Ash Grove Cement Company
EMISSION STATEMENT FOR 1999

SECTION IIA-1
EMISSION FACTORS

General Remarks
Ash Grove listing of units in table IIA-1 exhibits the following advantages: 1) it follows a logical material flow through the plant; 2) it ensures avoidance of emissions of any criteria pollutant from any Point except 001, Cement Kiln, from exceeding 30 tons per year which would require enhanced monitoring.

The plant contains 47 bag houses that exhaust to the outdoors. The largest are for the Kiln, G-cooler, Finish Mill Separators and the Cement Mills.

The following Units are non-fugitive sources and are all controlled by bag houses. The cement kiln and the coal mills discharge pollutants other than particulate and qualify for their own designation as "Unit KN" (PSAPCA Point 001). The remaining sources emit only particulate matter and have been grouped in units that follow the flow through the plant: the nuisance dust collectors serving the received raw material handling and storage are "Unit RM" (PSAPCA Point 002); those serve the kiln feed handling and storage are "Unit KF" (PSAPCA Point 003); those serving the clinker handling and storage, including the G-cooler, are "Unit CK" (PSAPCA Point 004); those serving the cement handling, storage and shipping, including the cement mills are "Unit CM" (PSAPCA Point 005).

Finally, the most accurate emission factors to use for PSAPCA's annual emission statement would be annual averages of continuous measurements or a sufficient number of discrete measurements to adequately account for emission rate variability. The main stack CEMS allow such data to be developed for emissions of CO, NO_x and SO_2 from the kiln. For most other sources emission factors were developed from less representative data. Attempts are made to estimate the factors on the high side to provide a conservative, upper bound annual emission statement. The development of the individual emission factors is discussed below.

Metric vs. English units: Most of the calculations are made in metric units with final results shown in English units.

Ash Grove Unit KN, PSAPCA Point 001, Segment 01, Cement Kiln
CO, NO_x and SO_2 The main stack CEMS was last certified by RATA August 23, 1999.

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CGAs were conducted on March 5, 1999; May 5, 1999; and November 2, 1999. The inventory expresses the measured emission for each pollutant.

Particulate Matter The data from the following source test conducted to demonstrate compliance with the New Source Performance Standards can be used to define an actual (short term) emission factor:

Test Date	kg PM/hour(1)	Mg Clinker/Hour	kg PM/ Mg clinker
6/17/93	0.704	74.8	0.00941

(1) Front half, raw mill in operation

Stack tests on 07/24/92 and 04/06/93 in connection with troubleshooting of a detached plume problem show an average back half to front half ratio of 4.4. Thus the short term main baghouse PM emission factor can be calculated as 0.00941*4.4 = 0.0414 kg PM/Mg clinker. Absent better data this factor will be used to estimate the annual emission.

Ash Grove Unit KN, PSAPCA Point 001, Segment 02, Coal Mills

CO, NO_x and SO_2 According to plant design data, up to 10 percent of the preheater gases, which contain all the CO, NO_x and SO_2 emitted from the plant, may be diverted to the coal mills for drying with these relatively inert gases. They are then emitted from the two stacks in the coal grinding system. The amount diverted on an annual basis is a function of the annual amount of coal ground. We assume that the control of CO, NO_x and SO_2 is the same whether the preheater gases pass through the roller mill and kiln/mill baghouse or the coal mills and their baghouses. If the kiln used only coal all year, for instance, the total amount of CO emitted from the coal stacks would be (1-1/0.9)*100 = 11 percent of the main stack emissions. Further, if the plant used only coal to produce clinker, the coal consumption (assuming an annual clinker production of 700,000 Mg clinker, a fuel consumption of 3.35 Mega Joule per Mg of clinker and a coal heating value of 26 MJ per Mg of coal as received) the annual coal consumption would be about 90,000 Mg of coal as received. Thus, the amount of CO, NO_x and SO_2 emitted from the coal stacks can be calculated as

(Mass flow from main stack)*(11%)*(As received coal usage in kiln)/90,000 Mg.

Particulate Matter No source tests have been run on any of these baghouses since the plant was started. They are required by Order of Approval # 7381 which supersedes Order of Approval #3382 and #5730 to operate with emissions not to exceed 0.005 gr.

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PM/dscf. The dust collectors are rated 10,400 acfm. Assuming actual cubic feet equals dry standard cubic feet for the coal mill dust collectors, the potential short-term emission rate is

(0.005 gr. PM/dscf)*(10,400 dscf)*(60 min/hour)/(15420 gr/kg) = 0.202 kg PM/hour.

The maximum design (raw, wet) coal feed rate is 10 Mg/hour, so the emission factor becomes (0.202 kg PM/hour)/ (10 Mg/hour)= 0.0202 kg PM/Mg coal.

Ash Grove Unit RM, PSAPCA Point 002, Raw Material Handling and Storage
Ash Grove Unit KF, PSAPCA Point 003, Kiln Feed Handling and Storage
Ash Grove Unit CK, PSAPCA Point 004, Clinker Handling and Storage
Ash Grove Unit CM, PSAPCA Point 005, Cement Handling and Storage

Particulate Matter Source tests have been conducted on four new dust collectors installed in the Finish Mill (Ash Grove Unit CM, PSAPCA Point 005, Cement Handling and Storage).

1) The two Mill Sweep dust collectors were installed and tested in 1994 under NOC 5276 and shown an average emission rate of .0036 gr. PM/dscf. The dust collectors are rated 20,000 acfm. Assuming actual cubic feet equals dry standard cubic feet for each of the Mill dust collectors, the potential short-term emission rate is

(0.0036 gr. PM/dscf)*(20,000 dscf)*(60 min/hour)/(15420 gr/kg) = 0.280 kg PM/hour.

The maximum design Cement feed rate is 59 Mg/hour, so the emission factor becomes:

(0.280 kg PM/hour)/(59 Mg/hour) = .0047 kg PM/Mg cement

2) The two high efficiency separator dust collectors installed and tested in 1995 under Order of Approval #5730 shown an average emission rate of .002 gr. PM/dscf. In the dust collectors are rated 77,000 acfm. Assuming actual cubic feet equals dry standard cubic feet for each of the high efficiency separator dust collectors, the potential short-term emission rate is

(0.002 gr. PM/dscf)*(77,000 dscf)*(60 min/hour)/(15420 gr/kg) = 0.599 kg PM/hour.

The maximum design Cement feed rate is 59 Mg/hour, so the emission factor becomes

(0.599 kg PM/hour)/(59 Mg/hour) = .0102 kg PM/Mg cement

No source tests have been run on any other baghouses in these units since the plant was started. Most were installed in 1990 under Order of Approval #3382. Order of Approval #7381 supersedes Order of Approval #3382 and #5730 requires emissions not to exceed 0.005 gr. PM/dscf. The PM emission factors for these units are derived in a manner similar to that shown above for the coal mills.

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