Suwannee American Cement
SAC
Branford, Florida, USA
P.O. Box 410
Branford, Fl 32008

April 25, 2005

Mr. Jim Pennington
Division of Air Resources
Department of Environmental Protection
2600 Blair Stone Road, MS # 5500
Tallahassee, Florida 32399-2400

SUBJECT: **Response to Request for Additional Information (RAI), March 31, 2005**
Suwannee American Cement – Branford Plant
DEP File No. 1210465-014-AC (PSD-FL-352)
Proposed New Kiln at the Branford Cement Plant in Suwannee County, Florida

Dear Mr. Pennington:

Suwannee American Cement (SAC) welcomes the opportunity to respond to the Florida Department of Environmental Protection's (Department) request for additional information dated March 31, 2005. SAC wishes to offer the following information in response to the information requests. SAC has included text from the Department's RAI in *italic* for clarity with SAC responses following each response.

If the Department has any additional questions regarding the responses supplied please feel free to contact me at (386) 935-5039 or by e-mail at jbhorton@suwanneecement.com.

Sincerely,

Joe Horton
Suwannee American Cement

CC: Tom Messer - SAC
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1. Provide details on the kiln burner and describe where air and fuel will be introduced and how they are staged to minimize NOX formation. Please indicate the type of burner that will be used. Rules 62-212.400 and 62-4.070(1), F.A.C.

As described in our February 15, 2005 cover letter and in Section 1 of the Regulatory Analysis Report in Support of a Major Source Air Permit Application (Regulatory Analysis Report), a vendor for the kiln system has yet to be finalized. Although a specific vendor is yet to be finalized which would allow for detailed information of air and fuel input locations, Section 4.8 of the Best Available Control Technology (BACT) Analysis describes the possible staging of air combinations available and under consideration. In this Section SAC described a staging of air as offered by some vendors which is referred to as Multiple Staged Combustion (MSC). Additionally a system referred to as "reduction zone" is described in detail in this section. Each system has differences in the location of the staged air but creates the same conditions to reduce NO_x. Each system seeks to create a reducing zone by the combustion of fuel in the calciner region whereby CO and free radicals are formed which react and reduce the NO_x generated by the main kiln burner. This is followed by a secondary zone where staged air is added to create an oxygen rich region where the previously generated CO is destroyed. SAC considers both of these systems to be BACT suitable to control NO_x emission and upon selection of a vendor SAC will provide exact details as to the location of staged air.

As described in Section 1 of the Regulatory Analysis Report , SAC will introduce fuels in the calciner region of the kiln system as well as the material exit of the kiln system via the kiln main burner.

Section 4.4 of the BACT Analysis describes the type and methodology of the low NO_x burner to be used at SAC. SAC will install a burner with multiple channels allowing for the creation of distinct combustion zones in the flame. These distinct zones allow portions of the flame to exist in sub-stoichiometric oxygen conditions, which limits the formation of thermal NO_x due to the lack of sufficient oxygen. Other portions exist at lower temperatures, again limiting the formation of thermal NO_x due to the lowering of the temperature profile. SAC will provide exact details on manufacturer and model of the kiln burner upon selection of the vendor for the kiln system. Regardless of the final design, the system will meet the proposed NOx limit of 2.0 lb./t of clinker.

2. Describe the manner in which the precalciner vessel(s) will operate. Indicate where and how tires, flyash, and non-hazardous solid waste will be combusted in the MSC device while maintaining the Low NOX conditions of the design. Rules 62-212.400 and 62-4.070(1), F.A.C.

As noted above, a vendor for the kiln system has yet to be finalized. Regardless of the vendor selected, SAC will employ a calciner design that will accommodate the introduction of fly ash and non-hazardous solid waste through the calciner burner. The burner will contain a specific chamber or nozzle within the burner for the simultaneous introduction of coal, fly ash and non-hazardous solid wastes. SAC has been introducing fly ash into its existing calciner system via this manner as tested and approved by the Department since November of 2004 with improved or negligible NO_x emission results. These data were provided to the Department in Construction Permit Application DEP File No. 1210465-011-AC.

The introduction of fly ash and/or solid non-hazardous waste theoretically should have little effect on the Low NO_x design of the calciner. Fly ash and solid non-hazardous waste such as filter fluff typically have high volatile content and suitable reactivity for combustion and the generation of CO and free radicals. The reactivity of the material can depend heavily on the size and the introduction method into the calciner. SAC's calciner will employ a burner designed to accommodate the introduction of these fuels as described above. Additionally, the calciner will be designed with adequate retention time to insure the complete combustion of these materials should the reactivity of the material require this additional retention time for combustion. Pet coke typically has a lower reactivity and typically requires the longest retention time in the calciner. Regardless of vendor SAC will design adequate retention time in the calciner for pet coke as is currently designed in SAC's existing calciner system. This burner design and calciner design will insure that use of fly ash and non-hazardous solid waste will maintain the intended low NO_x design. Additionally, Selective Non-Catalytic Reduction (SNCR) will be installed at a location beyond the calciner in the gas stream to allow for additional NO_x control.

As described in Section 1 of the Regulatory Analysis Report , tires will be used in either/or a whole or shredded form that can be injected via air lock/gate system into the material inlet of the kiln. This location is a common location in kiln systems and the tires provide additional heat to the calcination process as well as providing a localized reduction zone around the tire fuel which assists in NO_x reduction. A tire gasification system is also proposed that would produce a combustible gas that would be injected into the kiln inlet or calciner region of the kiln system. The portion of the tires that do not gasify will form a coke/residue material. This material will be fed into the kiln inlet in the same manner as shredded or whole tires and provides additional heat input while incorporating the ash into the clinker. Air is supplied to the tire gasification system via the tertiary air from the clinker cooler and/or ambient air. Upon selection of a kiln system vendor, SAC will supply detailed information to the Department on the tire system and tire gasification system.

3. Submit a projected chemical analysis of the raw materials and additives likely to be used at this plant. Provide a proximate and ultimate analysis of the fuels proposed. Rule 62-4.070(1), F.A.C

Raw materials analysis and uel analysis for existing materials used at the site is included in Appendix A. Additional similar raw materials such as calcium carbonate sources, silica sources, iron sources, alumina sources, and alkali sources will also be utilized by SAC and will have similar analysis to those provided in Appendix A. Appendix A is a representative analysis but does not denote limits for the raw materials or fuels. SAC will provide analysis for fuels not included in Appendix A to the Department prior to use in the kiln system and as discussed in Responses 5 and 6.

4. Describe the primary fuel firing scenarios and describe the ratio of heat input at various fuel mixtures. Detail why heat input ratios might change under normal operating conditions and emissions. Provide an estimate of pollutant emissions under each scenario. Rule 62-4.070(1), F.A.C.

The primary fuel firing scenario will have a heat input of 55 to 60 percent of the total heat input being provided in the calciner via the calciner burner and 40 to 45 percent of the heat input being provided in the kiln main burner. During periods when tire derived fuels are being used,whole tires may account for up to 15 percent of the calciner heat input which will reduce the heat input of the calciner burner. During use of a tire gasification system, up to 40 percent of the calciner fuel may be supplied by the gasification of the tires, which again directly reduces the heat input provided from the calciner burner while leaving the kiln main burner heat input unaffected.

The primary fuel for the main burner and calciner burner will be ground bituminous coal and pet coke. In addition to this, ground coal and pet coke, liquids such as fuel oil or non-hazardous liquids may be fed through both the calciner burner and main burner. These fuels would replace up to 50% of the total heat input in varying amounts of each burner. Solid non-hazardous waste would only be introduced in the calciner region through the calciner burner as described in Response 2 and again substitute for the primary fuel in varying amounts from 0 to 50 percent of the total heat input.

Heat inputs of 55 to 60 percent in the calciner region supplied by various fuels (coal, pet coke, natural gas, fuel oil, non-hazardous liquids, non-hazardous solids, and tires) and 40 to 45 percent in the kiln burning zone supplied by various fuels (coal, pet coke, fuel oil, non-hazardous liquids, and natural gas) remain fairly constant. This heat input can fluctuate slightly as more or less heat is need in the calciner region or burning zone for the kiln main burner. If raw materials or quality control characteristics dictate, occasions can arise when more fuel is needed in the main burning zone via the kiln main burner. Regardless of the fuel firing scenario or fuels used, overall heat input to the kiln remains fairly constant in comparison to kiln feed rate. Theoretically, constant heat inputs are needed for the overall process of clinker formation with uniformly predictable variations for raw material deviations, heat exchange rates, and other conditions experienced in practical conditions.

Emissions under all above listed scenario for fuel firing scenarios or heat input ratios are expected to remain fairly constant in terms of concentration or mass per unit time and within the limits proposed in Section 3 of the Regulatory Analysis Report. Particulate emissions are independent of fuel type or fuel firing scenarios and are predominately dependent on control equipment. CO and VOC emissions are controlled as a function of raw materials and combustion practices. With the use of staged combustion and proper calciner design as described previously, SAC will insure proper control of CO and VOC in all scenarios that maybe generated from combustion practices. SO_2 emissions remain relatively unaffected by heat input ratios since the sulfur in the fuel will be volatilized equally in either location. SO_2 from fuel firing scenarios theoretically should remain unaffected as well since it is controlled by inherent scrubbing from the abundance of calcium carbonate and calcium oxide prior to the fuel firing locations. With the use of staged combustion and proper combustion practices, sulfur from fuel should be retained in the clinker and not exit via the stack. SO_2 emissions from the stack are predominantly a function of raw materials and not from sulfur from fuel components.

NO_x emissions can be affected by both fuel firing scenario and heat input ratios. Fuels higher in volatiles used in the calciner such as fuel oils, coal and some non-hazardous liquids and solids can increase the free radical pool, allowing for more reduction in NO_x generated by the main burner of the kiln. Additionally, tires injected via the mechanism described above or solid non-hazardous waste utilized in the calciner can create localized reducing zones around the fuel as it combusts. These reducing zones can also enhance the reduction of NO_x by the creation of additional reduction zones in comparison to highly reactive fuels. The heat input ratio can also play an important role in NO_x emissions. The more fuel fired in the high heat burning zone through the main kiln burner, the higher the overall NO_x per unit of heat input. The more fuel that can be utilized in the calciner at lower temperatures while still maintaining the needed temperature profile in the burning zone the less the overall NO_x per unit of heat input. In modern kilns this ratio is typically 60 percent in the calciner and 40 percent in the kiln main burner. As described above, this same ratio for heat input is proposed in the design for the SAC kiln system. Slight variations as described above may occur as more fuel is needed in the main burner to maintain the needed burning zone temperature. However, considering worst case scenarios for both fuel firing scenarios and heat input ratios (which would be low volatile fuels usage in the calciner and 45 percent heat usage ratio on the main kiln burner), NO_x emissions will remain below the proposed limits in the application. This will be due to the combination of BACT technologies as described in Section 4 of the BACT Analysis to be employed at SAC. This includes the use of a Low NO_x burner which helps to reduce the NO_x generation from the 45 percent heat input by the kiln main burner. The staged combustion calciner will utilize the principles of a reducing atmosphere to reduce NO_x, and additionally SNCR. SNCR allows for an additional control parameter independent of the kiln operations to insure compliance with the proposed NO_x emission limit throughout the normal variance of the parameters discussed.

5. Describe all solid fuel proposed to be burned in the calciner. Justify the burning of non-hazardous solids (plastic, filter fluff, wood waste) up to 50 percent of the total heat input, and include any other solids proposed to be burned in the calciner. Explain whether the new line is subject to 40 CFR 60, subpart CCCC, New Source Performance Standards for Commercial/Industrial Solid Waste Incinerators constructed after November 30, 1999. Rule 62-4.070(1), F.A.C

SAC proposes to use the following non-hazardous solid fuels to be utilized in the calciner:
Coal
Pet Coke
Plastics
Filter Fluff
Wood Wastes
Other Non-Hazardous Solid Waste

SAC will provide the Department with analysis of any material prior to use of that material as a fuel with the exception of those which have been provided in Attachment A. Analysis will consist of the following:

- Heat Content
- Moisture Content
- Ash Content
- Sulfur Content
- Volatile Metals (including Hg)
- Semi Volatile Metals

As discussed in Response 4, regardless of fuel type SAC anticipates that pyro-processing system design along with control technologies such as main baghouse, inherent scrubbing, combustion control, hydrated lime injection and SNCR will allow for use of various solid non-hazardous fuels while maintaining emission limits below those proposed in the application. As discussed in Response 12, no material will result in emissions of mercury above the proposed 122 pounds per year.

40 CFR 60 Subpart CCCC, section 60.2020(l), specifically states that cement kilns subject to Part 63, Subpart LLL, are exempt from Part CCCC.

6. Describe all liquid fuel and non-hazardous liquids, including on-spec fuel oil, proposed to be burned in the kiln and/or calciner. Rule 62-4.070(1), F.A.C.

SAC proposes to use the following non-hazardous liquid fuels to be utilized in the kiln main burner and the calciner burner:
Fuel Oils Specification (#1-6)
Used Oils On-Spec
Other liquid materials within Specification that are classified as non-hazardous

SAC will provide the Department with analysis of any material prior to use of that material as a fuel with the exception of those which have been provided in Attachment A and Specified fuel oils and on-spec used oil. Analysis will consist of the following:

- Heat Content
- Moisture Content
- Ash Content
- Sulfur Content
- Volatile Metals (including Hg)
- Semi Volatile Metals

As discussed in Response 4, regardless of fuel type SAC anticipates that pyro-processing system design along with control technologies such as main baghouse, inherent scrubbing, combustion control, hydrated lime injection and SNCR will allow for use of various liquid non-hazardous fuels while maintaining emission limits below those proposed in the application. As discussed in Response 12, no material will result in emissions of mercury above the proposed 122 pounds per year.

7. How many startup and shutdown events will normally occur each year? Describe the nature and duration of emissions, particularly from the in-line kiln/raw mill and clinker cooler, during startup and shutdown. Describe procedures used to minimize excess emissions during these events. Rules 62-4.070(1) and 62-210.700, F.A.C.

In the first quarter of 2005, SAC experienced 29 shutdowns of the total in-line kiln/raw mill and clinker cooler system, with each shutdown having an associated startup. Only one of these was a planned shutdown. The others were mostly due to operational excursions (buildup of material and abrupt temperature changes) and mechanical failures of the in-line kiln/raw mill system or associated equipment (kiln drive failures, fuel feed equipment failures, kiln feed equipment failures, and fan failures). Typically SAC has two planned shutdowns in a twelve month period. This time period between planned outages can be lengthened or shortened depending on the wear and life of equipment. SAC anticipates 7 to 8 unplanned shutdowns with associated startup of the total in-line kiln/raw mill and clinker cooler system per month during normal operations. SAC makes every effort to prevent these events in that they impact production and the economic viability of the plant. In reality, they cannot be predicted.

The in-line raw mill has more frequent planned and unplanned stops and is designed along with kiln feed storage to accommodate these more frequent stops without causing stops in the kiln and clinker cooler. The starting and stopping of the raw mill system has little to no effect on emissions concentrations as observed at SAC in its existing kiln system. NO_x emissions at SAC are unaffected since the majority of NO_x emissions are generated at the kiln burning zone which is unaffected by raw mill operations. PM emissions are also unaffected by raw mill operations, since the proposed new main baghouse will be sized to handle the higher gas flow rates that occur during raw mill operations. Stopping the raw mill will only decrease the flow rates which will have no affect or even decrease PM emissions. SO_2, CO and VOC emissions are primarily a function of the raw materials fed into the kiln process and can be controlled independently of raw mill operations to insure emissions remain below proposed limits. SAC has seen with its existing system and raw materials which will be very similar to the proposed new raw mill no emission changes during startup or shutdown of the raw mill and predicts with the proposed new in-line kiln/raw mill system similar data.

During shutdowns of the in-line kiln/raw mill and clinker cooler system, fuel is typically cut and the process stopped quickly, resulting in reduced emissions on a lb/hr basis, but small periods of higher emissions per unit of clinker. These periods are very limited and are not anticipated to cause problems with emission limits proposed in the application. However, during startup there are prolonged periods (up to 24 hours) where the process is brought up to capacity. During this time period mass emissions for NO_x remain similar to those observed during full capacity but mass emissions of NO_x per unit clinker are higher since the clinker production is reduced. VOC, CO, SO_2, and PM emissions are primarily dependent on raw materials and typically will be less in terms of mass at lower feed rates. All emission control equipment will operate to the fullest extent during periods of startup and shutdown. SAC anticipates little variation in emission mass rates during startup or shutdowns. SAC retains the ability to control emissions below proposed permit limits in a similar manner to operation at higher capacities.

As required by the 40 CFR 63 NESHAP subpart LLL, SAC is required to have a Startup, Shutdown, and Malfunction Plan (SSMP) for the minimization of emissions during these conditions. SAC will update its current SSMP for the proposed new in-line kiln/raw mill and clinker cooler system in accordance with the applicable regulations.

8. Has SAC or its parent company had any violations of Department regulations at this or any other of their facilities? Are there any unresolved violations? Please provide all documentation in relation to these violations. Rule 62-4.070(5), F.A.C.

SAC resolved compliance issues that occurred shortly after startup of the existing facility in late 2003 and early 2004. These issues were finalized in Consent Order OGC File No.: 03-2031. Excluding this compliance issue, SAC is unaware of any other unresolved violations to date. SAC is also unaware of any unresolved violations regarding its parent operating company, Votorantim Cimentos. Anderson Columbia is also a partial owner of SAC, however Votorantim Cimentos retains 100 percent of operational control over the SAC company including existing and proposed facilities.

9. Provide a description of the stack sampling facilities. Form 62-210.900(1), F.A.C.

As described in Section 1 of the Regulatory Analysis Report , stack sampling facilities will be constructed in accordance with all applicable regulations in Part 60 and 63. SAC will provide this information to the Department as soon as a vendor is selected and this information is available.

10. Provide operation and maintenance plans for all major process and pollution control equipment. Form 62-210.900(1), F.A.C.

As described in Section 2.2 of the Regulatory Analysis Report, SAC has submitted to the Department operation and maintenance (O&M) plans for existing major process and pollution control equipment onsite. Upon selection of pollution control equipment for the future kiln system SAC will update this O&M Plan to reflect the new equipment.

Please find included in Appendix B the previously submitted O&M Plan for the existing process system and emission control equipment which will be updated to include new pollution control equipment.

11. Clarify the maximum throughput rate for the new coal mill and coal transfer station. Is it 150,000 tons per year as indicated in the application? Rule 62-4.070(1), F.A.C

As described in Section 3.3 of the Regulatory Analysis Report , the coal mill emission estimates are based on gas flow through the coal mill not material throughput. Therefore throughput rates for the coal mill are not relevant in determining emission limits and have no effect on potential emissions. The coal mill and coal transfer stations are preliminarily designed for 150,000 tons of coal throughput per year but this was not intended as a throughput limit. This information was included in both Section 1 of the Regulatory Analysis Report and in the Application for Air Permit – Long Form in the New Emission Unit #2 section. The existiong coal receiving system will be used to receive coal for both the new and old coal mills and coal transfer stations. The combined throughput for the coal receiving system will be approximately 278,000 t/yr. as indicated in the application.

12. Provide detailed information as to how mercury compound emission rates are measured, calculated and/or estimated. Rule 62-4.070(1), F.A.C

Mercury emissions were calculated from the total of all inputs into the proposed new kiln system using the same materials that comply with the mercury limit for the existing kiln system. A safety factor was used to insure a very conservative estimate. SAC assumed that all mercury inputs into the kiln system would equal all mercury outputs via the stack with no incorporation of mercury into clinker. Data from samples taken over the past two years of similar kiln feed materials and fuel materials at the existing site were used to calculate the mercury factors used in the estimate for the inputs. The limiting factor in the determination of the estimates and calculations was the detection limit for the mercury in most of the raw materials used that are quarried from the site. SAC used the current lab detection limits for raw material inputs and actual data collected for fuels collected over the past two years which resulted in the conservative estimate of 122 pounds of mercury emissions per year. Actual mercury inputs from the raw materials such as limestone and sand are probably well below the detection limits resulting in another assurance of the overestimation of mercury emissions.

SAC proposes to monitor mercury in the same manner used for the existing kiln. SAC would monitor all feed and fuel inputs into the process on a semi-annual basis. Composites of the materials would be collected and analyzed on this semi-annual basis or prior to introduction of new material or fuel into the process. These results along with the amount of all inputs in this semi-annual period would be used to determine a total input of mercury into the system for this period. Detection limits would be treated as the detection limit value. Any consecutive semi-annual analysis and mass balance sum would be below 122 pounds ensuring that no 12 month period has mercury inputs above 122 pounds. SAC would also analyze the clinker during this semi-annual analysis and if clinker results yielded detectable limits of mercury then the mercury detected in the clinker would be excluded from the calculated input amount since this mercury could not be present in air emissions and should be excluded from the 122 pounds per hour.

Appendix A
Raw Material and Fuel Analysis

Raw Material Additive Type	Moisture %	CaO %	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	K_2O %	NaO %	SO3 %	LOI %	Fixed C %
Average of Various Sand (silica source)	11.06	0.72	78.91	8.75	1.46	0.14	0.12	0.04	0.26	3.40	-
Average of Various Clay (silica source)	14.96	0.69	79.43	8.60	1.65	0.14	0.10	0.02	0.24	6.70	-
Steel Slag (Iron Source)	0.88	1.06	1.38	0.30	94.40	0.57	0.00	0.00	0.15	0.00	-
Blast Furnace Slag (Silica & Alumina Source)	1.00	37.20	36.20	8.00	0.70	10.30	-	-	1.50	0.00	
Iron Ore Fines (Iron source)	21.28	0.83	6.86	0.77	89.40	0.64	0.00	0.00	0.64	0.28	-
Iron Oxide Fines (Iron Source)	24.80	1.40	4.52	0.81	90.90	0.79	0.11	0.00	0.82	0.78	-
Iron Ore (Iron source)	6.31	4.97	5.11	0.85	80.34	0.14	0.03	0.02	0.11	3.56	-
Mill Scale (Iron source)	3.64	1.24	3.05	1.00	91.90	0.15	0.00	0.61	0.00	0.35	-
Mill Scale (Iron source)	3.32	2.06	4.43	0.98	90.50	0.12	0.00	0.21	0.00	0.02	-
Mill Scale (Iron source)	2.95	1.59	2.86	0.84	91.70	0.18	0.00	0.66	0.00	0.27	-
Mill Scale (Iron source)	7.91	4.64	7.42	4.45	78.40	2.43	0.00	0.00	0.33	0.00	-
Fly Ash (Alumina source)	42.62	1.59	52.88	26.57	3.89	0.87	3.39	0.17	0.18	5.56	6.05
Fly Ash (Alumina source)	19.07	3.43	49.73	25.87	5.59	0.87	2.75	0.24	0.23	7.01	5.35
Fly Ash (Alumina source)	25.26	3.04	53.84	26.88	4.38	0.85	2.69	0.23	0.07	4.77	3.94
Fly Ash (Alumina source)	29.60	3.26	50.20	27.10	6.25	0.69	2.49	0.17	0.38	7.32	5.32
Fly Ash (Alumina source)	41.07	2.11	51.60	27.60	5.65	0.71	2.50	0.15	0.45	6.88	5.51
Fly Ash (Alumina source)	26.33	2.89	51.30	27.00	5.61	0.63	2.31	0.26	0.41	7.33	6.31
Fly Ash (Alumina source)	28.62	2.86	51.80	26.90	5.94	0.70	2.50	0.20	0.44	6.36	5.47
Fly Ash (Alumina source)	24.73	3.13	50.50	26.80	6.16	0.75	2.37	0.21	0.51	7.34	5.76
Fly Ash (Alumina source)	23.28	2.86	51.30	26.90	5.40	0.82	2.56	0.54	0.41	7.03	5.97
Fly Ash (Alumina source)	26.12	2.17	51.60	27.20	5.95	0.71	2.50	0.18	0.40	6.82	6.47
Dry Fly Ash (Alumina source)	0.72	3.31	37.20	14.26	7.45	1.52	0.94	0.46	7.67	39.12	33.36
Dry Fly Ash (Alumina source)	0.61	3.11	38.63	15.24	7.94	1.47	1.13	0.45	7.74	36.62	30.98
Bottom Ash (Alumina source)	27.06	1.65	46.17	23.44	6.65	0.84	3.77	0.19	0.17	27.66	17.48
Feldspar (Alkali Source)	0.55	1.73	73.80	15.90	0.52	0.00	3.47	4.00	0.00	-	-
Feldspar (Alkali Source)	1.01	2.10	70.90	18.30	0.46	0.00	3.03	4.72	0.00	-	-

Limestone Data	Moist. (%)	CaO (%)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	MgO (%)	K_2O (%)	Na_2O (%)	SO_3 (%)	LSF
Limestone (Calcium Carbonate Source)	17.00	52.67	5.51	0.72	0.11	0.57	0.01	0.09	0.08	322.16
Limestone (Calcium Carbonate Source)	17.00	51.78	6.56	0.70	0.09	0.57	0.01	0.08	0.05	268.95
Limestone (Calcium Carbonate Source)	17.00	51.96	6.32	0.96	0.14	0.56	0.02	0.09	0.07	274.63
Limestone (Calcium Carbonate Source)	17.00	51.81	6.63	0.90	0.11	0.56	0.01	0.09	0.06	263.03
Limestone (Calcium Carbonate Source)	17.00	52.68	6.53	0.74	0.11	0.57	0.02	0.09	0.06	273.97
Limestone (Calcium Carbonate Source)	17.00	49.85	8.92	1.32	0.14	0.55	0.02	0.09	0.03	187.23
Limestone (Calcium Carbonate Source)	17.00	52.31	5.64	0.86	0.11	0.56	0.01	0.09	0.10	309.92
Limestone (Calcium Carbonate Source)	17.00	50.96	7.67	1.16	0.16	0.57	0.01	0.09	0.06	222.06
Limestone (Calcium Carbonate Source)	17.00	50.83	7.77	1.12	0.15	0.57	0.02	0.09	0.04	219.33
Limestone (Calcium Carbonate Source)	17.00	51.22	7.27	1.04	0.15	0.59	0.02	0.09	0.07	236.25
Limestone (Calcium Carbonate Source)	17.00	51.57	6.88	1.02	0.16	0.60	0.02	0.09	0.08	250.69
Limestone (Calcium Carbonate Source)	17.00	50.91	6.37	1.04	0.15	0.57	0.02	0.09	0.07	265.70
Carbonate Byproduct (Calcium Carbonate Source)	25.00	46.50	6.00	0.30	0.30	0.50	0.13	0.04	6.00	-

Gypsum Data	Moisture %	Hydration Water(%)	SO3 %
Gypsum (Grinding)	11.71	0.09	38.26
Gypsum (Grinding)	6.01	0.07	38.48
Gypsum (Grinding)	5.51	0.04	38.50
Gypsum (Grinding)	5.01	0.08	40.46
Synthetic Gypsum (Grinding)	10.70	0.06	39.21

Fuel Analysis

Fuel Type	Moisture %	Sulfur (%)	Ash (%)	Volatiles (%)	Cal. Value BTU/lb
Coal	9.50	0.70	10.95	39.86	14,196.00
Coal	5.54	0.97	6.59	39.22	13,384.00
Coal	6.08	0.60	5.80	39.87	14,168.00
Coal	7.12	0.59	4.61	41.32	14,328.00
Coal	8.23	0.76	6.36	37.42	13,676.00
Coal	9.82	0.73	7.56	37.47	13,426.00
Coal	6.01	1.64	6.83	27.15	11,864.00
Pet Coke	8.07	4.85	0.69	20.48	15,135.00
Fuel Oil #1	Liquid	0.09	0.10	-	20,189.17
Fuel Oil #2	Liquid	0.10	0.10	-	19,638.87
Fuel Oil #4	Liquid	1.35	0.10	-	19,383.06
Fuel Oil #6	Liquid	2.10	0.10	-	18,344.80
Natural Gas	-	-	-	-	1000 BTU/ft3

Appendix B
Existing O&M Plan

Suwannee American Cement
Branford, Florida

BAGHOUSE OPERATION AND MAINTENANCE PLAN

July 18, 2002

File: Baghouse O&M Plan.doc

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Attachments

1. Introduction

Suwannee American Cement (SAC) operates a limestone quarry and a cement production facility at this location. Limestone is mined /stockpiled and then mixed with other raw materials which provide an addition source of iron and aluminum, in designed proportions, to produce a ground mixture of kiln feed. The additional raw materials used will include coal ash, bauxite, sand, and mill scale. The kiln feed will have sufficient chemical properties to produce clinker when it is subjected to high temperatures of the preheater, precalciner and rotary kiln. The clinker produced by the pyroprocess. As the clinker is introduced into the finish (grinding) mill a small percentage of gypsum is added to produce portland cement.

SAC is committed to operating facility in a manner that will comply with applicable federal, state, and local environmental regulations and in harmony with the surrounding community. SAC expects to operate at this location well into the 21st century. To accomplish this, SAC has made regulatory compliance a corporate commitment. This commitment is vigorously disseminated throughout the company, from the top down.

2. Purpose

The purpose of this plan is to effectively operate and maintain baghouse emission control systems to meet or exceed the requirements of federal state and local environmental regulations.

It is a regulatory requirement for SAC develop and implement a baghouse Operations & Maintenance Plan (O&M Plan) to ensure the effective operation of the fabric filter emission control systems throughout the facility. The routine monitoring and maintenance of emission control units is essential for the optimum performance/capture efficiency of the units. The O&M plan will describe the measures and procedures that must be followed to ensure that the emission control units will achieve their designed operating efficiency throughout the life of the units.

The facility has several permitted point sources (emission points), the majority of which are fabric filter dust collectors (baghouses). Baghouses are designed to capture fine dust particles in various process gas streams and potential emissions from material handling operations. Each baghouse system has been designed with sufficient cloth area, airflow and capture velocities to control emission at specific locations throughout the facility. While there are several mechanisms involved in removing dust from the gas stream, the primary removal mechanism is filtration. Particles are filtered from the gas stream by fabric and a thin layer of dust on the surface of the fabric. The dust that accumulates on the fabric is periodically removed or cleaned from the surface. Dust captured in the emission control units is returned to the process; either by screw conveyors with rotary airlocks, air slides, chutes with dampers/flop gates, or a combination of these conveying mechanisms.

The maintenance required for the mechanical aspects of the baghouse, and the associated material handling devices, is incorporated into the plant wide preventative maintenance (PM) program. This program has been established based on manufacturer's suggested maintenance and the process experience of SAC personnel.

3. Baghouse (Dust Collector) Operating Principle

Baghouses work on the simple principle of filtration and they are mechanically straight foreword 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. Keep them separate and the 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 exists 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 particle 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 the 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/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.

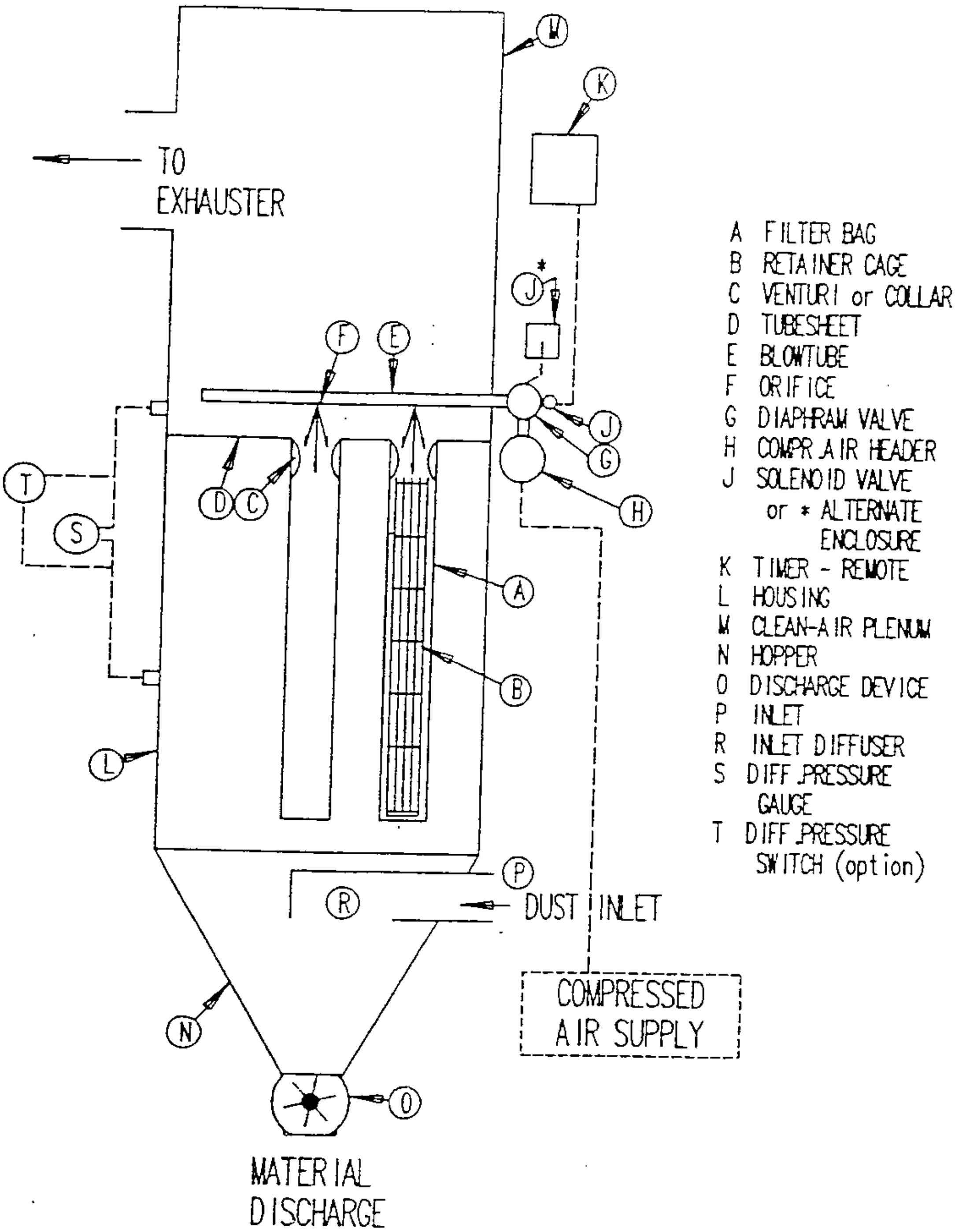


Figure 1. Pulsejet Baghouse Components

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 compartment/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 airflow 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 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 the 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.

4. Gas/Air Flow

Gas/air is moved through a dust collector by either of two methods, suction or pressure. In a suction system, a fan installed downstream of the baghouse to draw or induce gas flow through the dust collector from the ventilation source(s). In a pressure system, a fan immediately upstream of the baghouse draws air from the ventilation point(s) and forces (forced draft) the gas through the dust collector. SAC baghouses are equipped with suction or induced draft (ID) fans, where the fan is downstream of the baghouse. The ID fan system is preferable because it maintains a negative pressure (vacuum) on the entire system upstream of the fan and air will be drawn into the system at any point of leakage. Where the forced draft system will blow air/dust out at any point of leakage, downstream of the fan, on the baghouse.

5. 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 emission as the airflow through the system decreases. All of the baghouses at the facility are self-cleaning, pulsejet 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 pulsejet unit, the pulse valve of one or more rows opens to inject a short blast of compressed air through blowtubes, along the row of bags and down into the bags from the clean airside. This pulse of compressed air sends shock wave 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 cleaning cycle will continue from row to row, preferably non-sequentially, until all rows have been cleaned. The frequency with 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 row(s) out of service during the cleaning cycle will be out of service for only milliseconds. The other rows remain in operation throughout this period and the filtering process continues without interruption. The compartments (8) of the reverse flow unit are cleaned individually in a timed sequence with only one compartment off-line at any given time. 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 or rows. 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 setting, 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 six (10") inches across the baghouse. However, there are many process variables that may cause the baghouse to operate out side this range and still effectively control emissions.

6. Timer/Controls

The function of the timer is (1) to automatically sequence the cleaning of the rows in the pulsejet dust collector or compartment 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 its 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: (1) On a continuously cycling basis (std), 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 unit (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 closes the contacts of low set point and shut off the timer/cleaning cycle.

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.

The taps for the connections for either gauge, negative and positive are located directly above and below the tubesheet, respectively. In addition, these gauges can indicate unusual differential pressure conditions, which 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.

7. Differential Pressure Switch

A differential pressure switch or gauge/switch combination device (Photohelic) is installed on two of baghouses for the coal grinding operation. The Photohelic is equipped with dual set points, a high and a low. It will automatically activate the timer to initiate a cleaning cycle whenever the differential pressure across the dust collector reaches high set point and activates the time/cleaning cycle and deactivate the timer when the Delta P reaches the low set point. Once activated the timer will function to clean rows until the specified low-pressure differential is reached and the switch opens to stop the timer. A switch of this type is normally used when the dust loading is intermittent or not heavy enough to require continuous cleaning. The Kiln/Raw Mill baghouse and the Merrick baghouses on the coal grinding system are equipped with Photohelic gauges.

8. Pulse Valve

The pulse valve, of as pulsejet baghouse, introduces the blast of compressed air through the blowtube 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 blowtube. 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.

9. 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. Compressed air supply for the header should be relatively dry and at approximately 80 - 100 psi.

10. 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 pipe the under side 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 cause 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.

11. 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 is supplied is on and the ID (induced draft) is operable; the start-up sequence may begin. The baghouse materials handling devices should be started first. Where the system is equipped with dampers, inlet and or outlet, the flow should be controlled to no more than 25% of design, if practical, but no more that 50% percent open during start-up. This will allow the bags to gradually build a dust cake and prevent impingement of dust particles into the fabric and possible bleed through, due the low resistance to flow of the new bags. When the Delta P across the baghouse reaches one (1) to two- (2) inches pressure drop, the dampers may gradually opened to the full open or desired position.

The use of dampers or blast gates would be the desired method of airflow reduction even if they must be installed. Furthermore, a dust collection system with multiple and/or remote pick-up points may require such devices to balance the air flow(s) for maximum capture efficiency. Obviously this procedure would need to be completed under low process material flow/out put conditions. The start-up sequence may be completed prior to process start-up by manually introducing a pre-coat material into the system immediately up stream of the of the baghouse inlet.

During either of the above start-up sequences 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, the baghouse system would not require any stepped sequence for start-up other than those associated with process/operation start -up sequence.

12. 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 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 venting an operation that has the potential to produce a steam plum 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.

13. Filter Bag Replacement

Filter bags, in the correct application, may have a useful life of one (1) to four (4) years, depending on the chemical and physical nature on the gas stream at the point of control. However, bag wear is usually gradual and through routine inspections you must establish the expected bag life for specific baghouse units. 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 vary abrasive materials, excessive cleaning, or incorrect fabric type. Operating a baghouse with broken/failed bags will not only allow excess emission 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 changed/replaced as needed.

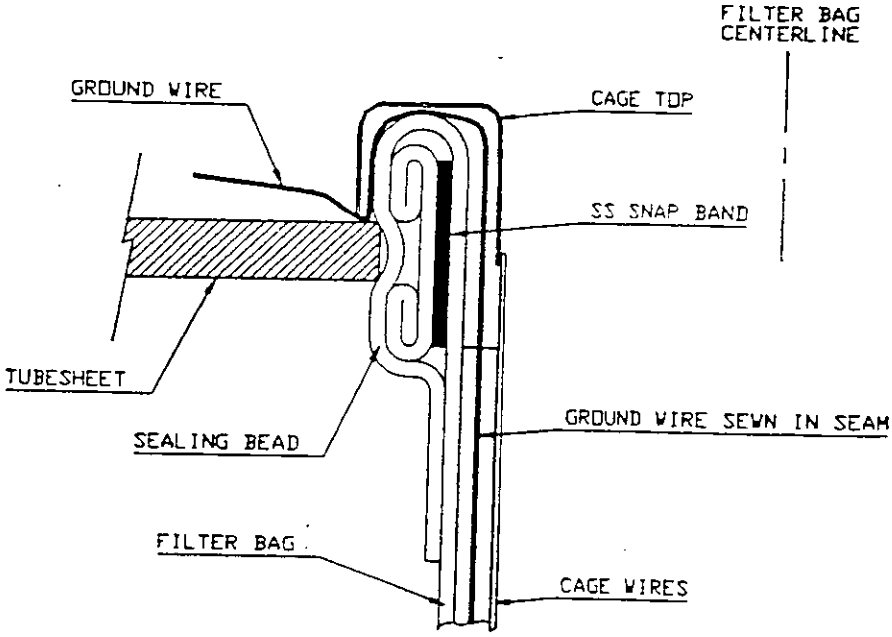
Established safety precautions should always be taken during the replacement of bags and/or baghouse entry. Precautions must be taken to minimize employee exposure to potential hazards with routine energy isolation, as required, and personal protective equipment.

13.1. Pulse Jet Baghouse – Bag Replacement

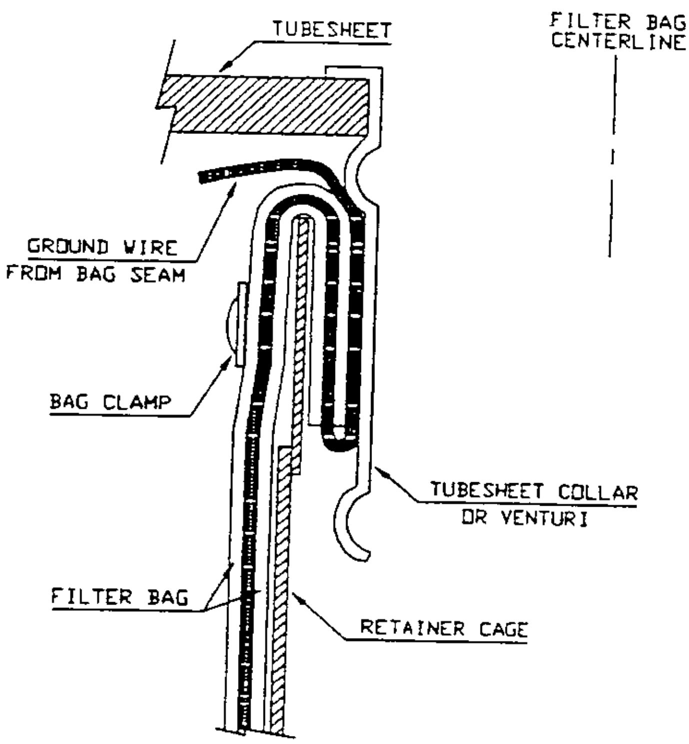
The pulsejet baghouses have top entry/access for the inspection and/or replacement of filter bags. To inspect for bag leakage or bag replacement the doors/covers at the access point of the unit must be opened or removed for access to the bags.

To remove and/or replace a bag the blow tube 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 (see figure 2, Top-Access) 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 sewned into the bag collar. This snap ring must be flexed inward to remove or replace a bàg 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 tub 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 grove that must mate with the edge of the tubesheet as you release the flex in the snap ring (see Figure 3). The collar of the bag must fit snugly against the entire circumference of the tub 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 (see Figure 4 & 5). 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 (see Figure 2, Bottom Access).



TOP-ACCESS SNAP-IN STYLE w/GROUNDWIRE



BOTTOM-ACCESS STYLE w/GROUNDWIRE

Figure 2. Typical Bag Installation

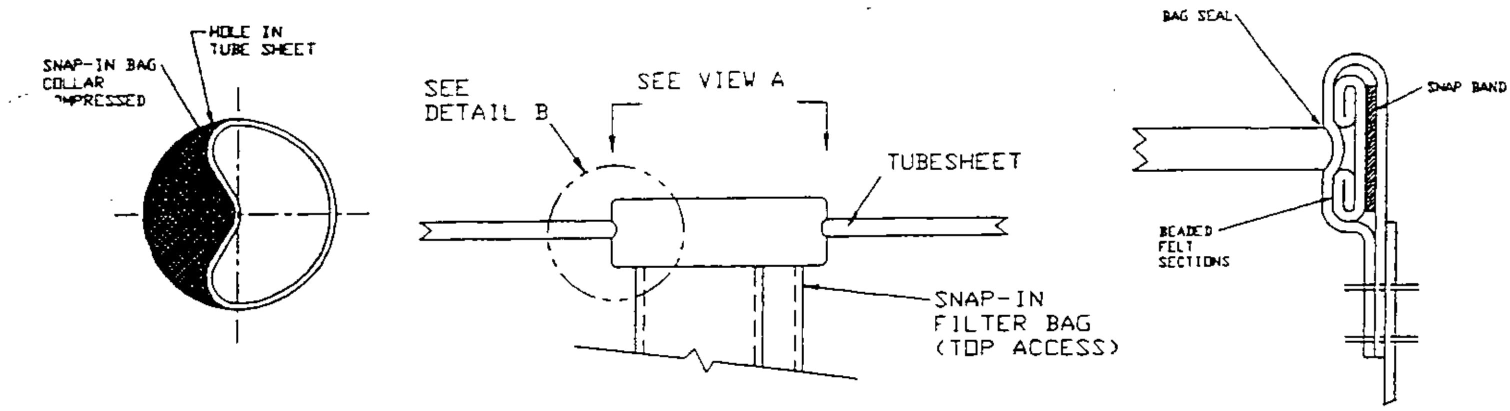


Figure 3. Snap-In Pulsejet Bag Installation

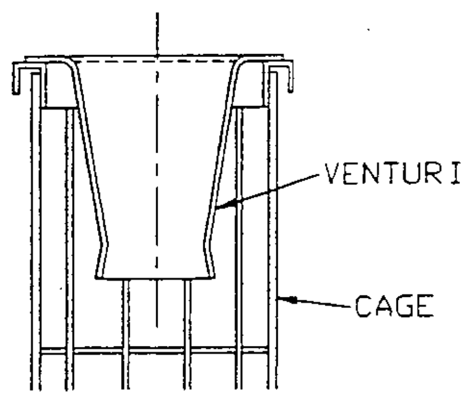


Figure 4. Typical Cage w/Venturi Assembly

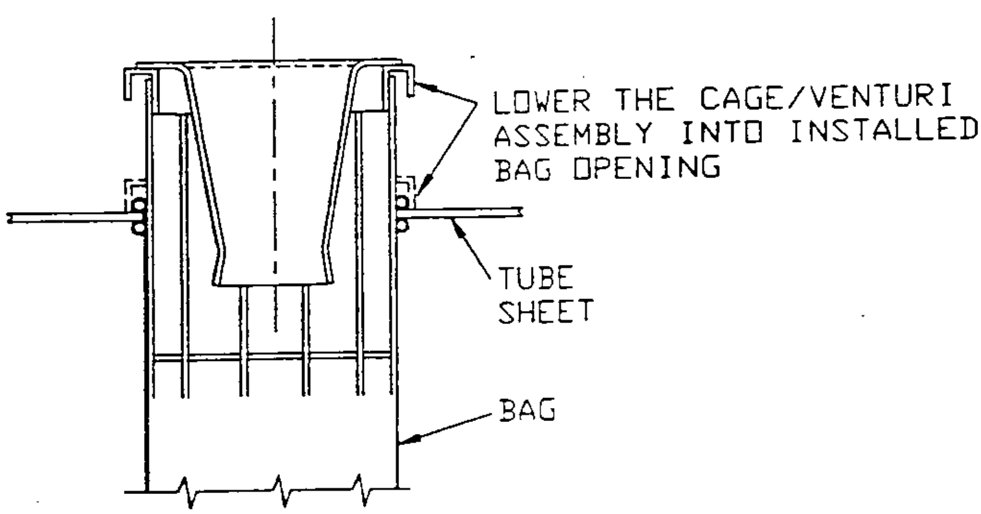
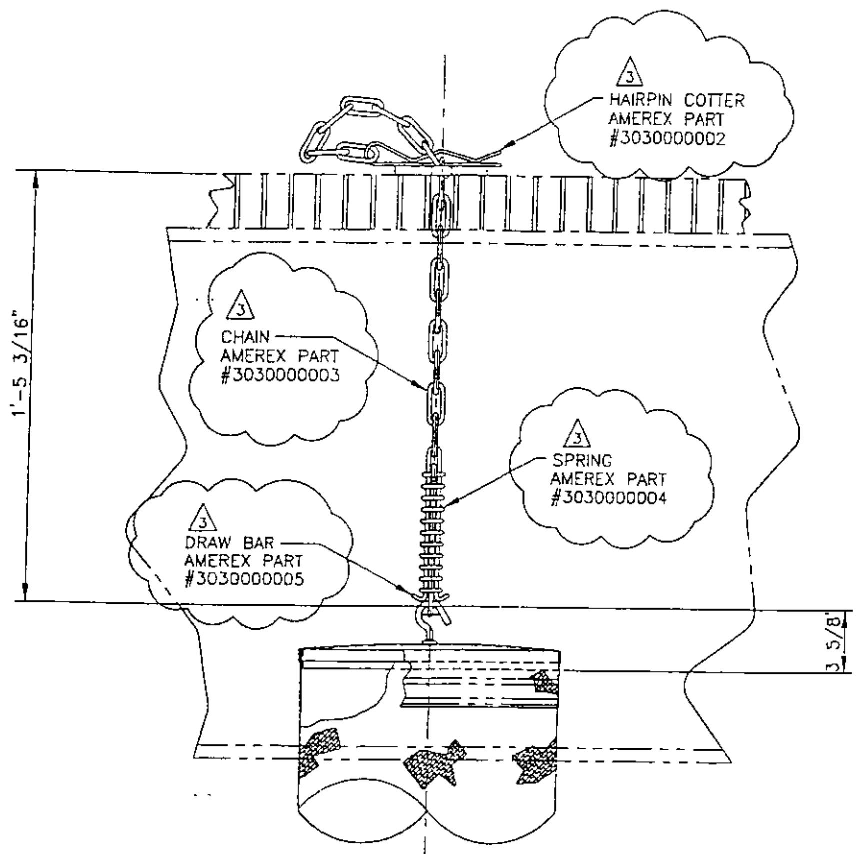


Figure 5. Filter Bag/Cage Installation

13.2. 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) at 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 convex ring of the thimbles of the tube sheet and secured in place with a strap clamp (see Figure 2.) 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 (see Figure 6.). The bag should be attached to the thimble first and then the other end of the bag should then be hoisted up and attached to the hanger assembly. A bag tension tool should be used to set 75 pounds of tension. New bags need to be re-tensioned after several days of operation.



DETAIL "A"

The bags for the kiln/raw mill baghouse are approximately 35 feet long and care must be taken during installation not to drag the bag across sharp or rough surfaces that may cause abrasion or puncture the bag.

In both type of baghouse, the bag to tub sheet seal is the critical to the separation of the clean air/dirty air interface of the gas stream as it passes through the baghouse.

14. Weekly Baghouse Inspection

The units should be checked weekly for performance and operation effectiveness. At a minimum the inspection should include noting the differential pressure (Delta P) across the baghouse, operation of timer sequence, solenoid operation, diaphragm valve operation, hopper discharge, and stack visible emissions (VE). During the inspection also listen for the pulsing of the blow tubes to verify diaphragm operation and listen for the release of air from the solenoid operation. You should also listen for unusual noises and/or vibration from the fan. 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 tub 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 off line in the reverse flow unit.

During the inspection also the pressure at the compressed air header, bleed/drain the compressed air header, and verifying that the hopper is empty. Hoppers without a bindicator/level indicated 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).

15. Monthly Baghouse Check

On a monthly basis you should check the access doors/hatches for leaks, check air lines and fittings for leaks, and verify the operation of the rotary airlock, screw conveyor or other associated dust removal devices. 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 the screw conveyor and drive motor for operation. Where practical, you should check the screw conveyor at both ends to verify that a shaft or coupling is not broken, although such a condition may be indicated by an over heating or high Amps condition of the drive motor.

16. Yearly Baghouse Check

The baghouse should be checked yearly for leaks and/or corrosion of the housing (interior and exterior), check the tubesheet for material build up and deterioration, condition of bags, alignment of blowpipe, poppet valves, dampers and the condition and tension of drive belts on the fan and material removal devices. You should also verify the cleaning cycle of the baghouse, i.e. is each solenoid firing and that each row or compartment in the unit is being cleaned.

Make a general check of the baghouse support structure, access ladders/cages, and the platforms/baghouse roof, and the handrails.

17. Visible Emission/Opacity

A baghouse system will usually lack sufficient moisture/water vapor to cause a steam plume and should otherwise have virtually no visible emissions (VE) from the baghouse discharge point. However, even with low moisture a the hot stacks gas, there can be a detached stem plum 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.

The opacity/visible emission (VE) allowable for all baghouses is five (5) percent. Opacity is essentially a measurement or indication of the amount of light obscured/scattered by particles in the exit gas stream. The measurement of opacity is either made by an in stack-monitoring device or by the unaided human eye, for baghouse opacity determinations it will be the latter, except for the kiln/raw mill baghouse. Opacity is measured over a range of zero (0) to one hundred (100) percent. A trained observer can make opacity determinations over a wide percentage range. However, observations in the ten (10) percent and below range can be very subjective. Furthermore, when observing opacity in the low ranges factors such as sunlight, background color, and the position of the observer relative to the source can greatly bias the results.

Compliance of a point source with an opacity standard is determined by averaging a six minute observation period, taking a reading at a rate of three per minute, which will allow the observer to detect potential changes in opacity due to process variations and/or cleaning events. Particularly for pulse jet baghouses, it is not out of the ordinary to see an increase in opacity after a cleaning event takes place even with the system in good condition. However, this increase sometimes may not be perceptible by the observer.

Although, each baghouse at some point in time will be observed by several the plant employees; on a daily basis. A monthly *one (1)-minute VE (Method 22)* test must be conducted on each unit, except the kiln/raw mill baghouse, finish mill sepol (N09), and finish mill grinding (N12). *Daily six (6)-minute Method 22* tests must be conducted at these units. This method is used only to determine the presence of visible emissions and not the opacity of the emissions, therefore; observer certification is not required. An employee familiar with the process and the principles of baghouse operation can perform the observation.

The observer should position themselves at least fifteen (15) feet from the emission point and where the sun is not directly in the eyes of the observer. Once in position, fill out the observation form (see Fugitive Emission Inspection form) and note the start time and then observe the emission point continuously for required period of time, 1-minute or 6-minutes, and note the end time of the observation. You will need two (2) stopwatches for this method. Use one stopwatch to monitor the duration of the observation period and this stopwatch should continue to total the time period even if there is a break in the observation period. Stop the watch when the break begins, without resetting the elapsed time, and restart the watch when the observation period begins again.

The second stopwatch will be used to record the duration of visible emissions, if any. Start the second stopwatch when you observe visible emissions and stop the watch when the visible emissions stop. Repeat this procedure each time you observe visible emissions. At the end of the observation period the accumulated elapsed time on this watch will the total time emissions were observed.

If visible emissions are observed during Method 22 test, a six (6)-minute Method 9 test must be conducted within one (1)-hour of the observed emissions for all units except two large finish mill units. These units will require a thirty (30)-minute Method 9 test. The Method 9 observer must be a certified observer, with a current certification.

If an individual source has no visible emission, using Method 22, for six (6) consecutive months the testing frequency may be reduced from monthly to semi-annually.

18. Corrective Measures

When a baghouse is continuously over the opacity limit (5%) it is imperative that it and the process it controls is taken off line as soon as possible, so that the source of the problem can be determined and properly addressed. In the cement manufacturing process, due to the particle size on the material captured, a one-quarter (1/4) inch hole is a single bag can cause an opacity that is excess of 5%. When a unit is out of compliance, it should be taken off line within thirty (30) minutes, where the process conditions allow.

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. You may need a trace dye and a black light to pinpoint less obvious/minor bag leaks and dirty side to clean side breaches. The trace dye must be introduced into the baghouse, upstream of the unit, while it is in operation. ***Before or immediately after the baghouse and/or the associated process are taken, the Production Manager and/or the Plant Manager should be notified.***

Once the decision is made to take the unit off-line the appropriate amount of trace dye should introduced into the inlet ductwork of the baghouse (see trace dye instructions). For the best results it is recommended usage for the trace dye is 0.1 lbs. for every 100 square feet of filter cloth or 1 lbs./1000 ft^2 of cloth. Then you may initiate the associated process shut down. Baghouse operation should continue until the process emissions have ceased/stabilized. When process emissions are minimized the baghouse can be shut down to perform a check of the clean side of the tubesheet, using the black light. With the black you may see traces of the dye over a significant area if the bag leak is a large one. However, by shining the black 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 a hole or breach itself 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 complete 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 the unit is in compliance, other than documenting the event and notifying the appropriate manager(s), no further action is needed. If the unit is not in compliance you must repeat the corrective measures.

19. Troubleshooting (Quick Reference)

The main indicator of potential baghouse problems is the Magnahelic (differential pressure) gauge. Depending on factors such as grain loading, gas temperature, and air-to-cloth ratio, the operating rage for pressure drop across the unit will typically be two (2) to six (6) inches of pressure drop. In most cases a pressure outside this range will be an indication of 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 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
    a. Check for loose wiring
    b. Check for dirt in solenoid valve
    c. 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.

C. Secondary Dusting (Dirty Exhaust Air/Visible Emissions)

- At initial start up, if the unit is not brought online by the prescribed procedure, there may be secondary dusting for several hours after start up. This condition will subside as the dust cake is established on the bags.
- Check bags for proper installation and or broken bags.

For Additional Troubleshooting Measures
See attached troubleshooting section

Attachment 1

Troubleshooting

TROUBLESHOOTING

SYMPTOM	CAUSE	CORRECTIVE ACTION
FABRIC FILTER HIGH PRESSURE DROP	PLC Failure, resulting in one or more inoperative circuits.	Inspect PLC for proper operation. Replace if defective.
	Insufficient Compressed Air.	Check compressor for proper operation. Inspect for compressed air system leaks.
	Excessive Air Flow.	Reduce flow rate to design flow rate conditions.
	Re-entrainment, a condition in which the dust which falls from the bags is redeposited on the bags before it can fall into the hopper. This acts like "blinding.	Continuously empty hoppers. Remove plugged dust from hoppers. Ensure proper dust handling operation. Verify that all access covers on screw conveyors are in place. Missing covers permit reverse and turbulent air flow conditions.
	"Blinded" Bags, a condition in which the bags are not cleaned. May be caused by excessive moisture, incomplete combustion or change in dust loading.	
	Pressure indicator malfunction.	Clean out pressure sensor tubing. Check for leaks. Calibrate instrument. Replace instrument.

SYMPTOM	CAUSE	CORRECTIVE ACTION
FABRIC FILTER HIGH PRESSURE DROP (continued)	Outlet poppet valve not closing and/or reverse proper air poppet valve not opening.	Check solenoid valves and pneumatic cylinders for proper operation. Check valve blade for seating.
	Bags not cleaning.	Revise cleaning operation.
FABRIC FILTER LOW PRESSURE DROP (LESS THAN 3" W.C.)	Pressure sensor Line(s) plugged.	Blow back through lines. Protect sensing point from dust buildup.
	Pressure sensor line(s) broken or uncoupled.	Repair.
	Overcleaning of bags.	Modify cleaning settings.
DUST IN THE OUTLET OR EXHAUST STACK	Leaking bag/hole(s) in bag.	Remove and replace the suspect bag(s). Generally, leaking bags will emit dust more noticeably after cleaning. Fluorescent powder and the black light test method may also be used.
AIR VOLUME TOO HIGH	Insufficient static pressure.	Slow down fan.
FAN VIBRATION	Material build-up on wheel.	Clean wheel and rebalance.
	Erosion on corroded wheel.	Replace wheel.
	Bolts on motor or blower housing or foundation loose.	Tighten bolts.

SYMPTOM	CAUSE	CORRECTIVE ACTION
FAN VIBRATION (continued)	Wheel set screws loose.	Tighten.
	Clearance between wheel and housing has changed.	Call manufacturer.
	Drive misaligned.	Realign coupling.
	Worn bearings.	Replace bearings.
SCREW CONVEYOR WEAR	Screw deflection.	Eliminate excessive deflection. Straighten screw.
	RPM too high.	Reduce speed.
	Frequent start/stop.	Cease jogging or change start/stop frequency.
SCREW CONVEYOR END BEARING FAILURE	Material getting into bearing.	Replace seal.
	Insufficient lubrication.	Lubricate properly.
	Shaft slope.	Align screw. Check for deflection.
DUST IN THE OUTLET OR EXHAUST STACK	Bag seal leak; evidenced by dust particle traces around the faulty installed bags.	Inspect snap band for proper seating and either reseat or replace.
	Insufficient filter cake.	Clean less frequently.
INSUFFICIENT AIR FLOW FOR CONTROL OF DUST AT THE SOURCE	Fan malfunction; evidenced by low pressure differential.	Check fan operation.

SYMPTOM	CAUSE	CORRECTIVE ACTION
INSUFFICIENT AIR FLOW FOR CONTROL OF DUST AT THE SOURCE (continued)	Duct blockage; evidence by high pressure differential.	Check ductwork and damper for restriction.
	Duct leaks between the source and the collection unit.	Check ductwork for leaks and seal or replace.
FAILURE TO CONVEY DUST	Screw conveyor and/or rotary valve failure.	Check screw conveyor for blockage and proper rotation and correct if necessary.
	Plugged hopper.	Remove dust from hopper.
	Re-entrainment of dust within collector.	Increase null settings. Modify cleaning settings.
SCREW CONVEYOR HANGER BEARING FAILURE	Incorrect alignment.	Align.
	Overheated.	Align.
	Thrust from pipe on bearing insert.	Check coupling bolts and holes for elongation. Readjust screw/hanger clearances.
MOTOR WON'T START	Motor improperly connected.	Check motor connection and control connections.
	Incorrect line voltage.	Check nameplate for required voltage. Measure voltage at motor terminals.

SYMPTOM	CAUSE	CORRECTIVE ACTION
EXCESSIVE MOTOR BEARING TEMPERATURE - SLEEVE BEARING (continued)	Oil rings not functioning.	Check for damage or reason for binding, roundness, burrs, shaft level, and correct.
	Bearing material torn.	Dress down, scrape, and refit.
	Rough shaft or corrosion.	Dress and polish shaft.
	Bearing misalignment.	Realign bearing or reseat bearing. Check feet flatness and re-shim.
	Coupling misalignment.	Realign motor.
	Shaft current.	Insulate bearing and isolate shaft from ground.
MOTOR EXCESSIVE TEMPERATURE	Overload.	Reduce load to nameplate rating or replace with larger motor.
	Restricted ventilation.	Check openings and ductwork for obstructions and correct.
	Electrical.	Check for grounded or shorted coils and unbalanced voltages between phases.
MOTOR EXCESSIVE VIBRATION	Coupling misalignment.	Realign to operating condition.
	Coupling unbalance.	Rebalance.

SYMPTOM	CAUSE	CORRECTIVE ACTION
EXCESSIVE MOTOR BEARING TEMP - ANTI-FRICTION BEARING (continued)	Inadequate lubrication.	Add lubricant per nameplate instructions.
	Bent shaft.	Replace shaft.
	Coupling misalignment.	Realign unit.
	Inadequate internal clearance.	Incorrect replacement bearing – consult factory.
	Inadequate ventilation.	Clean filters. Check to see if louvers are blocked.
EXCESSIVE MOTOR BEARING TEMPERATURE - SLEEVE BEARING	Inadequate oil supply.	Refer to nameplate requirements and correct. Check for proper fill, oil, leaks, gauge level.
	Excessive end thrust.	Locate cause and eliminate. Check coupling float, shaft level, air baffle balance.
	Contaminated oil.	Draw and refill. If filters are provided, replace with new ones. Determine source of contamination and correct.
	Tight clearance.	Check bore and O.D. clearance.
	Bent shaft.	Straighten and refinish.

SYMPTOM	CAUSE	CORRECTIVE ACTION
MOTOR EXCESSIVE VIBRATION (continued)	Coupling key unbalance.	Rebalance.
	Rotor unbalance.	Rebalance rotor.
	Worn bearing.	Replace bearing.
	Coupled equipment.	Check uncoupled and, if necessary, rebalance equipment.
	Shaft straightness.	Straighten without residual stress to avoid springback or replace shaft.
REDUCED COMPRESSED AIR PRESSURE	Restrictions in piping.	Check piping.
	Dryer plugged.	Replace desiccant.
	Supply line too small.	Consult design.
	Compressor inefficient and/or undersized.	Consult manufacturer.
BAG FAILURE	Bag material improper for chemical composition of gas or dust.	Analyze gas and dust and check with manufacturer. Treat gas with neutralizer prior to entering fabric filter.
	Cleaning cycle too frequent.	Slow down cleaning.
PLUGGED HOPPER	Moisture in fabric filter.	
	Dust being stored in hopper.	Remove dust continuously. Inspect dust removal system.

SYMPTOM	CAUSE	CORRECTIVE ACTION
EXCESSIVE MOTOR BEARING TEMPERATURE - SLEEVE BEARING (continued)	Oil rings not functioning.	Check for damage or reason for binding, roundness, burrs, shaft level, and correct.
	Bearing material torn.	Dress down, scrape, and refit.
	Rough shaft or corrosion.	Dress and polish shaft.
	Bearing misalignment.	Realign bearing or reseat bearing. Check feet flatness and re-shim.
	Coupling misalignment.	Realign motor.
	Shaft current.	Insulate bearing and isolate shaft from ground.
MOTOR EXCESSIVE TEMPERATURE	Overload.	Reduce load to nameplate rating or replace with larger motor.
	Restricted ventilation.	Check openings and ductwork for obstructions and correct.
	Electrical.	Check for grounded or shorted coils and unbalanced voltages between phases.
MOTOR EXCESSIVE VIBRATION	Coupling misalignment.	Realign to operating condition.
	Coupling unbalance.	Rebalance.

Attachment 2

Facility Baghouse Listing

SAC Baghoues Specifications & Design Data

Emission Control Unit		Equip. No.	Amerex Model No.	Bag Material	No. of Bags	Bag Size	Bag Area	Cloth Area	Design ACFM	A-C Ratio	Temp. Deg. F	Delta P (-) INWG	Stack Dia. '
Kiln/Raw Mill (8 Comps.) *	1	E21-01	RA-35-180-D12	Fiberglass w/SGT	1,440	12" X 35'	109.96	158,337	220,000	1.39	450	12	9.42
Finish Mill, Sepol No.1 (W), **	2	N09-01	RP-12-770 D6	16 Oz. Singed Poly. DD	1540	6" X 12'	18.85	29,028	128,600	4.43	158	21	7.6
Finish Mill, Mill No.2 (E)	3	N12-01	RP-12-420 D6	16 Oz. Singed Poly. DD	420	6" X 12'	18.85	7,917	35,000	4.42	203	15	4
Finish Mill Baghouse No. 3 (E)	4	N91-01	RP-10-72 D6	16 Oz. Singed Polyester	72	6" X 10'	15.71	1,131	6,000	5.31	200	10	
Fringe Cement Silo	5	**N36-01**	RP-10-49 D6	16 Oz. Singed Polyester	49	6" X 10'	15.71	770	4,000	5.20	130	8	
Aeropol @ Homogenizing Silo	6	E28-01	RP-10-36 D6	14 Oz. Singed Nomex	36	6" X 10'	15.71	565	3,000	5.31	300	10	
Off Spec. Feed Handling	7	**E34-01**	RP-10-25 D6	14 Oz. Singed Nomex	25	6" X 10'	15.71	393	2,000	5.09	300	10	
Homogenizing Silo Inlet	8	G07-01	RP-10-182 D6	16 Oz. Singed Polyester	182	6" X 10'	15.71	2,859	15,000	5.25	200	10	
Poldos Blend Silo Outlet	9	H08-01	RP-10-25 D6	16 Oz. Singed Polyester	25	6" X 10'	15.71	393	2,000	5.09	200	10	
Coal Mill No. 1, East	10	S17-01	Merrick	16 Oz.Ept.Singed Ploy.	140	6" X 14'	21.99	3,079	12,500	4.06	150	35	
Coal Mill No. 2, West	11	S17-01	Merrick	16 Oz.Ept.Singed Ploy.	140	6" X 14'	21.99	3,079	12,500	4.06	150	35	
Coal Mill No. 3, South	12	S21-01	RP-12-35 D5	16 Oz. Singed Polyester	35	5" X 12'	15.71	550	2,000	3.64	150	6	
Clinker Cooler Conv./Breaker	13	L03-01	RP-10-36 D6	16 Oz. Singed Polyester	36	6" X 10'	15.71	565	3,000	5.31	300	10	
Clinker Silo, Inlet	14	L06-01	RP-10-140 D6	16 Oz. Singed Polyester	140	6" X 10'	15.71	2,199	6,000	2.73	300	10	
Gyp/OS Clinker Transport	15	**L25-01**	RP-10-49 D6	16 Oz. Singed Polyester	49	6" X 10'	15.71	770	4,000	5.20	90	10	
Clinker Conveyor (South)	16	M08-01	RP-10-72 D6	16 Oz. Singed Polyester	72	6" X 10'	15.71	1,131	6,000	5.31	212	10	
Clinker Conveyor (North)	17	**M09-01**	RP-10-36 D6	16 Oz. Singed Polyester	36	6" X 10'	15.71	565	3,000	5.31	90	10	
Cement Transport Conveyor	18	**P03-01**	RP-10-36 D6	16 Oz. Singed Polyester	36	6" X 10'	15.71	565	3,000	5.31	130	8	
Cement Silo Input	19	**P11-01**	RP-10-182 D6	16 Oz. Singed Polyester	182	6" X 10'	15.71	2,859	15,000	5.25	130	10	
Truck Load-out No. 1 (E)	20	Q14-01	RP-10-36 D6	16 Oz. Singed Polyester	36	6" X 10'	15.71	565	3,000	5.31	130	8	
Truck Load-out No. 2 (W)	21	Q17-01	RP-10-36 D6	16 Oz. Singed Polyester	36	6" X 10'	15.71	565	3,000	5.31	130	8	
Railcar Load-out	22	Q24-01	RP-10-56 D6	16 Oz. Singed Polyester	56	6" X 10'	15.71	880	3,000	3.41	130	8	
				Totals	**4,783**			**217,886**					

The visible emissions (VE) limit on all baghouses is 5%

* 7 Compartments (180 Bags/Compt. = 138,545 ft^2 Cloth Area, 1.59 AC Ratio

* 6 Compartments (180 Bags/Compt. = 118,752 ft^2 Cloth Area, 1.85 AC Ratio

File: SAC Baghouse Design Data.xls

Reverse Air Recommended AC Ratio - 1.5 - 2.0

**** - Two 770 bag units**

The Merrick S17's have epithropic (grounded) bags & S/S cages

Bag Area Square Feet=(Dia." X 3.1416 X Length")/144 In^2/Ft^2

Attachment 3

Baghouse Inspection Forms

SAC Weekly Baghouse Inspection

Date: ____________________ Inspected By: ______________________________

Baghouse		Equip. No.	Delta P "H_2O	Air Header PSI	Emission Point VE		Access Doors or Covers Ok		Poppet or Solenoid Valves Ok		Hopper/ Material Discharge Ok	
					Yes	No	Yes	No	Yes	No	Yes	No
Kiln/Raw Mill (8 Comps.)	1	E21-01										
Finish Mill, Sepol No.1 (W)	2	N09-01										
Finish Mill, Mill No.2 (E)	3	N12-01										
Finish Mill Baghouse No. 3 (E)	4	N91-01										
Fringe Cement Silo	5	N36-01										
Aeropol @ Homogenizing Silo	6	E28-01										
Off Spec. Feed Handling	7	E34-01										
Homogenizing Silo Inlet	8	G07-01										
Poldos Blend Silo Outlet	9	H08-01										
Coal Mill No. 1, East	10	S17-01										
Coal Mill No. 2, West	11	S17-01										
Coal Mill No. 3, South	12	S21-01										
Clinker Cooler Conv./Breaker	13	L03-01										
Clinker Silo, Inlet	14	L06-01										
Gyp/OS Clinker Transport	15	L25-01										
Clinker Conveyor (South)	16	M08-01										
Clinker Conveyor (North)	17	M09-01										
Cement Transport Conveyor	18	P03-01										
Cement Silo Input	19	P11-01										
Truck Load-out No. 1 (E)	20	Q14-01										
Truck Load-out No. 2 (W)	21	Q17-01										
Railcar Load-out	22	Q24-01										

During the inspection you must note readings and verify the operation of the items listed. Enter check marks Yes No to indicate item status. For any item not operating or functioning as it should enter "No" and follow up with the shift supervisor or maintenance so that appropriate action and/or repairs may be initiated.

Notes: ____

____

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le: SAC Weekly Baghouse Inspection.xls

SAC Quarterly Bagnouse Inspection

Emission Control Unit		Epuip. No.	Access Doors & Hatches	Air Line Fittings Valves	Drain Air Header	Rotary Air Lock	Flop Gates	Inlet & Outlet Ducts	Screw Conveyor/ Air Slide	Fan & Housing	Drive Belts or Chains
Kiln/Raw Mill (8 Comps.)	1	E21-01									
Finish Mill, Sepol No.1 (W)	2	N09-01									
Finish Mill, Mill No.2 (E)	3	N12-01									
Finish Mill Baghouse No. 3 (E)	4	N91-01									
Fringe Cement Silo	5	N36-01									
Aeropol @ Homogenizing Silo	6	E28-01									
Off Spec. Feed Handling	7	E34-01									
Homogenizing Silo Inlet	8	G07-01									
Poldos Blend Silo Outlet	9	H08-01									
Coal Mill No. 1, East	10	S17-01									
Coal Mill No. 2, West	11	S17-01									
Coal Mill No. 3, South	12	S21-01									
Clinker Cooler Conv./Breaker	13	L03-01									
Clinker Silo, Inlet	14	L06-01									
Gyp/OS Clinker Transport	15	L25-01									
Clinker Conveyor (South)	16	M08-01									
Clinker Conveyor (North)	17	M09-01									
Cement Transport Conveyor	18	P03-01									
Cement Silo Input	19	P11-01									
Truck Load-out No. 1 (E)	20	Q14-01									
Truck Load-out No. 2 (W)	21	Q17-01									
Railcar Load-out	22	Q24-01									

Place a check mark for each item and NW (needs work) for any item that needs to be repaired of replaced. A work should be generated for any item with NW indicated and the maintenance department should follow-up with notification work order completion. An item that could potentially result in non-compliance must receive immediate attention.

SAC Yearly Bag. .use Inspection

Emission Control Unit		Epuip. No.	Baghouse		Condition of		Inlet	RPM		Screw Conveyor Drive	Reverse Air Fans	Cleaning Cycle Freqcy.
			Interior	Exterior	Bags	Tubesheet	Baffle	Motor	Fan			
Kiln/Raw Mill (8 Comps.)	1	E21-01										
Finish Mill, Sepol No.1 (W)	2	N09-01									NA	
Finish Mill, Mill No.2 (E)	3	N12-01									NA	
Finish Mill Baghouse No. 3 (E)	4	N91-01									NA	
Fringe Cement Silo	5	N36-01									NA	
Aeropol @ Homogenizing Silo	6	E28-01									NA	
Off Spec. Feed Handling	7	E34-01									NA	
Homogenizing Silo Inlet	8	G07-01									NA	
Poldos Blend Silo Outlet	9	H08-01									NA	
Coal Mill No. 1, East	10	S17-01									NA	
Coal Mill No. 2, West	11	S17-01									NA	
Coal Mill No. 3, South	12	S21-01									NA	
Clinker Cooler Conv./Breaker	13	L03-01									NA	
Clinker Silo, Inlet	14	L06-01									NA	
Gyp/OS Clinker Transport	15	L25-01									NA	
Clinker Conveyor (South)	16	M08-01									NA	
Clinker Conveyor (North)	17	M09-01									NA	
Cement Transport Conveyor	18	P03-01									NA	
Cement Silo Input	19	P11-01									NA	
Truck Load-out No. 1 (E)	20	Q14-01									NA	
Truck Load-out No. 2 (W)	21	Q17-01									NA	
Railcar Load-out	22	Q24-01									NA	

Place a check mark or OK for each item and "NW" (needs work) for any item that needs to be repaired of replaced. A work should be generated for any item with NW indicated and the maintenance department should follow-up with notification work order completion. An item that could potentially result in non-compliance must receive immediate attention. If the item cannot be visually inspected due to unit operation indicate "U" (unavailable)

File: SAC Yearly BH Inspection.xls

Attachment 4

Baghouse Mapping Forms

N ⇐

Kiln/Raw Mill Baghouse - Bag Installation Map

Installed By: ____________

Position No.

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
A	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
O	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 1

Date:

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
A	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
O	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 3

Date:

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
A	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
O	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 5

Date:

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
A	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
O	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 7

Date:

Position No.

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
O	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
A	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 2

Date:

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
O	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
A	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 4

Date:

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
O	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
A	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No.6

Date:

Row No.	1	2	3	4	5	6	7	8	9	10	11	12
O	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O
A	O	O	O	O	O	O	O	O	O	O	O	O

Compartment No. 8

Date:

Place an X on or line through the bag(s) or comparpment(s) replaced

Finish Mill No. 2 (S) Bag Installation Map

Compressed Air Header

Row No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Position
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	A
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	B
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	C
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	D
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	E
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	F
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	G
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	H
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	I
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	J
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	K
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	L
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	M
	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	N

Installed By: ______________________

Date: ______________________

420 Bags	Unit
Finish Mill No. 2 (N)	N12-01

File: Finish Mill No. 2 (S) Bag Map.xls

Finish Mill No. 1 (N) Bag Installation Map

1540 Bags, 770/Side	Unit
Finish Mill No. 2 (N)	N09-01

Installed By: ______________________ Date: ______________________

Compressed Air Header

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
A	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
N	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Row No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

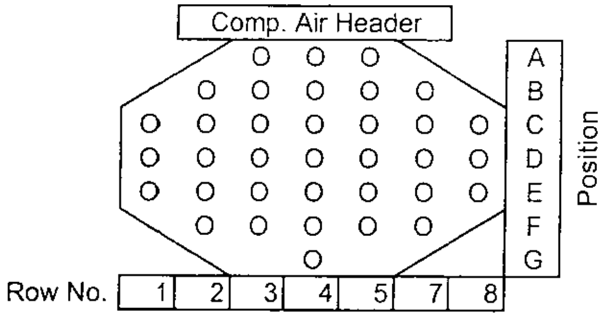
Row No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
N	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
M	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
L	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
K	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
J	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
I	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
H	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
G	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
F	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
E	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
D	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
C	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
B	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
A	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Compressed Air Header

File: Finish Mill No. 1 (N) Bag Map.xls

"X" out the bag(s) replaced and indicate the unit(s) in which the change took place

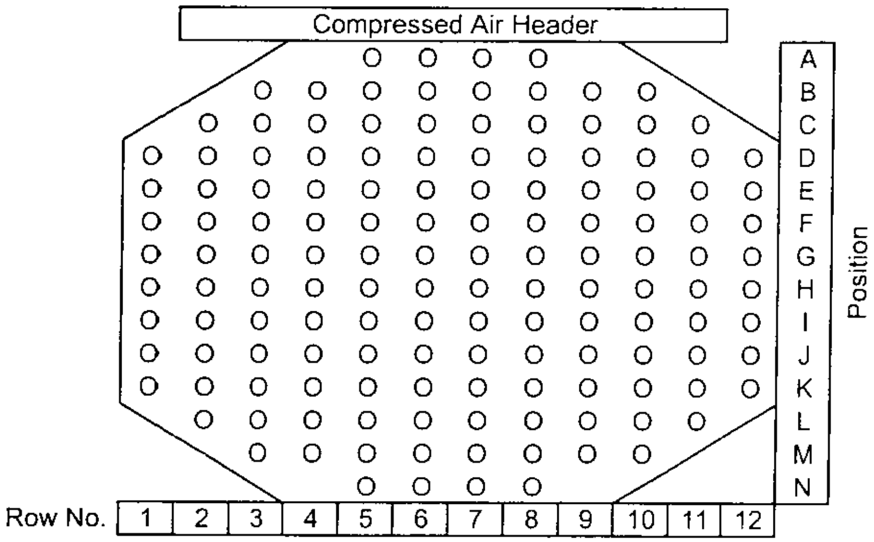
Coal Mill Baghouse Bag Installation Map



Installed By: ______________________

Date: ______________________

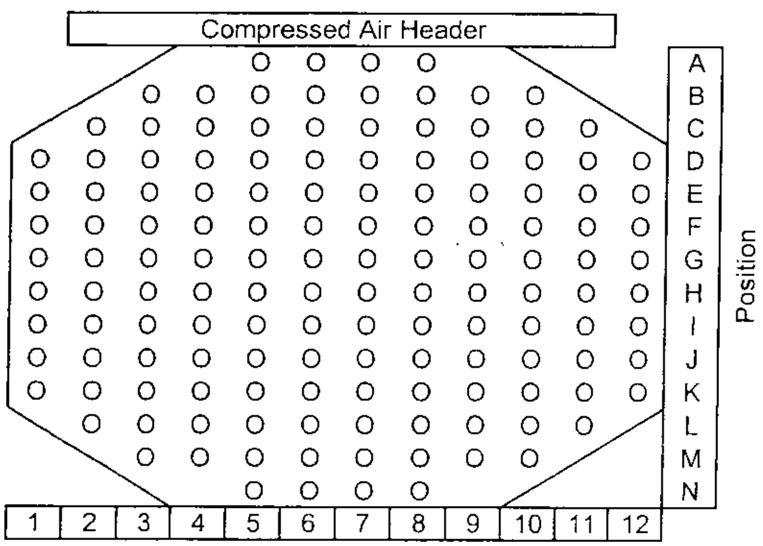
35 - Bag	Unit
Coal Mill No. 3 East	S21-01



Installed By: ______________________

Date: ______________________

140 - Bag	Unit
Coal Mill No. 1 North	S17-01



Installed By: ______________________

Date: ______________________

140 - Bag	Unit
Coal Mill No. 2 South	S17-01

X" out the bag(s) replaced and indicate the unit(s) in which the change took place

ile: Coal Mill BH Bag Maps.xls

Baghouse Bag Installation Map

Installed By: ______________________ Date: ______________

Comp. Air Header						
	O	O	O	O	O	A
	O	O	O	O	O	B
	O	O	O	O	O	C
	O	O	O	O	O	D
	O	O	O	O	O	E
Row No.	1	2	3	4	5	Position

25 - Bag		Unit
Off Spec. Feed Handling	E34-01	
Poldos	H08-01	

Installed By: ______________________ Date: ______________

Comp. Air Header							
	O	O	O	O	O	O	A
	O	O	O	O	O	O	B
	O	O	O	O	O	O	C
	O	O	O	O	O	O	D
	O	O	O	O	O	O	E
	O	O	O	O	O	O	F
Row No.	1	2	3	4	5	6	Position

36 - Bag		Unit
Aeropol @ Blend Silo	E28-01	
Clinker Cooler Conv./Breaker	L03-01	
Clinker Conveyor (South)	M09-01	
Cement Transport Conveyor	P03-01	
Truck Load-out (East)	Q14-01	
Truck Load-out (West)	Q17-01	

Installed By: ______________________ Date: ______________

Comp. Air Header								
	O	O	O	O	O	O	O	A
	O	O	O	O	O	O	O	B
	O	O	O	O	O	O	O	C
	O	O	O	O	O	O	O	D
	O	O	O	O	O	O	O	E
	O	O	O	O	O	O	O	F
	O	O	O	O	O	O	O	G
Row No.	1	2	3	4	5	6	7	Position

49 - Bags		Unit
Fringe Cement Silo	N36-01	
Gyp/Off Clinker Transport	L25-01	

"X" out the bag(s) replaced and indicate the unit(s) in which the change took place
If bags in multiple units of the same size are changed on the same day, use a separate sheet for each unit

File: Bag Replacement Maps-1.xls

Baghouse Bag Installation Map

Installed By: ______________________________ Date: ______________________

	Comp. Air Header								
O	O	O	O	O	O	O	O	A	Position
O	O	O	O	O	O	O	O	B	
O	O	O	O	O	O	O	O	C	
O	O	O	O	O	O	O	O	D	
O	O	O	O	O	O	O	O	E	
O	O	O	O	O	O	O	O	F	
O	O	O	O	O	O	O	O	G	
O	O	O	O	O	O	O	O	H	
O	O	O	O	O	O	O	O	I	

Row No.	1	2	3	4	5	6	7	8

72 - Bags	Unit
Finish Mill No. 3 (E)	N91-01
Clinker Conveyor (N)	M08-01

Installed By: ______________________________ Date: ______________________

	Comp. Air Header										
O	O	O	O	O	O	O	O	O	O	A	Position
O	O	O	O	O	O	O	O	O	O	B	
O	O	O	O	O	O	O	O	O	O	C	
O	O	O	O	O	O	O	O	O	O	D	
O	O	O	O	O	O	O	O	O	O	E	
O	O	O	O	O	O	O	O	O	O	F	
O	O	O	O	O	O	O	O	O	O	G	
O	O	O	O	O	O	O	O	O	O	H	
O	O	O	O	O	O	O	O	O	O	I	
O	O	O	O	O	O	O	O	O	O	J	
O	O	O	O	O	O	O	O	O	O	K	
O	O	O	O	O	O	O	O	O	O	L	
O	O	O	O	O	O	O	O	O	O	M	
O	O	O	O	O	O	O	O	O	O	N	

Row No.	1	2	3	4	5	6	7	8	9	10

140 - Bags	Unit
Clinker Silos	L06-01

"X" out the bag(s) replaced and indicate the unit(s) in which the change took place

If bags in multiple units of the same size are changed on the same day, use a separate sheet for each unit

File: Bag Replacement Maps-2.xls

Attachment 5

Visible Emissions Forms

Suwannee American Cement
Method 22 Visible Emissions Form

Observer: ______________________ Date: ______________

Process/Unit: ______________________ Source Equipment No.: ____________

Sky Conditions:	Clear		Partly Sunny		Partly Cloudy		Over Cast	

Precipitation:	Yes			No	

Wind Direction:	
Wind Speed ~MPH:	

Temperature		Degrees F

Direction To Source:	

Layout Sketch:
Sketch the process unit and indicate observer position relative to the source and the sun.
Also, indicate the potential/actual emission point of the unit

Observation Period:

		Stopwatch 1	Stopwatch 2
Start Clock Time	End Clock Time	Period Duration Min:Sec	Emissions Duration Min:Sec

File: Method 22 Form.xls

Six Minute Visible Emission

Suwannee American Cement
5117 US HWY 27
Branford, FL 32008
Phone 386-935-0966

Facility ID No.			Minutes	0	15	30	45
Process/Equipment	**Finish Mill - Finish Grinding**		1				
Operating Rate TPH			2				
Dust Collector No.	**N12**		3				
Emission Point Height	131'		4				
	Start	Stop	5				
Relative To Observer			6				
Distance From Observer			Average Opacity		#DIV/0!		
Direction From Observer			Reading Above 5%				
Emission Color							

Seconds: 0, 15, 30, 45

Plum Type			Describe Background
☐	Continuous		
☐	Intermittent	Start	
☐	Attached	Stop	
☐	Detached		

	Yes	No		Background Color
Water Droplets Present In Plum			Start	
			Stop	

Point In The Plum At Which Opacity Was Determined

Start		Inches or Feet After Exist
Stop		Inches or Feet After Exist

	Start	Stop
Sky Conditions		
Wind Speed		
Wind Direction		
Ambient Temperature		

File: Six Minute VE Form.BH.xls

Six Minute Visible Emission

Suwannee American Cement
5117 US HWY 27
Branford, FL 32008
Phone 386-935-0966

				Seconds			
Facility ID No.			Minutes	0	15	30	45
Process/Equipment	**Finish Mill - Sepol/Separator**		1				
Operating Rate TPH			2				
Dust Collector No.	**N09**		3				
Emission Point Height	131'		4				
	Start	Stop	5				
Relative To Observer			6				
Distance From Observer			Average Opacity			#DIV/0!	
Direction From Observer			Reading Above 5%				
Emission Color							

Plum Type	☐	Continuous		Describe Background
	☐	Intermittent	Start	
	☐	Attached	Stop	
	☐	Detached		
				Background Color
	Yes	No	Start	
Water Droplets Present In Plum			Stop	

Point In The Plum At Which Opacity Was Determined		
Start		Inches or Feet After Exist
Stop		Inches or Feet After Exist

	Start	Stop
Sky Conditions		
Wind Speed		
Wind Direction		
Ambient Temperature		

Suwannee American Cement
Branford, Florida

ELECTROSTATIC PERCIPITATOR OPERATION AND MAINTENANCE PLAN

April 16, 2004

File: ESP O&M Plan.doc

Table of Contents

Section

1. Introduction

Suwannee American Cement (SAC) operates a limestone quarry and a cement production facility at this location. Limestone is mined /stockpiled and then mixed with other raw materials which provide an addition source of iron and aluminum, in designed proportions, to produce a ground mixture of kiln feed. The additional raw materials used will include coal ash, bauxite, sand, and mill scale. The kiln feed will have sufficient chemical properties to produce clinker when it is subjected to high temperatures of the preheater, precalciner and rotary kiln. The clinker produced by the pyroprocess. As the clinker is introduced into the finish (grinding) mill a small percentage of gypsum is added to produce portland cement.

SAC is committed to operating facility in a manner that will comply with applicable federal, state, and local environmental regulations.

2. Purpose

The purpose of this plan is to effectively operate and maintain the Electrostatic Precipitator (ESP).

It is a regulatory requirement for SAC develop and implement a ESP Operations & Maintenance Plan (O&M Plan) to ensure the effective operation. The routine monitoring and maintenance of emission control units is essential for the optimum performance/capture efficiency of the units.

The facility has one ESP which controls particulate emissions from the clinker cooler.

Section 3

Description

DESCRIPTION

The precipitator is a single chambered unit having four (4) mechanical fields in the direction of the gas flow. Each mechanical field consists of collecting plates and discharge elements enclosed in an externally stiffened rigid frame casing design. The casing is composed of a hot roof and side walls manufactured from 3/16" thick ASTM-A36 plate and external A36 hot rolled sections. The hot roof is designed to withstand the full operating pressure of the precipitator plus the pressurization of the purge air unit. The each hot roof panel includes a 20 inch x 30 inch quick opening access door for access to the high voltage frames and collecting plates inside the precipitator. The cold roof includes two 20 inch x 30 inch quick opening doors for access to the high voltage insulators and the hot roof below. A perforated gas distribution device is located across the inlet and outlet chambers for efficient entry and exit of the flue gasses.

The precipitator contains the following major components:

1. One (1) Weather Enclosure
2. Four (4) Electric Fields with one (1) High Frequency Switched Mode Power Supply per electrical field.
3. Eight (8) High Voltage Insulators
4. One (1) Electromagnetic Rapping System
5. One (1) Microprocessor Rapper Controller
6. One (1) Penthouse Pressuring Air System
7. One (1) each Inlet and Outlet Plenum
8. Two (2) Hoppers for collection of dust with Hopper Level Probes
9. Two (2) Knife Gates at the discharge of the hoppers
10. Two (2) Double Dump Tipping Valves
11. One (1) Screw Conveyor
12. Structural Support
13. Ladders, Stairs and Accessways

Section 4

Precipitator Parts

PRECIPITATOR PARTS

The interior part of each field consists of an intermeshing system of grounded collecting surfaces and independently hung discharge electrodes.

Collecting Surfaces

The COLLECTING SURFACES consist of panels 10'-7" wide x 38'-0" long, fabricated of 18 gauge ribbon plate and supporting tubes. The collecting surfaces are supported from upper support channels. These channels are then hung from the casing girders by 1" diameter mine bolts to allow for proper expansion of the internal equipment without undue stresses during start-up and shut down.

The lower end of each collecting plate curtain is guided by an alignment bar via a loose slip joint.

Discharge Electrodes

The DISCHARGE ELECTRODES are of a rigid design. These rigid electrodes are composed of 1-1/2" diameter by 14 gauge supporting tubes with 14 gauge corona generating elements resistance welded along wither side of the length of the tube.

The electrodes are guided by ASTM A36 structural steel alignment frames below and are kept in position by two (2) alumina anti – sway bars mounted from the lower frame. The electrodes are supported from above by ASTM A36 hanger frames isolated from ground by two (2) alumina barrel type compression insulators above the gas passage of the precipitator.

Rappers

MERRICK has utilized a 240 volt electromagnetic drop hammer type rapper mounted on the precipitator roof to clean the collecting plates, the discharge electrodes and the inlet perforated gas distribution plates. The electromagnetic rappers are solenoid type devices designed for high reliability with one (1) moving part. The rappers are located on the precipitator roof, out of the gas stream, for ease of inspection, maintenance and adjustments.

The COLLECTING PLATE RAPPING SYSTEM is composed of a rapping shaft fabricated from 2" diameter steel is fitted to the collecting plate support channels on one end and protrudes from the roof of the precipitator. This allows for maximum transition of rapping blows directly to the collecting surfaces. The rapper shaft is enclosed in a 4" diameter Schedule 40 pipe with a flexible hypalon boot seal to maintain the integrity of the precipitator's gas tight casing.

The DISCHARGE RAPPING SYSTEM is composed of a 2" diameter insulated shaft fabricated from reinforced fiberglass and tapered at each end. One end is fitted to the high voltage system support shaft via a dual tapered fitting. The other end is fitted to a tapered impact cap. This cap protrudes from the top of the precipitator roof. The rapper shaft is enclosed in a 4" diameter Schedule 40 pipe with a flexible hypalon boot seal to maintain the integrity the precipitator's gas tight casing.

The DISTRIBUTION PLATE RAPPING SYSTEM is composed of a rapping anvil, which is connected to the distribution plate itself. Attached to this is a rapping shaft fabricated from 2" diameter steel. The shaft protrudes from the roof of the precipitator nozzle. This allows for maximum transition of rapping blows directly to the center of the distribution plates. The rapper shaft is enclosed in a 4" diameter Schedule 40 pipe with a flexible hypalon boot seal to maintain the integrity of the precipitator's gas tight casing.

Section 5

Operation

OPERATION

Operation of the precipitator depends upon the creation of an electrostatic field to electrically charge the dust particles in the gas stream as it passes through the precipitator and the subsequent collection and removal of these particles from the precipitator. The electrostatic field is established by stepping up low voltage alternating current with a transformer, and changing the resulting high voltage alternating current to high voltage unidirectional current with a rectifier. The rectified current is then delivered to a system of high voltage electrodes, which are suspended within and insulated from another system of uniformly spaced collecting surfaces. The high voltage electrodes create the electrostatic field within the spaces between collecting surfaces. The dust particles in the gas stream are then charged as they pass through the electrostatic field. The majority of the particles are charged negatively or opposite in polarity to that of the collecting surfaces, and are thus attracted to the surfaces and adhere thereto until removed. The remainder of the particles are attracted to the high voltage electrodes. This collected material is periodically removed by a system of rappers, and falls by gravity onto the bottom of the precipitator where it is carried out of the precipitator.

The precipitator is energized after the introduction of flue gas into the system as follows:

1. Energy is brought to the precipitator power supplies and rapper control panel when the breakers in the power distribution panel are closed.

2. The power supplies and rapper control panel are energized by engaging the local disconnects.

3. The high voltage power supplies are energized by selecting the respective power supply on the control screen and pressing the HV ON selection on the menu.

4. The rapping system is energized by selecting RUN from the menu.

5. The precipitator will then operate in its pre-configured mode of operation. To modify the mode of operation please see the independent manuals for the rapper controller and the power supplies.

While the precipitator is in operation, the controls operate automatically to maintain optimum input power to the high voltage system.

Precipitator Operating Voltage

The highest efficiency of collection is usually obtained when the MERRICK precipitator is operated at the maximum voltage than can be maintained without excessive sparking. The term "sparking" is used to designate sharp, snappy sparks, which ordinarily occur occasionally at various points in the precipitator. This sparking is not accompanied by a heavy current flow, but may cause the ammeter to fluctuate slightly.

Under normal conditions, occasional sparking in the precipitator is not at all objectionable; on the contrary, it indicates that maximum voltage is being used. Should this sparking become too frequent or approach a steady power arc, the voltage control will operate to reduce the voltage.

In order to maintain maximum voltage, all points of all high voltage electrodes must be equidistant from the collecting elements. All members passing though the annular, rings or shrouds must be centered therein and kept away from any grounded part of the precipitator casing.

Any unequal spacing or projection will lower the arcing voltage for the entire field or group of fields receiving high voltage current from and electrical set. Just as a chain is only as strong as its weakest link, the voltage that can be applied to a precipitator field is determined by the weakest point, (i.e., where the electrical clearance is the least).

Deposits of precipitated material on the electrodes will also affect the voltage and must not be allowed to accumulate.

The gas temperature and moisture and also the characteristics and concentration of the suspended particles produced by the plant operation, all affect the operating voltage of the MERRICK precipitator.

It is important, therefore, that the operator has an understanding of the extent and manner in which the efficiency of electrostatic precipitation may be affected by these conditions.

An increase in temperature of the gas usually lowers the spark over voltage, the voltage at which sparks begin to occur. The introduction of steam, atomized water or acid sprays will usually increase this voltage and lower the current flow at the same time. A high concentration of suspended particles in the gas tends to also increase this voltage and decrease the current.

The polarity of the discharge electrode should always be negative. When operating with negative polarity, the precipitator efficiency is higher than when operating with positive polarity because with negative polarity it is possible to operate at higher voltage. Rectifiers are installed to always deliver current of negative polarity to the precipitator.

Precipitator Operating Temperature

In order to prevent condensation, it is essential that all parts of the MERRICK Precipitator be maintained at an operating temperature greater than the dew point of the gases being treated. Severe corrosion generally results when condensation occurs in the presence of alkali, chlorides, sulfides or other corrosive agents that may be present in the gas stream.

Further, the presence of moisture on the collecting elements will form a mud, which is extremely sticky and therefore, difficult and expensive to remove. This can be prevented by allowing the gases to pass through the precipitator untreated until the unit is above the dew point, prior to applying power to the precipitator. In some cases this is possible; however, many EPA permits today do not allow this practice. Under these conditions it is advisable to warm the precipitator to the operating point and then manually activate the rapping system to clean up any sticky dust accumulated on the internals.

Section 6

Maintenance

MAINTENANCE

Precipitator Maintenance Procedure

The MERRICK Precipitator, like all operating equipment, needs routine cleaning, lubrication and adjustment to keep it in first class condition.

It is strongly recommended that a competent engineer or operator be appointed to be responsible for the operation and maintenance of the precipitator installation. The required maintenance work should be supervised or performed by them.

A suggested MINIMUM maintenance routine is as follows:

DAILY:

1. Take control board readings (preferably hourly or at least once per shift)
2. Check that all insulator compartments are receiving proper ventilation.
3. Walk down rapping system and check rapper operation.
4. Check ash handling system operation.

WEEKLY:

1. Remove dust and foreign matter from electrical equipment.
2. Check signal lights to see that they are functioning properly.
3. Check purge air unit filter.

SHUT DOWN

1. Clean the insulators in the precipitator penthouse as well as all other insulators.

2. Thoroughly inspect the entire interior of the unit. Any necessary adjustments or repairs should be immediately undertaken. Particular attention should be given to the high voltage electrodes. (REMEMBER – The electrodes should be equidistant from the adjacent collecting surfaces) Misalignment of even a single electrode reduces the electrical clearance between the high voltage electrodes and collecting surfaces, resulting in a serious reduction of collecting efficiency.

The intent of the foregoing procedure is to keep the electrical equipment clean and dust free and to insure preventative maintenance for other vital parts. Due to the variation in different plants, it may be necessary to increase the frequency of this maintenance for a particular plant.

Professional Engineer Review and Certification

Brooks & Associates, Inc.
Engineering and Environmental Consulting

April 20, 2005

Mr. Jim Pennington
Division of Air Resources
Department of Environmental Protection
2600 Blair Stone Road, MS # 5500
Tallahassee, Florida 32399-2400

SUBJECT: Response to Request for Additional Information (RAI), March 31, 2005

Suwannee American Cement – Branford Plant
DEP File No. 1210465-014-AC (PSD-FL-352)
Proposed New Kiln at the Branford Cement Plant in Suwannee County, Florida

Dear Mr. Pennington:

I, the undersigned, hereby certify that:

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in the above referenced Application for Air Permit, and in this Response to the Request for Additional Information (RRAI) when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application and RRAI are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application,and RRAI based solely upon the materials, information and calculations submitted with this application and RRAI.

I further certify that the engineering features of each such emissions unit described in this application and RRAI have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering

5068 NW 85th Rd. Coral Springs, FL 33067
Phone: (954) 796-1987 Fax: (954) 796-1984

principles applicable to the control of emissions of the air pollutants characterized in this application.

Should you have any questions, please feel free to contact the appropriate party.

Sincerely,

Stephanie S. Brooks, PE