the direct operating mode, the raw mill is brought on-line by opening the dampers isolating the raw mill; and as quickly and simultaneously as possible starting the raw mill fan, the raw mill and the raw mill feed.

During the startup of the raw mill while the kiln is operating, there can be a brief imbalance in the airflow through the kiln system resulting in short-term spikes in emissions from the kiln. The raw mill startup is not expected to affect particulate matter (PM or PM_{10}) emissions.

Clinker Cooler Startup

The clinker cooler I.D. fan and baghouse are powered prior to clinker being discharged from the kiln into the clinker cooler. The air flow and clinker flow through the cooler during startup will be controlled to optimize heat recovery. The time to bring the cooler on-line and to full capacity is dependent upon the time required to bring the kiln/raw mill to full capacity. Typically, this time period will be three (3) to four (4) hours. Emissions from the cooler are limited to PM and PM_{10}. During the startup period, no excess emissions are expected from the clinker cooler.

It may, from time to time, be necessary to start the grate cooler and the clinker conveying system in order to transport away the materials. In order not to fill up the cooler, the grates should be moved for about 10 minutes every hour at minimum speed. To ensure effective cooling at the cooler inlet, it may at the same time be necessary to start the first fans of the cooler to ensure that there is sufficient air for combustion.

The clinker cooler startup should occur around the same time as the kiln feed startup.

1. Start clinker pan conveyors.
2. Start clinker crusher.
3. Start timer and operation of tipping valves.
4. Start cooler vent fan and adjust draft to maintain a negative pressure in the kiln firing hood.
5. Progressively, start cooler undergrate fans to provide enough combustion air to the kiln, and keep grate plate temperatures down.
6. As clinker begins to discharge into the cooler, the grates should be started to prevent any buildups.
7. Progressively, as the clinker production increases, the fan volumes should be increased, and the grates operated more frequently.

ATTACHMENT 2: IN-LINE KILN/RAW MILL/CLINKER COOLER SHUTDOWN PROCEDURES

The kiln/raw mill, clinker cooler and coal mill have normal and emergency shutdown procedures. The emergency procedures will shutdown entire systems immediately and close dampers isolating the systems.

Shut-down may be either:

5 Emergency, in which case all equipment upstream of the failure must be stopped immediately (the emergency shutdown sequence is automated), or

6 Controlled, in which case the feed bin and coal system should be emptied, the kiln load run out as far as possible, and the cooler emptied. The burner pipe is withdrawn, or cooling air is continued through the burner, and the kiln is rotated on a standard schedule for about 12 hours with the ID fan running at reduced speed.

Suggested inching is as follows:

Duration of Shutdown	Kiln Turning
0 - 2 hours	continuous
2 - 4 hours	1/4 turn every 15 minutes
4 - 12 hours	1/4 turn every hour

If the shut-down is for less than 24 hours and does not involve entering the kiln or preheater, then heat should be retained either by stopping the ID fan immediately and shutting the preheater dampers after 2 hours, or shutting down the fan after 2 hours.

The following procedures are followed for normal (controlled) shutdowns.

Normal Kiln/Raw Mill Shutdown

Shutdown of the kiln and raw mill, while operating in the compound operating mode, is accomplished by first shutting down the raw mill and then shutting down the kiln. The raw mill is shutdown by stopping raw meal feed, stopping the raw mill and stopping the raw mill fan quickly and as simultaneously as possible. The dampers isolating the raw mill are then quickly closed.

The kiln is shutdown by shutting off the kiln feed and cutting back on the fuel to the main kiln burner. The kiln exhaust fan is also cut back. The kiln continues turning as the fuel in the main burner is continually cut back and finally cut off. The kiln continues turning at a prescribed rate until cool. At this time, the kiln can stop being turned. The kiln baghouse remains powered as long as air is drafted through the kiln.

There are no excess emissions expected during kiln shutdown.

Shutdown Sequence

1. Stop the preheater I.D. fan. The following should happen automatically:

A. The kiln feed will stop
B. The kiln and calciner firing will stop
C. The preheater fan damper will close
D. The last two cooler fans will stop and the air flows to all other cooler fans will reduce to preset minimum

2. Stop the kiln drive.
3. Reduce the cooler grate speeds to minimum.
4. Reduce the primary air fan damper.
5. Stop the shell cooling fans.
6. Close the tertiary air damper.
7. Start kiln rotation operation as outlined above.
8. Stop the cooler grates and operate for 5 minutes every 30 minutes.

Extended Shutdowns

Where shutdown of kiln extends over a prolonged period of time, all machinery not required for rotation of kiln and cooling of burner pipe must be stopped.

1. Stop the dust conveyance system when the system is empty.
2. Stop the compressors.
3. Prepare plans for subsequent clean-up operation in kiln, preheater, cooler, and baghouse.
4. After the kiln has cooled off, stop the primary air fan.
5. Stop the clinker conveying system.
6. Plan for maintenance and repair work prior to startup.

Normal Raw Mill Shutdown

The shutdown of the raw mill while the kiln continues to operate is accomplished by stopping the raw meal feed, the raw mill fan and the raw mill quickly and as simultaneously as possible. The dampers isolating the raw mill are then quickly closed. The shutdown of the raw mill can create a slight imbalance in the kiln system causing short-term spikes in emissions. The excess emissions will be minimized by good operating practices.

Normal Clinker Cooler Shutdown

The clinker cooler is shutdown following the shutdown of the kiln by cutting back on the airflow through the clinker cooler until any residual clinker in the cooler is sufficiently cool. At that time, the clinker cooler fan can be shut off. The clinker cooler baghouse operates at normal conditions during the entire time the clinker cooler fan operates.

There are no excess emissions associated with the shutdown of the clinker cooler.

ATTACHMENT 3: MANUFACTURER ESP O&M PLAN