

VOID

ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY  
DIVISION OF AIR POLLUTION CONTROL

Summary Report Relative to Permit Application

**Submitted By:** Ash Grove Cement Company  
Foreman (Little River County)

**CSN:** 410001

**Permit No.:** 75-AR-6

**Date Issued:** 7/8/91

**Submittals:** April 4, 1991; May 1, 1991

**Summary**

The Ash Grove Cement Company owns and operates a portland cement plant near Foreman. Ash Grove is requesting that their permit be modified allowing them to change the outlet nozzles of the ESPs so that each cement kiln will vent to a single stack. Currently each cement kiln has two stacks. This modification will simplify testing and monitoring of the kilns.

Emissions will not be increased as a result of this permit nor will Ash Grove be allowed to modify their method of operation.

Ash Grove uses the wet process to make cement. In this process limestone slurry is added to one of three rotary kilns. The slurry is fed into the upper end of the kiln and travels slowly to the lower end. As the material travels towards the flame it is dried, decarbonated, and calcined. Finally, at the lower end of the kiln, the material burns and fuses together to form clinker. The clinker is cooled, mixed with gypsum, and ground to the desired fineness. After grinding, the cement is stored for later packaging and shipping.

Each kiln is equipped with an electrostatic precipitator (ESP) which controls particulate emissions and each ESP has two stacks. After the modifications to the facility are made, each ESP will have one stack. The three clinker coolers (which once had their own stacks) are ducted to one baghouse (SN-7).

**Installation:** Summer 1991  
**Control Equipment:** N/A  
**Reviewed By:** Mike Porta  
**Applicable Regulation:** Air Code SIP

**Operation:** Summer 1999  
**Total Project:** \$600,000  
**Approved By:** James B. Jones Jr.

### Specific Conditions

1. The permittee shall maintain and operate the KVB gas monitoring system as described in Attachment I to this permit.
2. The permittee shall continue to calibrate, maintain, and operate a continuous monitoring system, and record the output of the system, for measuring total hydrocarbon emissions to the atmosphere from each kiln capable of burning WDF. This data may be used for enforcement purposes and to determine compliance with this permit and with all applicable State and Federal regulations.
3. The feed of WDF to any kiln shall be stopped if the exhaust gases of that kiln have a hourly averaged total hydrocarbon (THC) concentration greater than 20 ppm as measured by a total hydrocarbon analyzer. The waste feed may not resume until the hourly average THC concentration is below 20 ppm.
4. When the total hydrocarbon analyzer is not in operation, the feed of WDF to any kiln shall be stopped if the exhaust gases of that kiln have:
  - a) a nitrogen oxides (NO<sub>x</sub>) concentration less than 200 ppm as measured by the KVB gas monitoring system or
  - b) an hourly averaged carbon monoxide (CO) concentration greater than 100 ppm as measured by the KVB gas monitoring system.

In the case of NO<sub>x</sub> the waste feed may not resume until the exhaust gas concentration is above 200 ppm. In the case of CO, the waste feed may not resume until the hourly averaged concentration is below 100 ppm.

5. When required to demonstrate compliance with the emission limits specified in Table I, the permittee shall use the following test methods:

Pollutant	Test Method
Particulate	EPA reference method 5
Sulfur Dioxide	EPA reference method 6
Hydrogen Chloride	Ion Chromatography
Metals	Multiple Metals Train
Opacity	EPA reference method 9

The permittee may substitute an equivalent test method provided it is approved by the Director before it is used.

6. The waste derived fuel shall meet the specifications listed in Table II and Table IIa on an as received basis. Each parameter for which a specification is listed shall be measured in accordance with the conditions below.
7. The permittee shall sample at least one load of liquid WDF per day. This data will be evaluated to determine if the fuel shipments are meeting required specifications and to determine if the fuel vendor's sample analysis is accurate. The permittee shall use the test methods specified in Attachment III when conducting the sampling required by this condition unless, prior to use, an equivalent test method has been approved by the Director.
8. The solid WDF shall be sampled in accordance with Attachment II. The permittee shall use the test methods specified in Attachment III when conducting the sampling required by this condition unless, prior to use, an equivalent test method has been approved by the Director. The sample is to be analyzed for Btu, chlorides, and ash content before any solid WDF from the load in question is introduced into the kiln. In addition a composite of each shipment shall be made and analyzed weekly for all parameters listed in Table IIa except for those parameters already tested (Btu, chlorides, and ash).
9. In addition to WDF and coal, the permittee may also burn oil, natural gas, and/or carbon black.
10. The permittee shall burn no more than one container of solid WDF per kiln revolution. The total weight of each container shall be no more than 80 pounds.
11. On or before July 1, 1991, the permittee shall submit a complete air permit application for all emission sources, point or fugitive, at this facility.
12. The permittee shall comply with the emission limits specified in Table I. If an emission limit is specified with more than one set of units, all apply.
13. Unless otherwise specified, visible emissions from any source at this facility shall not exceed 20% opacity as measured by USEPA Method 9.

TABLE I

Allowable Emission Rates				
Source	Pollutant	Emission Limit		
		lb/hr	alt. units	tpy
Kiln #1	TSP	19.5	0.3 lb/ton of dry feed	85.4
	SO <sub>2</sub>	450.		1,971.0

Ash Grove Cement  
 Permit # 75-AR-6  
 CSN: 410001

Allowable Emission Rates				
Source	Pollutant	Emission Limit		
		lb/hr	alt. units	tpy
	HCl	46.8	0.18 lb/mm Btu	205.0
	Pb	0.06		0.263
	Cr	0.086		0.038
	Opacity		20%	
Kiln #2	TSP	19.5	0.3 lb/ton of dry feed	85.4
	SO <sub>2</sub>	450.0		1,971.0
	HCl	46.8	0.18 lb/mm Btu	205.0
	Pb	0.06		0.263
	Cr	0.086		0.038
	Opacity		20%	
Kiln #3	TSP	27.0	0.3 lb/ton of dry feed	118.3
	SO <sub>2</sub>	674.0		2,952.1
	HCl	71.0	0.18 lb/MM Btu	311.0
	Pb	0.10		0.438
	Cr	0.144		0.631
	Opacity		20%	
Clinker Cooler	TSP	25.0		109.5
	Opacity		10%	
Clinker Handling	TSP	1.0		4.38
	Opacity		5%	

Pollutant	Total Emissions tpy
TSP	403.0
SO <sub>2</sub>	6,894.1
HCl	720.9
Pb	1.0
Cr	1.4

TABLE II

Liquid Waste Derived Fuel Specifications	
Parameter	Specifications
Heat of Combustion	Rangs: 6,000-20,000 Btu/lb Average: 11,700 Btu/lb
Ash Content	10% (by weight) or less
Sulphur Content	1% (by weight) or less
Moisture Content	No Visible Standing Water
Heavy Metals <sup>1</sup>	Less than 0.3% (by weight)
Chlorine Content	Less than 3.5% (by weight) as burned Less than 10% (by weight) as received
Flash Point	Less than 140°F
Pesticides or Pesticide By-Products	Less than 50 ppm pesticides or pesticide by-products

TABLE III

Solid Waste Derived Fuel Specifications	
Parameter	Specifications
Heat of Combustion	Greater than 6,000 Btu/lb
Ash Content	40% (by weight) or less
Sulphur Content	1% (by weight) or less
Moisture Content	No Visible Standing Water
Heavy Metals <sup>1</sup>	Less than 0.72% (by weight)
Chlorine Content	Less than 8% (by weight) as burned
Pesticides or Pesticide By-Products	Less than 50 ppm pesticides or pesticide by-products

<sup>1</sup> "Heavy Metals" means arsenic, silver, cadmium, lead, chromium, selenium, and mercury.

## ATTACHMENT I

### DESCRIPTION OF KUB GAS MONITORING SYSTEM

The KVB gas monitoring system was purchased last year to improve our kiln performance. By precise gas analysis several combustion parameters can be determined. By monitoring oxygen we are assured we have sufficient air for combustion. This is common on all kilns, however; the lower limit of "excess" air cannot be determined. By monitoring CO in trace quantities, i.e. parts per million (ppm) we can further trim air in the process thereby reducing the total amount of air we must heat in the kiln thereby save some energy. We typically run with a trace of CO, i.e. less than 200 ppm, but with some CO showing always, i.e. greater than 50 ppm spikes. This ensures that we are at the optimum air level for complete combustion but not any excess air is being heated or handled in the kiln system. Both of these parameters are important in determining complete combustion of our fuel thereby getting all of the available heat we are paying for. The CO analyzer supplied with the KVB system is unique in our industry in that we are analyzing for trace amounts. Most people that analyze for CO do so in percent CO or the best they can check for is .1 % or 1,000 ppm. The only way we can use an instrument as sensitive as ours is to have special gas handling equipment which I will describe later. We also purchased two other analyzers with the system. One is an NO<sub>x</sub> analyzer that analyzes for NO and NO<sub>2</sub>. It has been proven in the industry that by monitoring NO<sub>x</sub> we can indirectly determine the burning zone temperature. Prior to the KVB system we had no good method to determine how hot we were in the kiln. We used and continue to use the best optical pyrometer we can obtain but it has severe limitations that can lead operators to come to wrong conclusions in burning the kilns. There exists a relationship with the amount of NO<sub>x</sub> achieved in the kiln. Absolute numbers are not important to us in our burning operation nor are they obtainable, however, the relationship is a very key parameter to us now after a years worth of operation. We know for our kilns that by running a high NO<sub>x</sub>, i.e. in excess of 3,000 ppm, we are endangering our refractory lining as well as tremendously over burning our product possibly even to the point of liquifying the entire load in the kiln so we stay away from this limit. We also know that below a certain minimum, i.e. approximately 300 to 400 ppm, we do not have sufficient temperature to complete the chemical reactions in the kiln or do not burn our product hard enough. We set up guidelines on the NO<sub>x</sub> to be able to control our kiln much better now than in the past. If the NO<sub>x</sub> is typically in the 600 to 1,200 ppm range on # 3 kiln we are in a good area. If the operator sees the NO<sub>x</sub> going above 1,200 they start cutting fuel slowly to "cool" the kiln some. If they see the NO<sub>x</sub> dropping below 600 they start adding fuel slowly to "heat" the kiln some. This has proven to be very successful in stabilizing our kiln operation.

As I have mentioned before all of the analyzers are extremely sensitive instruments and are placed in a harsh environment. For this reason a very elaborate sampling system must be maintained. As all kiln operators know getting an analyzer of any type to work for any extended period of time on a kiln is almost impossible. The best oxygen analyzers available to date are the "insitu" type or the analyzer itself is out in the gas stream. We had these on the kilns and they were by far the most reliable we had ever tried. However, the new analyzers are far too sensitive to use this technique and not all of them are capable of the "insitu" environment so an extractive method must be used. That is a gas sample must be pulled from the exit gas stream. This has historically been a nightmare due to the gases handled. This is where KVB spent much effort and expense to develop a reliable extractive technique. The gas is first pulled through a sintered stainless steel filter to remove most of the dust from the gas stream. Then the gas passes through a 1.0 micron fiberglass filter to remove most all of dust from the air stream. The gas sample then pass down a heat traced line to the analyzer cabinet. Thus far the sample is kept hot to avoid condensation of any water. The gas is then cooled in a condensing coil that is maintained at 32° F and most of the water removed and then passed again through a secondary condenser coil to remove remaining moisture. The sample then goes through another very fine coalescer fiber filter to again remove all suspended dust and any trace moisture. All of the sample handling tubing and valves are designed of special materials to avoid troubles. They are Teflon, stainless steels, and Hastalloys where required. During the extractive process the stainless filter must be back purged, i.e. a blast of air blown backwards to knock the collected dust off the filter, intermittently as well as the condenser coils must be blown down to remove excess moisture intermittently. The sample is now ready for the analyzers. The sample is split into four parts depending on the individual requirements of each analyzer and any excess sample is exhausted. The cabinet that contains most of the sample handling equipment and the analyzers is climate controlled, that is must be dust proof and held at a constant temperature range to maintain proper operations. This cabinet is then housed in another special building to again buffer the environment.

The operations are controlled and systems are monitored by a dedicated computer. The output of the analyzers are accumulated and processed by the computer as well as other select data from other inputs and the information displayed graphically on a CRT as well as numerically on a Data Logger. The graphically displayed information can also be printed on demand as required for prudent historical information.

Due to the expense of this system we elected to "time share" the analyzers with all three kilns. The equipment dedicates a set interval on a kiln then changes to another kiln unless the operator specifically wants to observe a specific kiln, then he can do so for 10 to 15 minutes after which it must monitor the other operating kilns. If a kiln is down it can be toggled off so more time can be dedicated to the operating kiln or kilns. A sample purge time plus system cleaning cycles are all controlled around the time sharing feature.

Due to the control parameters we are using and how we use them, sample point location is not extremely important. We are looking for a repeatable number, not an absolute value therefore we selected a spot in the duct work after the kiln so as to minimize any possible pluggage problems. The sample is not a stack sample as such. The gas still goes to the Induced Draft fan and the Electrostatic precipitators before being discharged.

The operating history of this equipment is excellent and the hands on type maintenance thus far has been minimal except for routine preventative type maintenance. The information is valuable enough for kiln control that if something happens to it when trained personnel are not in the plant they are called out on overtime to get the system back in operation.

Hard copies of the KVB information on typical operations have already been forwarded. I suggest this be sent as proprietary information due to agreements made with KVB on release of systems design.



## ATTACHMENT II

### SOLID WDF SAMPLING FREQUENCY

Sampling point: Each six gallon container of Chem Fuel S Blend within a given shipment will be assigned a number. A random number table will be used to choose the six gallon container which will be core sampled with a sampling trier. Chem Fuel S Blend is a heterogeneous mixture for which simple random sampling is appropriate. (EPA SW846 Chapter nine page nine-8)

Sampling frequency: The sampling frequency will be one sample every seventy-two containers. This is based on EPA SW 846 chapter nine and Neter, Wasserman, and Wetmore, "Fundamental Statistics for Business and Economics", Allyn & Bacon Inc., 1973 pages 245-247.

Sampling size: The sampling size will be eight ounces.

Sampling method: For each shipment the individual samples will be composited, vigorously mixed and sized to make an eight ounce sample .