AP42 Section:	11.3
Title:	Comments, correspondence and test summaries from contractor for August 1997 supplement

DRAFT

MRI

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Date: ~~March 19~~ April 2, 1997

Subject: Review and Update of AP-42 Sections in Chapters 11, 12, and 13 Covering Mineral Products Industries, Metallurgical Industries and Miscellaneous Sources
EPA Contract 68-D2-0159, Work Assignment 4-02
MRI Project 4604-02

From: Brian Shrager

To: Ron Myers
EPA/EFIG/EMAD (MD-14)
U. S. Environmental Protection Agency
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Enclosed is a summary of the comments (and MRI responses) provided by State agencies and industry on the final draft background report and AP-42 Section 11.3, Brick and Structural Clay Product Manufacturing. I will finalize the report and AP-42 section after I receive your input on these comments and responses. Please let me know if you have any questions.

Comments from North Carolina Department of Environment, Health, and Natural Resources, Division of Air Quality

General

The revised Section is a major improvement over previously existing information and obviously represents considerable data and work. The preparers are commended on the efforts to make these improvements. However, continued efforts to develop more information and make further improvements needs to be made. North Carolina has a large number of brick plants and produces a large share of the nation's brick and would therefore like to be confident that the emissions are properly characterized.

Comment NC-1

It would be helpful to start out with some additional definitions for those who use the section but are not well versed in the terms. For example, technical definitions of what makes a clay or shale suitable or not for brick making; adobe brick; differences between chimney pipe and flue liners; between drain and sewer tile etc.

Response

It is beyond the scope of AP-42 to provide a higher level of detail. The procedures document for AP-42 states that the process description "explains the flow diagram and gives a very general idea of the process. It is not intended to give a complete explanation of the industry." The reader should consult other references if such information is needed.

Comment NC-2

Is it germane to explain why additives such as barium carbonate are added?

Response

Additives are used as colorants and to add texture to the brick. A sentence will be added to the text to reflect this.

Comment NC-3

Since HF is dependent almost solely upon characteristics of local clays, is it possible to make generalizations about Fluoride content of clays in various parts of the country, or do they vary greatly within limited geographical areas?

Response

Information on fluoride contents of surface soils by geographical area is available from a document entitled *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States: U.S.*

Geological Survey Professional Paper 1270. This document, however, provides information about surface soils only, and may not be applicable to the clays and shales used for brick manufacturing. The document shows highly variable soil fluorine concentrations throughout the U.S.. The background report will include a brief discussion of the information contained in this document, but the information will not be presented in the AP-42 section. No sources of information regarding clay and shale fluorine content have been identified yet.

Comment NC-4

Page 11.3-3, 2nd paragraph from bottom: "The firing zone is typically maintained at...." as opposed to "the firing zone typically maintains..."

Response

Will change text to "The firing zone is typically maintained at....."

Comment NC-5

Explain difference between steps, especially what is happening to the structure of the clay materials during oxidation, vitrification and flashing.

Response

It is beyond the scope of AP-42 to provide a higher level of detail. The procedures document for AP-42 states that the process description "explains the flow diagram and gives a very general idea of the process. It is not intended to give a complete explanation of the industry." The reader should consult other references if such information is needed.

Comment NC-6

PM 2.5 should be included (in the discussion of emissions and controls), especially since some "credible" data seem to exist

Response

MRI will include PM 2.5 in the emissions discussion.

Comment NC-7

TOC is included in the tables but not the write up on page 11.3-4, and the converse seems to be true for SVOC.

Response

MRI will include TOC in the emissions discussion. SVOC are included in the tables, but are identified as individual compounds rather than "SVOC".

Comment NC-8

Mention is made of the influence of sulfur content on SO2 but no discussion of sulfur contents of materials is given earlier. What is range; what is typical, etc. Is there a pattern to sulfur content of soils by parts of the country?

Response

MRI will add text indicating a range of sulfur contents and a geographical pattern if data are available. The document entitled *Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States: U.S. Geological Survey Professional Paper 1270* provides information about the sulfur content of surface soils. However, this information may not be applicable to the clays and shales used for brick manufacturing. The document shows highly variable soil sulfur concentrations throughout the U.S.. The background report will include a brief discussion of the information contained in this document, but the information will not be presented in the AP-42 section. Currently, we do not have information on the range of sulfur contents or a geographical pattern for clays and shales.

Comment NC-9

Since the constituents of the exhaust stream are reasonably well characterized, can you not make an estimate of TOC on the basis of actual mass and report it at least as a footnote or qualifier sentence in the text?

Response

Although many of the compounds emitted from brick manufacturing have been identified, it is likely that other compounds also are emitted. Therefore, the sum of the speciated compounds may provide a misleading emission factor for TOC.

Comment NC-10

We presume that "relatively dry" material exists below 4 percent also? The implication in the wording is that it is only a narrow range near 4%.

Response

During this study, 4 percent was the lowest raw material moisture content recorded, and appears to be a lower limit for facilities in the eastern part of the country. The possibility of clay or shale with a lower percentage of moisture exists, particularly for facilities in the southwestern part of the country. The wording will be revised to avoid confusion.

Comment NC-11

Table 11.3-1: 1) Include column with PM-2.5 factors, 2) Include statistical confidence intervals using the data available, 3) We presume the "XX'' SCC's will be determined and included in the final. Correct? 4) In spite of the rules of rating, a "D" for the entire contents of the table seems overly critical and disqualifying. Since there is good agreement in several cases, even in a small data set, this may be worthy of considering for a "promotion" to a higher rating for some of the factors. Ratings are more meaningful on an individual factor basis anyway. 5) You need another footnote so they go from a to z. How about putting somewhere in the table, text or footnote how much a brick weighs, or how many standard brick constitute a ton? What is breakage, recycle percentage, other such practical "insider" information, etc. Help the inspector types to be able to talk the lingo with the plant officials.

Response

1) PM-2.5 factors will be presented where data are available.
2) Statistical confidence interval are not typically shown in AP-42.
3) An SCC will be proposed for each emission point that does not currently have an SCC assigned.
4) The rating system follows current EFIG guidelines.
5) It is beyond the scope of AP-42 to provide this level of detail. The reader should consult other references if such information is needed.

Comment NC-12

Table 11.3-2: 1). Footnotes c, h and m - may be appropriate to note that for mass balance, each pound of sulfur in raw materials will result in "x" lbs. of SO_2 in the exhaust, where x is normally 2, but may be reduced by some amount by contact with alkaline components of product or controls?? 2). For CO2, a material balance of carbon burned should be of such confidence that you could give it an A rating. The amount stopping at CO is very small relatively and it will eventually end up as carbon dioxide also, anyway.

Response

1) MRI will add the following sentence to footnotes c, h, and m: "Assuming that all of the sulfur in the raw material is released as SO_2 during firing, each lb of sulfur in the raw material will result in 2 lb of SO_2 emissions. The amount of SO_2 released may be reduced by contact with alkaline components of the product or control media."

2) The CO_2 factors will not be changed at this time. The following note will be added to the CO_2 footnotes: "A mass balance based on carbon burned will provide a better estimate of emissions for individual facilities."

Comment NC-13

Table 11.3-3: 1) Reference earlier comments on TOC and SVOC, "x's" in SCC, etc. 2) Sawdust fired kiln and sawdust dryers would have carbon dioxide emissions also? Calculate via material balance of carbon, consumed stoichiometrically, 3) It is very confusing to have a table labeled with a rating for the entire table, especially when footnotes reflect different ratings. Just rate each individually to start with, 4) Fluorine content seems to be very important for HF emissions and seems to vary by area of the country. This should be stated in the footnotes k and m with a method to do a material balance based on the raw material content. This may be key in NC where, from the test data, Fl is high and results in a top end estimate using actual data but lower emissions if you use the average factor in the table which we contend is inappropriate.

Response

1) See responses to Comments NC-7 and NC-11.
2) Data for "sawdust-fired kiln and sawdust dryer" are included in the sawdust dryer CO_2 emission factor. A footnote will be added to indicate this in Table 4.3.2.
3) The rating of an entire table is consistent with current EFIG guidelines. However, the tables will be examined on a case-by-case basis for possible revisions.
4) The test data include two tests conducted in North Carolina that average 0.37 lb/ton, or 0.01 lb/ton less than the average factor presented in AP-42. This indicates that North Carolina clay is in the middle of the fluorine range. The footnotes for the HF factors will include the following statement regarding mass balance procedures: "Assuming that all of the fluorine in the raw material is released as HF during firing, each lb of fluorine in the raw material will result in 1.05 lb of HF emissions."

Comment NC-14

Table 11.3-4: 1) The listed compounds constitute less than 10% by approximate mental arithmetic, of the total TOC or VOC. What is the rest of it? 2) Do tetrachloroethane and trichloroethane not have CAS numbers? 3) Unless some of measurements showed positive results, it is inappropriate to take one half of the detection limit as the factor. Better to say "not detected at "x" lb/ton detection limit and let it go at that. If you have some detects and some non-detects, then it may be better to use the ½ factor.

Response

1) The listed compounds for coal-fired kilns constitute 33 percent of TOC. The listed compounds for natural gas-fired kilns constitute 133 percent of TOC (the data come from a test on an atypical facility, and a note will be added to the table or the data will be removed). The listed compounds for sawdust-fired kilns constitute 36 percent of TOC. The reason for the difference in the sum of the speciated compounds and the TOC measurements may be due to (1) differences in the facilities that were tested or (2) the presence of unidentified organic compounds in the exhaust stream.
2) The CAS number for tetrachloroethane is 127-18-4. The CAS number for trichloroethane is 71-55-6. These CAS numbers will be added to the table.
3) The factors based on all non-detect runs will be replaced with "BDL," or below detection limit. The detection limits for these compounds will be included in the table footnotes. For factors that include some detects and some non-detects, ½ of the detection limit will be used to estimate emissions from the non-detect tests or test runs.

Comment NC-15

Table 11.3-6: Is there similar, potentially conflicting data in Appendix and has it been updated to be consistent? A picture is worth a thousand words; i.e., a particle size distribution curve would be nice. As mentioned above, the 2.5 numbers should be incorporated into the PM tables where appropriate and can be done with reasonable levels of conjecture.

Response

PM-2.5 factors will be included in the tables. A particle size distribution curve (will/ will not) be incorporated into the section.

Comments from the Utah Department of Environmental Quality, Division of Air Quality

Comment UT-1

In reviewing this section, I would have liked more information regarding the semivolatile organic compounds (SVOC). Please clarify which compounds contained in Table 11.3-4 are semivolatile, or if they are non-reactive, please explain that in the definition of SVOC.

Response

A definition of SVOC will be included in the text.

Comment UT-2

More information regarding PM-2.5 would be helpful, especially considering the impending PM-2.5 standard.

Response

Emission factors for PM-2.5 will be included in the tables where data are available.

Comments from the Georgia Department of Natural Resources

Comment GA-1

Naturally, having a larger database from which to develop the factors thereby causing an increase of the emission factors' ratings would be the single greatest improvement that could be made. However, we realize that an attempt has already been made to incorporate all reliable and recently developed test data. Nevertheless, the fact that the emission factor tables in this revised AP-42 section have "D" and "E" ratings as opposed to the "C" ratings of the previous section, could lead to some confusion. In order to avoid having to explain to third parties why the new factors are being used in preference to the old, especially where the new factors are lower, the language contained in section 4.4.2 of the Emission Factor Document should perhaps also be included in AP-42. This section explains that more stringent criteria were used to rate the new emission factors which were indeed developed from higher quality data.

Response

Comment GA-2

Moving the emission factor ratings for specific table entries from the footnote material in Tables 11.3-1 and 11.3-3 to a separate column along side of the data, as in Table 11.3-2, may also help avoid some confusion.

Response

Tables that have more than a few footnotes that include ratings will be revised to include the ratings next to the factors.

Comment GA-3

Another improvement we would like to see is the inclusion of information on geographical variations in fluorine concentrations if that type of information is available from the research that was performed. Hydrogen fluoride emissions are dependant upon the amount of fluorine compounds in the raw material, which the report states is highly variable. However, if the fluorine concentrations were consistent within a certain geographical area, this information would be useful to have in performing the recommended mass balance calculations.

Response

See Response to Comment NC-3.

Comments provided by the Brick Institute of America (BIA)

The BIA believes the revisions to the brick section of AP-42 to date are a major improvement over earlier versions. The section reasonably portrays our industry's air emissions based on the best available information. We appreciate the opportunities we have had to assist in the development of the document.

Following are individual manufacturer comments on the AP-42 document for your consideration. Some of these comments are specifically directed to your request for discussion on the methods for estimating the control efficiency of building enclosures on grinding room emissions.

Comments of The Belden Brick Company

Comment BIA-1

The 8.5 lbs/ton emission factor for a grinding plant (Table 11.3-1, page 11.2-7) processing dry material without a fabric filter is overstated as that number represents the inlet side of Plant 6 grinding plant and there is no correlation between what is picked up ahead of a dust collector and what leaves a building.

Exhibit A calculates the emission factor to be 0.368 based on ambient air sampling taken at Plant 6 inside and outside (upstream and downstream) of the grinding plant at the same time as the grinding plant baghouse tests were taken.

Response

The upwind-downwind method of sampling fugitive dust requires the use of sampling instruments at least two downwind distances and three crosswind distances. The number of required upwind instruments depends on the degree of isolation of the emission source (i.e., the absence of interference from other sources upwind).

The net downwind concentrations (i.e., downwind minus upwind) are used as input to dispersion equations to back calculate the particulate emission rate required to generate the pollutant concentration measured. A number of meteorological parameters must be recorded concurrently for input to the dispersion equation. At a minimum, the wind direction and speed must be recorded on-site.

The monitoring conducted upwind and downwind of the Belden Brick grinding room was conducted for background information purposes and was not designed to calculate emission rates from the building. In particular, the concentrations measured by only one downwind monitor cannot be assumed to represent the entire plume emanating from the grinding operations.

Until testing is conducted to determine the control efficiency of this type of building enclosure, an emission factor that accurately reflects the effect of the building cannot be developed. A footnote is included that states that the uncontrolled emission factor is "based on measurements at the inlet to a fabric filter and does not take into account the effect of the building enclosure."

Comment BIA-2

Table 11.3-2 (page 11.3-8) shows an excessive emission level for CO and CO_2 coming from a brick dryer with a supplemental burner fired with natural gas. That number came from the MRI-EPA test of Belden's Plant 6 Dryer. You should note that at the time of test, the supplemental gas burner was not firing correctly, was dirty, and could not be adjusted properly. US EPA recognized this and subsequently did not include the VOC test results from this dryer in the AP-42 draft. The CO and CO_2 results should not be included either.

Response

After the initial Belden test, Belden had additional testing performed on the brick dryer after the burner was adjusted. Belden provided these data to EPA, and the data were included as Appendix F to the EPA test report for Belden Brick. These data, as provided by Belden are as follows:

Emission rates: CO = 1.52 lb/hr; TOC= 0.474 lb/hr as carbon = 0.579 lb/hr as propane

Process rate: 3.43 ton/hr brick produced

Emission factors: CO = 0.44 lb/ton, TOC as propane = 0.17 lb/ton

Again, these data were provided by Belden Brick to replace the data gathered when the dryer was malfunctioning. These data represent emissions from a dryer with a recently tuned-up supplemental gas burner. The question about the CO_2 emission factor for brick dryers cannot be addressed because no emission factor is presented in the AP-42 section for CO_2 from brick dryers.

Comments of Boral Bricks, Inc.

Comment BIA-3

Page 11.3-1: In the second paragraph of the Process Description, a sentence reads "From the grinding room, the material is conveyed to storage piles, which are typically enclosed." The words "*silos or*" should be added after the word "storage" for a more accurate description.

Response

The sentence will be revised as follows: "From the grinding room, the material is conveyed to storage silos or piles, which typically are enclosed."

Comment BIA-4

Page 11.3-3 and other locations: English units should be associated with numerical values rather than metric units to be consistent with the new format for emission factors. Metric units can be shown in parenthesis if necessary.

Response

Currently, the EFIG procedures indicate to report metric units in the text with the corresponding English units in parentheses. This is a formatting issue that will be decided by EFIG.

Comment BIA-5

Page 11.3-4: In the first paragraph, it may be of interest to conclude the sentence that begins "Some plants have fuel oil available as a backup fuel..." by adding "*although most natural gas-fired plants use vaporized propane as a backup fuel, if any.*"

Response

The sentence will be revised as follows: "Some plants have fuel oil available as a backup fuel. Most natural gas-fired plants that have a backup fuel use vaporized propane as the backup fuel.

Comment BIA-6

Page 11.3-4: The last paragraph includes the sentence "Organic compound emissions from brick dryers are primarily a result of volatilization of the lubricating oil that is typically applied to the formed material during extrusion, and may also result from volatilization of organic matter in the raw material." This sentence infers that the majority of VOC emissions from dryers is generated from the lubricating compound. Unless field or laboratory tests have confirmed this, please consider rewording the sentence or eliminating the sentence altogether because the statement is speculation.

Response

The sentence will be revised as follows: "Organic compound emissions from brick dryers may include a contribution from petroleum-based products in those plants that use petroleum-based products as a lubricant in extrusion."

Comment BIA-7

Page 11.3-5: The last sentence of the fourth paragraph reads "In addition, fluoride emissions can be reduced by using raw materials with a low fluorine content." This sentence infers that changing a raw material source is a viable option to reduce emissions. Sufficient data is not available to confirm that low fluorine raw materials are available in localized areas. In addition, regardless of availability, changing raw material sources will rarely be an economically viable alternative.

Response

The sentence will be revised as follows: "Fluoride emissions are a function of the fluorine content of the raw materials."

Comment BIA-8

Page 11.3-7: Aside from available data, does it really make sense that the $_{PM-10}$ emission factor for a grinding and screening operation with a fabric filter is higher than PM-10 emissions from the same uncontrolled process (using wet material)?

Response

The emission factors in question are of similar magnitudes. Engineering judgement and the only available data suggest that raw material moisture content is an important factor in the magnitude of PM emissions from grinding operations. The PM-10 control efficiency of moisture (about 13 percent moisture in this case) for this type of operation is not known, and a comparison to the control efficiency of a fabric filtration system is speculative. The development of a relationship between material moisture content and PM-10 emissions would be useful in resolving this question, but sufficient data are not available.

Comment BIA-9

Page 11.3-7: A clarification should be made specifying whether or not the grinding and screening factors represent enclosed processes. If not, an enclosure efficiency should be suggested in addition to the provided emission factors.

Response

Sufficient data are not available to calculate an enclosure efficiency factor. A footnote will be added stating that the data represent operations housed in large buildings.

Comment BIA-10

Page 11.3-7: Aside from available data, process knowledge and intuition suggest that the condensable portion of particulate emissions from a "sawdust fired kiln and sawdust dryer" would equal or exceed the emissions of a comparable natural gas fired or sawdust fired kiln. Are temperatures low enough to condense particulate emissions in the dryers or does another removal mechanism exist?

Response

Tests that were conducted simultaneously at the inlet and outlet of a sawdust dryer showed a decrease in condensable PM emissions following the sawdust dryer. The temperature changed from about 500°F at the inlet to about 185°F at the outlet. The outlet temperature is low enough to condense some of the condensable PM, including sulfates.

Comment BIA-11

Page 11.3-8: A range should be established to define "high sulfur material" if separate SO2 emission factors are included. Also, this emission factor (4.5 lb/ton) does not appear to be consistent with the sulfur analysis results reflected in the footnote (0.087%).

See the following calculation:

= (.00087 parts sulfur) (2000 lb/ton) (64 parts SO2/32 parts sulfur) = 3.48 lb SO2/ton.

Considering that not all sulfur is evolved from a brick body in firing and that not all sulfur is emitted as SO2, the emission factor and mass balance results are not consistent. Either the emission factor should be lowered or a suggested sulfur content should be increased above the draft value.

In addition, a specific method should be endorsed to define this range because different methods will produce different ranges.

Response

The data for raw material sulfur content represent an average for the various mixes that the facility uses. The facility will be contacted for data more specific to the test period.

Comment BIA-12

Page 11.3-8: Boral Bricks possesses stack tests that suggest NO_X emissions from natural gas fired kilns are less than draft value. These reports have been included.

Response

MRI will review the test reports and incorporate the data into the AP-42 section.

Comment BIA-13

Page 11.3-8: Boral Bricks possess stack tests that suggest CO emissions from natural gas and sawdust fired kilns are less than draft value. These reports have been included.

Response

MRI will review the test reports and incorporate the data into the AP-42 section.

Comment BIA-14

Page 11.3-9: Is methane reported *"as propane* "? If not, the VOC factors should be corrected appropriately.

Response

Methane is reported "as propane." This will be noted in the table.

Comment BIA-15

Page 11.3-9: The basis used to establish the difference between "HF' and "total fluorides" should be stated (i.e. different EPA test methodologies). Is total fluorides reported as HF?

Response

The test methods will be footnoted in the table. Method 13B measures total fluorides as a mass; total fluorides should not be reported "as HF."

Comment BIA-16

Page 11.3-9: Does it make sense that HF emissions from a sawdust-fired kiln and sawdust dryer are less than emissions from other kilns? Are temperatures low enough to condense HF or does another removal mechanism exist? If not, this data should simply be compiled with other kiln data.

Response

The sawdust dryer appeared to act as a control device for several pollutants, including HF.
The test conducted at Pine Hall Brick showed HF emissions from the kiln, prior to the sawdust dryer, of 0.46 lb/ton. Following the dryer, the emissions were 0.18 lb/ton.

Comment BIA-17

Pages 1.3-10-14: If a pollutant was not detected, is it necessary to supply any emission factor for the pollutant considering the magnitude of emissions of most of the hazardous air pollutants?

Response

See response to Comment NC-14.

Comment BIA-18

Page 11.3-14: Footnote "c" references a facility with a manganese surface treatment on the brick as a facility with a sawdust-fired kiln. This factor apparently should be applied to a natural gas, coal, or sawdust-fired kiln that produce brick with a manganese coating. The factor should be reformatted to reflect this.

Response

Agree. A note will be added to footnote c (Table 11.3-5) to reflect this.

Comment BIA-19

In support of these comments, the following test results of various Boral Brick plants are provided:

Exhibit	Facility	Date	Fuel	Control Equipment	Pollutants
B	Salisbury #6	10/6/95	Sawdust	None	CO
C	Atlanta #2	8/27/96	Nat'l. Gas	None	filterable PM, CO, SO2, NOX, VOCs, HF
D	Atlanta #1	8/28/96	Nat'l. Gas	None	filterable PM, CO, SO2, NOX, VOCs, HF
E	Henderson	6/29/95	Nat'l. Gas	Limestone Adsorber	filterable PM, SO2, NOx, HF
F	Henderson	2/15/95	Nat'l. Gas	Limestone Adsorber	filterable PM, NOX HF

Response

MRI will review these test reports and incorporate the data into the AP-42 section.

Comment BIA-20

Exhibit G is a memo summarizing the approach suggested for all Boral plants in estimating emissions from pneumatic control devices in operation. It suggests assuming a constant exhaust grain loading for pneumatic devices. The fabric filter factors are based on a compilation of the stack tests completed at General Shale and Belden Brick for the AP-42 revision. This is a more appropriate method for pneumatic devices rather than assuming that emissions are proportional to production rates. If operations are uncontrolled, emissions should be based on production rates (draft AP-42 factor) and incorporate a building removal efficiency where applicable.

Response

For emission inventory purposes, an emission factor that is associated with production is needed to estimate emissions from the industry as a whole. For a specific facility that needs to estimate emissions from grinding rooms, the proposed method may provide a better estimate than the AP-42 emission factor. However, this type of calculation relies on the assumption that the fabric filtration system captures 100 percent of the emissions from the grinding operations. This is unlikely, based on the amount of airborne dust present within the grinding rooms that we have visited during this project. The emissions that are not captured by the system may eventually settle out within the building or may be released to the atmosphere through building ventilation fans and other openings. Exhibit G will be cited in the background report, but will not be used for emission factor development.

Comments of General Shale Products Corporation

Comment BIA-21

The previous draft of the brick section of AP-42 and the documentation for the current draft (page 4-52) show the factor for HCl to be 0.018 lbs/ton. This was based on the Belden tests with no new references or data being cited. Table 11.3-3, however, lists a factor of 0.21 lbs/ton. This appears to be simply an error which should be corrected.

Response

The correct factor is 0.17 lb/ton. The Belden test result was inadvertently excluded from the candidate emission factor of 0.21 lb/ton, which was based on the BIA stack tests (Reference 26). The text on page 4-52 and the HCl factors shown in Tables 4-2, 4-3, and 11.3-3 will be changed to 0.17 lb/ton and will be referenced correctly.

Comment BIA-22

The hydrogen fluoride (HF) emission factor has increased from 0.30 lbs/ton of fired brick to 0.38 lbs/ton.

The questions arises whether this emission factor is applicable to coal, natural gas, and oil-fired kilns. Experience has shown that emissions of HF from coal-fired kilns, firing the same raw material, is significantly reduced when compared to natural gas or oil. This can likely be explained by the interaction of HF (acidic) with the coal fly ash (basic). (If this interaction is occurring, a mass balance on the raw material won't necessarily provide a better estimate of emissions.) The Environmental Protection Agency has been provided enough data from coal-fired facilities to develop a specific emission factor for coal-fired kilns. This may have particular importance relative to the upcoming MACT standard since only "major" sources (i.e. greater than 10 tons per year) will likely be subject to this regulation.

Response

Data for HF emissions from coal-fired kilns are available from two tests conducted at two facilities. An emission factor developed from these two tests is 0.17 lb/ton. The two tests account for the two lowest data points of the current HF data. However, a test report recently supplied by the BIA documents tests conducted at Boral Brick in Atlanta, GA, that show an average HF emission factor (for two natural gas-fired kilns) of 0.047 lb/ton. The emission factor for coal-fired kilns is still about one-half of the factor for kilns fired with other fuels. Therefore, a separate emission factor for coal-fired kilns **(will/ will not)** be presented in the AP-42 section.

Comment BIA-23

Since an emission factor has been added for total fluorides and since some states regulate total fluorides, this may affect the compliance status of brick manufacturing facilities in these states. Review of supporting documentation indicates that the proposed total fluoride emission factor is based on two tests; one test on a kiln firing structural clay tile, and the other at Boral Bricks Phenix City facility. A question arises as to the appropriateness of the structural clay tile results to brick kilns. With regards to the Boral test, the results indicated total fluoride results of 1.6 times the HF result. This factor is applied to the proposed HF factor (0.38 lbs/ton) to obtain the total fluoride factor from this test (0.61). This approach must be questioned when stack test results indicate that the majority, if not all, of the fluoride from brick firing is emitted as hydrogen fluoride.

Response

The only currently available stack test that includes measurements of both HF and total fluorides shows total fluoride emissions of 1.6 times HF emissions. If other data are available that show that most or all of the fluoride from brick firing is emitted as hydrogen fluoride, the stack tests that support this claim should be provided to EPA for incorporation into the AP-42 section.

Comments of Statesville Brick Company

Comment BIA-24

Exhibit H are the test results of a CO test on the kiln exhaust at Statesville's plant facility. This facility is firing with 100 percent sawdust. Page 3 of Exhibit H shows the production rate as 19,475 pounds or 9.738 tons of ware per hour. The kiln exhaust exits through two ducts. Page 5 shows the averages for the dryer and kiln exhausts are 3.77 and 1.96 lbs/hour. Dividing 5.73 by 9.738 gives an emission factor of 0.5888 pounds per ton of ware produced. This indicates that the proposed AP-42 factor of 3.1 lbs/ton is far too high and should be lowered substantially.

Response

MRI will review these test reports and incorporate the data into the AP-42 section.

Comments provided by Denis Brosnan, Clemson University

Comments on Text

Comment CLEM-1

p. 11.3.1 (last paragraph); the initial sentence should read that the majority of brick are produced by the extrusion process with a significant minority volume by the soft mud process. Brick have been historically produced by dry pressing, but there may be no plants in the United States now using this process.

Response

The text will be changed to reflect this comment.

Comment CLEM-2

p. 11.3.3 (second paragraph); the moisture content in the soft mud process may be in the range 15-22% but not 20-30%. At 30% moisture, the clay would be a slurry or slip.

Response

The Belden Brick trip report, which was reviewed and approved by Belden Brick, states that (in the soft mud process) "a double pug mill increases the material moisture content to about 28 percent." The range will be changed to "15 to 28 percent."

Comment CLEM-3

p. 11.3.4 (third paragraph). I strenuously object to the statement that the primary sources of PM emissions include the kilns. Data in Table 11.3.1 clearly shows that the primary source of potential PM emissions is the grinding room as follows:

For gas fired kilns (the vast majority of kilns):

$$\frac{0.28\ \text{lb/t}}{0.28\ \text{lb/t (kiln)} + 8.5\ \text{lb/t (grinding)}} \times 100 = 3.2\%$$

(obviously not a major source)

For coal fired kilns (perhaps 30 out of 300 kilns):

$$\frac{1.2\ \text{lb/t}}{1.2\ \text{lb/t (kiln)} + 8.5\ \text{lb/t (grinding)}} \times 100 = 12.4\%$$

(not a major if $< 10\%$ of kilns)

For sawdust fired kilns (perhaps 20 out of 300 kilns):

$$\frac{0.34\ \text{lb/t}}{0.34\ \text{lb/t (kiln)} + 8.5\ \text{lb/t (grinding)}} \times 100 = 3.8\%$$

(not a major source if $<7\%$ of kilns)

Response

Although the kilns are not a "primary" source of filterable PM, they are a primary source of PM-10 emissions. Therefore, the text will be revised as follows: "The primary sources of PM (and PM-10) emissions are the kilns and raw material grinding and screening operations."

Comment CLEM-4

p. 11.3.4 (third paragraph): I object to the statement that organic emissions are primarily a result of volatilization of lubricating oil (brick oil). I don't think there is any scientific or engineering validity to this statement. Since many raw materials may exhibit total organic carbon in a range of 0.1-0.6% and since a fraction of this organic may volatilize in the dryer, the concentration from the raw material may be as significant as the lubricant. In the absence of engineering data, the most correct statement would be, "Organic emissions from brick dryers may include a contribution from petroleum products in those plants using petroleum based products as a lubricant in extrusion."

Response

See response to Comment BIA-6.

Comment CLEM-5

p. 11.3.5 (4th paragraph: instead of stating that wet scrubbers are used in at least one facility, why not say that they are used in one facility or one plant location (the current tally for wet scrubbers In the US).

Response

The text will be changed to reflect this comment.

Comment CLEM-6

p. 11.3.5 (4th paragraph): I strenuously object to the statement that "Test data show that control efficiencies for total fluorides and S02 are greater than 99 percent for the packed bed scrubber" since in the very next sentence you indicate a control efficiency for S02 of 82% and no available fluoride control efficiency.

Response

The 99 percent control efficiencies apply to the high-efficiency packed tower wet scrubber at Interstate Brick in West Jordan, Utah. The 82 percent SO_2 control efficiency applies to the "medium efficiency" wet scrubber at Interstate.

The text will be revised to clarify the point as follows: "Test data show that the only high-efficiency packed tower wet scrubber operating in the U.S. (at brick plants) achieves control efficiencies greater than 99 percent for SO_2 and total fluorides. A unique "medium-efficiency" wet scrubber operating at the same plant has demonstrated an 82 percent SO_2 control efficiency. "

Comment CLEM-7

In Table 11.3.2, reference is made to the "medium efficiency scrubbers at Interstate Brick. How can you call a homemade scrubber as "medium efficiency"? This horizontal tunnel scrubber cannot be compared to anything I have seen in industry for controlling S02. The data from this scrubber can only be considered as atypical for any industrial process. I recommend you simply look at a picture of this scrubber before you consider if it is even worthy of mention, and if you do mention it, you must consider it a "scrubber not typical of current air pollution control technology..."

Since there is only one scrubber that would be considered by the engineering community as "professionally designed," only the correct statement should be used.

Response

The data will be retained in the section, but text will be added to the footnote to indicate that the scrubber is not a typical air pollution control device.

Comments on Emission Factors

Comment CLEM-8

Table 11.3-2 (Emission Factors For Brick Manufacturing Operations);

> Brick Dryer With Supplemental Gas Burner: The emission factor of CO of 0.44 lb/t is for a malfunctioning dryer with data taken during the EPA test at Belden Brick. Subsequent to the EPA test, I was present at Belden when the burner was disengaged and watched the CO meter indicate a substantial reduction in CO. EPA should consider supplemental data from Belden and revise the emission factor.

Response

The emission factor is based on the supplemental test data from Belden. The EPA test included TOC and methane/ethane measurements, but did not include a CO test. None of the data from the EPA test on the brick dryer at Belden were included in the section. See response to Comment BIA-2.

Comment CLEM-9

Table 11.3-2 (Emission Factors For Brick Manufacturing Operation.):

> Natural Gas Fired Kiln: The SO_3 factor is attributed to a Center For Engineering Ceramic Manufacturing Report (Reference 26). In fact there were no SO_3 values mentioned in that report since there was no speciation between SO_2 and SO_3. Therefore, this value must be removed.

Response

A letter sent by Dr. Brosnan to Ron Myers of EPA supplied test data for several of the reports summarized in AP-42 Section 11.3, Reference 26. Included in these data are data for SO_2 and SO_3 emissions from Boral Brick (Salisbury, NC), Boral Brick (Augusta, GA), Boral Brick (Phenix City, AL), and Redlands Brick (East Windsor, CT).

Comment CLEM-10

Table 11.3 2 (Emission Factors For Brick Manufacturing Operations):

Natural Gas Fired Kiln: I vigorously object to the SO_2 factor of 0.5 lb/t used in the table. The majority of brick plants in the U.S. do not have pyrite in the raw material or they have an insignificant amount of pyrite in the raw material. Shale based plants typically have NO pyrite in the material. The Belden data is atypical and might apply to < 10% of plants.

Therefore, the only way of scientific validity to present the data is to use the Triangle data as the basis for an emission factor giving an emission factor of 0.06 lb/t. This statement should be explained with a footnote saying that a mass balance test may be used to estimate emissions in the event that the raw materials contain sulfur species over the baseline based on low pyrite amount exhibited by most clays and the Triangle material.

In a paper I recently wrote on the topic which will be published in the August issue of the American Ceramic Society Bulletin, sulfur sources in the raw materials are discussed and it is concluded that the only accurate way to estimate sulfur emissions is through a mass balance or other procedure. Given the engineering discussion in the paper, it is appropriate to use the baseline factor given by the Triangle test of 0.06 lb/t or O.1 lb/t.

Response

Based on the available test data, most of which was supplied by the BIA through Clemson University, the SO_2 emission factor of 0.5 lb/ton seems appropriate. The Triangle SO_2 measurement is over 50 percent lower than the lowest SO_2 measurement from five other plants (these plants have not been identified as having high-sulfur raw materials). These plants are Boral Brick (Salisbury, NC), Boral Brick (Augusta, GA), Boral Brick (Phenix City, AL), and Redlands Brick (East Windsor, CT), and Acme Brick (Sealy, TX). The factor also includes two tests conducted at Belden Brick that, when averaged, are 30 percent less than the average factor of 0.5 lb/ton. The magnitude of these Belden data indicates that at the time of testing, Belden was processing material that did not include a large amount of sulfur. Excluding the Belden data raises the factor to 0.52 lb/ton. The Triangle Brick SO_2 factor seems to present a lower limit of SO_2 emissions. EPA has made an effort to present a separate factor for facilities that emit larger amounts of SO_2. After reviewing the additional test data supplied by Boral Bricks, two additional data points for SO_2 were included in the candidate emission factor. Both tests showed SO_2 emissions greater than 0.5 lb/ton, and the new candidate SO_2 emission factor is 0.67 lb/ton.

Comment CLEM-11

Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Natural Gas Fired Kiln Firing High Sulfur Material: I vigorously object to the S02 factor of 4.3 lb/t (uncontrolled) used in the table since footnote 8 gives the sulfur content of the raw material as 0.087%

For 2000 lb, this yields 1.74 lb of sulfur (S), or 1.74 lb S/t. A simple conversion of S to S02 may be written as follows;

S (32 grams/mole) + 02 (32 grams/mole) = S02 (64 grams per mole)

The conversion of S02 from S is therefore by a factor of 64/32 or 2.

Thin means a MAXIMUM of 3.48 lb/t was available for this raw material. I do not believe that a natural gas combustion factor can possibly increase this S02 emission MORE THAN the factor for Triangle of 0.06 lb/t. Therefore, the emission factor can not be greater than about 3.54 lb/t.

The factor 4.3 lb/t is therefore in error and cannot be considered of sufficient weight for publication.

Response

See response to Comment BIA-11.

Comment CLEM-12

Table 11.3-2 (Emission Factors for Brick Manufacturing Operations):

Natural Gas Fired Kiln Firing High Sulfur Material (with medium efficiency wet scrubber): I vigorously object to the inclusion of the data for Interstate's homemade scrubber on two bases;

(a) Previous argument: In Table 11.3.2, reference is made to the Medium efficiency scrubbers at Interstate' Brick. How can you call a homemade scrubber as Medium efficiency?? This horizontal tunnel scrubber cannot be compared to anything I have seen in industry for controlling S02. The data from this scrubber can only be considered as atypical for any industrial process. I recommend you simply look at a picture of this scrubber before you consider if it is even worthy of mention, and if you do mention it, you must consider it a "scrubber not typical of current air pollution control technology."

(b) The Interstate raw material is atypical of any in the United States in that the raw materials are of a volcanic origin likely containing sulfur species entrapped within glassy matter or encapsulated in the mineral matter. Since most brick plants are using highly weathered clays such as alluvial clays and shales, there is no reason to consider any result from this scrubber as typical.

Response

(a) In preparing a document such as AP-42, EPA relies on industry for descriptions of equipment and processes. Interstate Brick provided a test report and a process description that used the terminology "medium efficiency" to describe the scrubber discussed above. The scrubber will be noted as atypical in the AP-42 section.

(b) The raw materials are noted as being high-sulfur, high-fluorine materials. Although the materials differ from typical materials, the test data from this plant provide valuable insights on potential methods of air pollution control.

Comment CLEM-13

Table 11.3-2 (Emission Factors For Brick Manufacturing Operations)

Coal Fired Kiln: I object to footnote m since there is no data to indicate that the General Shale raw material contains pyrite. My own emission factor for this kiln was higher from the EPA test suggesting that the emission factor has been adjusted. If there was an adjustment, there should be a note explaining the adjustment so that the data could be applied to other kilns based on the sulfur content of the raw material in the kiln of interest.

Response

The word "pyrite" will be replaced with "sulfur." The EPA test at General Shale did not include SO2 measurements. It is unclear which test result is being questioned. The factor is based on tests conducted at Chatahoochee Brick (Atlanta, GA) and General Shale (Mooresville, IN).

Comment CLEM-14

Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

(1) Coal Fired Kiln: In footnote c, references 8, 12, and 15 refer only to Belden which has NO sawdust fired kilns. Reference 22 refers to Acme, Sealy, TX, which is a gas fired kiln. Reference 25 refers to Triangle, also a gas fired kiln. Reference 25 is the Center report which only gives 0.26 lb/t for a kiln fired only with sawdust. Since EPA did NOT measure SOx at Pine Hall, then 0.25 lb/t is the ONLY factor that can be used.

Response

Footnote c does not include Reference 8. It appears that this comment should read "Sawdust-fired kiln......" instead of "Coal-fired kiln:...". If so, the only SO_2 data for a sawdust-fired kiln were taken from the additional data (to the Center report) provided by Dr. Brosnan. The data were used to calculate an emission factor of 0.54 lb/ton, which was averaged with the natural gas-fired kiln data. The magnitude of emissions was almost identical to the average natural gas-fired kiln emissions, and there is no reason to believe that SO_2 emissions from sawdust-fired kiln would differ from natural gas-fired kiln emissions. Reference 25 did not include any emission factor for SO_2 from sawdust-fired kilns.

Comment CLEM-15

Table 11.3-3: (Emission Factors For Brick Manufacturing Operations)

Brick dryer: TOC emissions. I have a problems in a waste heat dryer from a gas fired kiln with TOC emissions >20% higher than TOC emissions from uncontrolled brick kilns. Once again, the defective Belden data (footnote e containing reference S) has likely affected this result. As a minimum, the Belden data should be removed from the calculation or the revised Belden data should be used in the calculation.

Response

The original Belden data were not used. The data from the Belden retest were used to develop the TOC emission factor for brick dryers. The magnitude of the dryer emissions is the primary reason that the lubricating oil is thought to contribute to a large extent to the dryer emissions. Note: the original test data for TOC (as methane) from the dryer at Belden gave an emission factor of 8.4 lb/ton. The proposed emission factor is two orders of magnitude less (0.085 lb/ton).

Comment CLEM-16

Table 11.3-3: (Emission Factors For Brick Manufacturing Operations)

Brick dryer; VOC emissions; It appears that the calculation used Belden data, and I voice the same objection as in previous objections referring to Belden.

Response

See response to Comment CLEM-15.

Comment CLEM-17

Table 11,3-3; (Emission Factors For Brick Manufacturing Operations)

Brick kilns with medium efficiency wet scrubber: I voice the same objection for inclusion of data from the homemade Interstate scrubber that I have also previously noted.

Response

See response to Comment CLEM-12.

Comment CLEM-18

Draft Table 11.3-4: (Emission Factors For Organic Pollutant Emissions From Brick Manufacturing Operations)

I vigorously object to any data with footnotes b or c on the basis that the estimation of any quantity as a fraction of the lower detection limit and inclusion of that estimate in any calculated value is with no scientific or engineering basis. If data does not exist of known precision, it can not be used.

Response

See Response 3) to Comment NC-14.

Comment CLEM-19

Draft Table 11.3-4: (Emission Factors For Metal Emissions From Brick Manufacturing Operations)

I vigorously object to the language in footnote a. There is no engineering information that allows EPA to conclude that colorants, as a body additive or as a surface treatment, increase metals emissions. This information is only inferred from the Pine Hall data.

I further question the statement in footnote a that metals emissions can be due to metallic additives used in the body of the brick. There are no additives listed in the table other than manganese and chromium which MIGHT lead to air emissions, and there is no engineering data that they DO lead to emissions.

Response

Although it is true that no concrete evidence exists indicating that metallic additives increase metals emissions from brick kilns, the Pine Hall data appear to indicate that a relationship may exist between colorant usage and metal emissions. The manganese emission factor calculated from the Pine Hall data (Pine Hall uses manganese dioxide as a surface treatment) is almost two orders of magnitude greater than the next largest manganese emission factor. If the Pine Hall factor was averaged with the other data, the manganese emission factor would be 0.0035 lb/ton, which is almost an order of magnitude greater than any of the data points except for Pine Hall. Therefore, the emission factors will not be revised. See response to Comment BIA-18 for additional information.

Sec. 4 Ref. #

TEST REPORTS AVAILABLE FOR USE IN DEVELOPING EMISSION FACTORS

Ref. #	Plant	Location and date	Fuel	Pollutants
80-BRK-01 15	Lee Brick and Tile Co.	Sanford, NC Apr. 1980	Coal	Kiln--PM, SO_2, NO_X, Particle size
EMB HAS 80-BRK-05 14	Chatham Brick and Tile Co.	Gulf, NC Oct. 1980	Sawdust	Kiln--CO_2, Particle size
18 (Missing from file)	Lee Brick and Tile Co.	Sanford, NC Feb. 1978	Coal	Kiln--PM
17 (Missing from file)	Lee Brick and Tile Co.	Sanford, NC June 1978	Coal	Kiln--PM
16 (Missing from file)	Chatham Brick and Tile Co.	Sanford, NC July 1979	?	Kiln--PM
3	General Shale	Atlanta, Ga Mar. 9, 1993	Coal	Kiln--SO_2, NO_X, CO, THC, CO_2 Dryer--SO_2, NO_X, CO, THC, CO_2
7	General Shale	Glascow, Va Oct. 16, 1990	Coal	Kiln--Filt. PM, CO_2
12	General Shale	Kingsport, TN Oct. 11, 1983	Coal	Kiln--Filt. PM, CO_2
VOID 11	~~General~~ Shale	Johnson City Feb. 7-9, 1984	Coal	Kiln--Filt. PM, CO_2, Particle sizing
13	General Shale	Kingsport, TN July 21, 1982	Coal	Kiln--Filt. PM, CO_2 Coal crusher--Filt. PM
10	General Shale	Knoxville, TN Apr. 22, 1986	Coal	Kiln--Filt. PM, CO_2
6	General Shale	Marion, VA Oct. 17-19,1990	Coal and supplemental gas	2 Kilns--Filt. PM, CO_2
9	General Shale	Mooresville, IN Dec. 2, 1986	Coal	Kiln/dryer--SO_2
5	Belden Brick	Sugarcreek, OH Mar. 3, 1992	Natural gas	Kiln--Filt. PM, SO_2, NO_X, CO_2
8	Belden Brick	Sugarcreek, OH July 21, 1989	Natural gas	Kiln--Filt. PM, SO_2, NO_X, CO_2
19	Acme Brick	Sealy, TX	Natural gas	Kiln--Filt. PM, HF, SO_2 Dryer--SO_2
4	Pine Hall Brick--EPA test	Madison, NC Oct.-Nov., 1992	Sawdust	Grinding room--Filt. PM, PM-10 Sawdust dryer--Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, methane, ethane, CO_2, HF/HCL, volatiles, semi-volatiles, metals *Kiln--Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, methane,* ethane, CO_2, HF/HCL, volatiles, semi-volatiles, metals
2	General Shale--EPA test	Johnson City, TN July 26-31,1993	Coal and supplemental gas	Grinding room--Filt. PM, PM-10 Brick dryer--THC Kiln--Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, methane, ethane, CO_2, HF/HCL, volatiles, semi-volatiles, metals
1	Belden Brick--EPA test	Sugarcreek, OH Nov. 8-12, 1993	Natural gas	Grinding room--Filt. PM, PM-10 Brick dryer--THC, methane, ethane Kiln--Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, CO_2, HF/HCL, volatiles, semi-volatiles, metals

Document Control Sheet

Project No.: 4602-01 (Subtask No.) ____ Document Name: Brick Memo CBI: ☐ Yes ☒ No Originator: B. Shrager Ext. 5224	WP COMMENTS: WP ID No.: 3498

Section ①

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Section ②

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Section ③

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Document Control Sheet (continued)

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WP PROOF ☐ Yes ☐ No

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☐ Firm
☐ RUSH

WP PROOF ☐ Yes ☐ No

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

OCT 9

MEMORANDUM

SUBJECT: Source Test Report

FROM: Gilbert H. Wood, Chief
Emission Measurement Branch, TSD (MD-19)

TO: Addressees

The enclosed final source test report is submitted for your information. Any questions regarding the test should be directed to the Task Manager (Telephone: FTS 541-0200). Additional copies of this report are available from the ERC Library, MD-35, Research Triangle Park, North Carolina 27711.

Industry: Brick Manufacturing

Process: Crushing, Sizing, Firing, Sawdust Drying

Company: Pine Hall Brick

Location: Madison, North Carolina

Project Report Number: 92-BRK-01

Task Manager: J. W. Brown

Project Officer: J. E. McCarley

Enclosure

Addressees:

Jim Southerland, TSD/EIB (MD-14)
Rosemary Thorn, EPA Library Services (MD-35)
Director, Air and Radiation Division, Region 4
NTIS, 5285 Port Royal Road, Springfield, VA 22161

Units	KILN OUTLET/DRYER INLET				Outlet A			OUTLET B			OUTLET TOTALS			Average Outlet	Dryer Contribution	
lb/hr	Run 1	Run 2	Run 3	Average	Run 1A	Run 2A	Run 3A	Run 1B	Run 2B	Run 3B	Run 1A/1B	Run 2A/2B	Run 3A/3B			
PM	4.83	5.64	4.84	5.10	2.21	2.19	3.07	19.39	20.15	20.78	21.60	22.34	23.85	22.60	17.49	342.78%
Antimony	< 1.24E-04	< 1.24E-04	1.97E-04	< 1.48E-04	< 2.72E-05	< 2.76E-05	< 2.65E-05	< 7.10E-05	< 7.16E-05	3.15E-05	< 9.82E-05	< 9.92E-05	< 5.80E-05	< 8.51E-05	-6.32E-05	-42.61%
Arsenic	9.52E-04	9.09E-04	7.53E-04	8.71E-04	1.97E-04	2.31E-04	2.60E-04	9.19E-05	1.85E-04	9.80E-05	2.89E-04	4.16E-04	3.58E-04	3.54E-04	-5.17E-04	-59.34%
Beryllium	9.06E-06	9.28E-06	1.84E-05	1.22E-05	2.31E-06	< 1.44E-06	8.84E-06	2.33E-06	< 1.47E-06	< 1.46E-06	4.64E-06	< 2.91E-06	< 1.03E-05	< 5.95E-06	-6.30E-06	-51.42%
Cadmium	1.06E-04	2.91E-04	4.79E-04	2.92E-04	8.12E-05	1.52E-04	5.79E-05	2.71E-04	2.80E-04	2.63E-04	3.52E-04	4.32E-04	3.21E-04	3.68E-04	7.64E-05	26.15%
Chromium	5.68E-04	9.23E-04	1.19E-03	8.94E-04	2.72E-04	6.78E-04	1.52E-04	2.40E-04	6.81E-04	3.91E-04	5.12E-04	1.36E-03	5.43E-04	8.05E-04	-8.90E-05	-9.96%
Lead	5.66E-03	2.92E-03	8.04E-03	5.54E-03	2.41E-03	9.18E-04	1.11E-04	2.12E-03	7.04E-04	3.96E-05	4.53E-03	1.62E-03	1.51E-04	2.10E-03	-3.44E-03	-62.06%
Manganese	1.88E-02	1.72E-02	6.08E-01	2.15E-01	2.63E-03	3.78E-03	6.43E-03	3.57E-03	4.30E-03	3.37E-03	6.20E-03	8.08E-03	9.80E-03	8.03E-03	-2.07E-01	-96.26%
Mercury	1.65E-04	9.02E-05	2.45E-04	1.67E-04	1.34E-04	8.62E-05	6.10E-05	1.62E-04	3.96E-05	5.98E-05	2.96E-04	1.26E-04	1.21E-04	1.81E-04	1.41E-05	8.48%
Nickel	3.55E-04	6.10E-04	7.81E-04	5.82E-04	3.17E-04	4.51E-04	1.19E-04	2.03E-04	3.66E-04	2.67E-04	5.20E-04	8.17E-04	3.86E-04	5.74E-04	-7.67E-06	-1.32%
Phosphorus	1.92E-02	3.09E-02	2.16E-02	2.39E-02	< 7.04E-03	4.71E-03	< 6.93E-03	9.05E-03	< 7.17E-03	< 7.14E-03	< 1.61E-02	< 1.19E-02	< 1.41E-02	< 1.40E-02	-9.89E-03	-41.37%
Selenium	1.97E-03	3.70E-04	5.12E-04	9.51E-04	4.60E-04	4.51E-04	4.29E-04	1.73E-04	4.67E-04	3.76E-04	6.33E-04	9.18E-04	8.05E-04	7.85E-04	-1.65E-04	-17.39%
Totals	0.05	0.05	0.64	0.25	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.03	0.03	0.03	-0.22	-88.99%
PM (Metals train)	4.83	5.64	4.84	5.10	2.21	2.19	3.07	19.39	20.15	20.78	21.60	22.34	23.85	22.60	17.49	342.78%
Filterable PM-10	3.42	3.62	3.75	3.60	1.98	1.99	2.64	2.53	1.72	2.26	4.51	3.71	4.91	4.38	0.78	21.63%
Condensible PM	5.14	5.05	4.22	4.80	0.26	0.06	1.48	0.51	0.19	0.41	0.77	0.25	1.88	0.97	-3.84	-79.87%
Total PM	9.97	10.69	9.06	9.90	2.47	2.25	4.55	19.90	20.34	21.19	22.37	22.59	25.73	23.56	13.66	137.89%
Total PM-10	8.56	8.67	7.97	8.40	2.24	2.05	4.12	3.04	1.91	2.67	5.28	3.96	6.79	5.34	-3.06	-36.39%
CO (metals runs)	55.36	56.16	46.5	52.67	25.98	26.38	26.35	24.89	24.63	22.84	50.87	51.01	49.19	50.36	-2.32	-4.40%
CO (PM10 & 202 runs)	43.74	62.62	60.71	55.69	19.09	26.91	26.67	26.7	29.59	29.33	45.79	58.50	56.00	53.43	-2.26	-4.06%
CO (Method 0010 runs)	51	57.91	61.65	56.85	25.09	27.07	27.34	23.13	25.25	23.35	48.22	52.32	50.69	50.41	-6.44	-11.33%
			Overall Average	55.07									Overall Average Outlet	51.40	-3.67	-6.67%
NOx (metals runs)	6.85	9.04	7.03	7.64	3	3.22	2.46	2.35	2.73	2.81	5.35	5.95	5.27	5.52	-2.12	-27.71%
NOx (PM10 & 202 runs)	5.55	7.95	7.34	6.95	1.85	2.96	2.9	2.46	2.63	3.01	4.31	5.59	5.91	5.27	-1.68	-24.14%
NOx (Method 0010 runs)	7.61	5.3	6.56	6.49	3.01	3.03	2.98	3.01	2.65	2.33	6.02	5.66	5.31	5.67	-0.82	-12.63%
			Overall Average	7.03									Overall Average Outlet	5.49	-1.54	-21.89%
T Fluoride (Method 13B)	0.048	0.295	3.248	1.197	0.307	0.173	0.524				0.31	0.17	0.52	0.33	-0.86	-72.04%
HF (Method 26)	9.275	11.036	3.593	2.56	1.2	3.094	0.329	0.014	2.384	2.197	1.21	5.48	2.53	3.07	0.51	19.92%
THC	0.72	0.8	0.81	0.78	0.29	1.97	2.26	0.98	0.79	1.24	1.27	2.76	3.50	2.51	1.73	223.18%
Acetone	3.94E-03	2.79E-03	1.29E-02	6.54E-03	5.96E-03	6.15E-03	1.09E-02	9.61E-03	9.47E-03	9.83E-03	1.56E-02	1.56E-02	2.07E-02	1.73E-02	1.08E-02	164.49%
Acrylonitrile	4.43E-04	< 3.46E-04	< 3.00E-04	< 3.63E-04	< 7.39E-05	1.48E-04	2.18E-04	2.21E-04	< 2.03E-04	2.13E-04	< 2.95E-04	< 3.51E-04	4.31E-04	< 3.59E-04	-4.03E-06	-1.11%
Benzene	9.60E-03	9.50E-03	6.70E-03	8.60E-03	3.87E-03	4.24E-03	4.12E-03	6.12E-03	4.99E-03	4.59E-03	9.99E-03	9.23E-03	8.71E-03	9.31E-03	7.10E-04	8.26%
Bromomethane	5.62E-04	7.44E-04	1.19E-03	8.32E-04	3.27E-04	3.38E-04	4.70E-04	4.35E-04	< 3.73E-04	4.69E-04	7.62E-04	< 7.11E-04	9.39E-04	< 8.04E-04	-2.80E-05	-3.37%
2-butanone	< 3.23E-04	< 5.05E-06	< 5.13E-06	< 1.11E-04	1.03E-03	< 6.53E-04	4.79E-03	1.44E-03	< 1.59E-03	2.60E-03	2.47E-03	< 2.24E-03	7.39E-03	< 4.03E-03	3.92E-03	3532.57%
Carbon Disulfide	2.66E-04	3.32E-04	2.15E-04	2.71E-04	1.07E-04	1.35E-04	1.50E-04	1.80E-04	1.63E-04	1.81E-04	2.87E-04	2.98E-04	3.31E-04	3.05E-04	3.43E-05	12.67%
Carbon Tetrachloride	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 3.30E-06	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 3.09E-06	< 2.87E-06	< 6.40E-06	< 6.34E-06	< 6.20E-06	< 6.31E-06	1.27E-06	25.26%
Chloroform	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 3.30E-06	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 3.09E-06	< 2.87E-06	< 6.40E-06	< 6.34E-06	< 6.20E-06	< 6.31E-06	1.27E-06	25.26%
Chloromethane	1.50E-02	1.68E-02	2.30E-03	1.14E-02	8.41E-03	1.12E-02	1.16E-02	1.29E-02	1.02E-02	1.35E-02	2.13E-02	2.14E-02	2.51E-02	2.26E-02	1.12E-02	98.86%
Ethylbenzene	2.20E-04	1.07E-04	1.00E-04	1.42E-04	8.16E-05	6.73E-05	1.10E-04	1.19E-04	6.89E-05	6.00E-05	2.01E-04	1.36E-04	1.70E-04	1.69E-04	2.66E-05	18.69%
2-Hexanone	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 3.30E-06	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 3.09E-06	< 2.87E-06	< 6.40E-06	< 6.34E-06	< 6.20E-06	< 6.31E-06	1.27E-06	25.26%
Iodomethane	2.66E-03	3.64E-03	3.88E-03	3.39E-03	1.55E-03	1.83E-03	2.07E-03	2.19E-03	2.17E-03	2.41E-03	3.74E-03	4.00E-03	4.48E-03	4.07E-03	6.80E-04	20.04%
Methylene Chloride	1.72E-04	6.90E-05	1.33E-04	1.25E-04	2.59E-04	1.76E-03	4.41E-04	2.07E-04	3.45E-04	6.79E-05	4.66E-04	2.11E-03	5.09E-04	1.03E-03	9.02E-04	723.50%
M-/p-xylene	4.23E-04	1.85E-04	8.35E-04	4.81E-04	4.64E-04	1.68E-04	2.56E-04	2.26E-04	1.47E-04	1.66E-04	6.90E-04	3.15E-04	4.22E-04	4.76E-04	-5.33E-06	-1.11%
O-xylene	< 1.39E-04	< 5.97E-05	9.00E-05	9.62E-05	7.60E-05	4.77E-05	7.56E-05	7.16E-05	4.65E-05	4.56E-05	1.48E-04	9.42E-05	1.21E-04	1.21E-04	2.48E-05	25.74%
Styrene	< 4.94E-06	< 1.17E-05	< 5.13E-06	< 7.26E-06	< 3.30E-06	< 3.25E-06	< 9.26E-06	< 8.52E-05	< 1.04E-04	< 2.62E-05	< 8.85E-05	< 1.07E-04	< 3.55E-05	< 7.71E-05	6.98E-05	962.15%
Tetrochloroethane	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 3.30E-06	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 3.09E-06	< 2.87E-06	< 6.40E-06	< 6.34E-06	< 6.20E-06	< 6.31E-06	1.27E-06	25.26%
Toluene	2.05E-03	1.08E-03	2.14E-03	1.76E-03	3.91E-03	4.00E-03	3.82E-03	3.52E-03	2.93E-03	3.44E-03	7.43E-03	6.93E-03	7.26E-03	7.21E-03	5.45E-03	310.25%
1,1,1-trichloroethane	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 1.89E-05	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 1.19E-05	< 2.87E-06	< 2.20E-05	< 1.52E-05	< 6.20E-06	< 1.45E-05	9.41E-06	186.71%
Trichloroethene	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 3.30E-06	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 3.09E-06	< 2.87E-06	< 6.40E-06	< 6.34E-06	< 6.20E-06	< 6.31E-06	1.27E-06	25.26%
Trichlorofluoromethane	1.17E-04	7.75E-05	9.50E-05	9.65E-05	< 1.51E-04	< 9.15E-05	1.56E-04	1.05E-04	< 5.84E-05	8.71E-05	< 2.56E-04	< 1.50E-04	2.43E-04	< 2.16E-04	1.20E-04	124.18%
Vinyl Acetate	< 4.94E-06	< 5.05E-06	< 5.13E-06	< 5.04E-06	< 3.30E-06	< 3.25E-06	< 3.33E-06	< 3.10E-06	< 3.09E-06	< 2.87E-06	< 6.40E-06	< 6.34E-06	< 6.20E-06	< 6.31E-06	1.27E-06	25.26%
Bis(2-ethylhexyl)phthalate	6.49E-04	4.68E-04	3.13E-04	4.77E-04	3.44E-04	< 1.91E-08	3.21E-04	8.94E-04	4.49E-03	9.08E-04	1.24E-03	< 4.49E-03	1.23E-03	< 2.32E-03	1.84E-03	386.50%
Dibenzofuran	5.81E-04	1.73E-04	< 3.40E-08	< 2.51E-04	< 1.94E-08	< 1.91E-08	< 1.92E-08	< 2.00E-08	< 1.95E-08	< 1.91E-08	< 3.94E-08	< 3.86E-08	< 3.83E-08	< 3.88E-08	-2.51E-04	-99.98%
Dimethylphthalate	< 3.38E-08	< 3.42E-08	5.10E-04	< 1.70E-04	< 1.94E-08	< 1.91E-08	< 1.92E-08	< 2.00E-08	< 1.95E-08	< 1.91E-08	< 3.94E-08	< 3.86E-08	< 3.83E-08	< 3.88E-08	-1.70E-04	-99.98%
Di-n-butylphthalate	< 3.38E-08	3.04E-04	< 3.40E-08	< 1.01E-04	3.63E-04	< 1.91E-08	1.28E-04	3.82E-05	8.63E-05	1.75E-04	4.01E-04	< 8.63E-05	3.03E-04	< 2.64E-04	1.62E-04	159.98%
2-methylphenol	< 3.38E-08	< 3.42E-08	< 3.40E-08	< 3.40E-08	< 1.94E-08	< 1.91E-08	< 1.92E-08	< 2.00E-08	< 1.95E-08	< 1.91E-08	< 3.94E-08	< 3.86E-08	< 3.83E-08	< 3.88E-08	4.77E-09	14.02%
Naphthalene	1.71E-02	< 3.42E-08	< 3.40E-08	< 5.70E-03	< 1.94E-08	< 1.91E-08	< 1.92E-08	< 2.00E-08	< 1.95E-08	< 1.91E-08	< 3.94E-08	< 3.86E-08	< 3.83E-08	< 3.88E-08	-5.70E-03	-100.00%
Phenol	< 3.38E-08	3.18E-03	4.36E-04	< 1.21E-03	< 1.94E-08	1.33E-03	1.59E-03	5.86E-04	9.24E-04	7.67E-04	< 5.86E-04	2.25E-03	2.36E-03	< 1.73E-03	5.27E-04	43.72%
Totals	< 0.05	< 0.04	< 0.03	< 0.04	< 0.03	< 0.03	< 0.04	< 0.04	< 0.04	< 0.04	< 0.07	< 0.07	< 0.08	< 0.07	0.03	72.00%
THC	0.72	0.8	0.81	0.78	0.29	1.97	2.26	0.98	0.79	1.24	1.27	2.76	3.50	2.51	1.73	223.18%

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 1

To Jeff Linstel	From Ron Myers
Dept./Agency Mutual Materials	Phone # (919) 541-5407
Fax # (806) 464-7732	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

< = 1/2 of detect limit	KILN OUTLET/DRYER INLET				Outlet A		
Units (lb/hr)	Run 1	Run 2	Run 3	Average	Run 1A	Run 2A	Run 3A
PM	4.83	5.64	4.84	5.10	2.21	2.19	3.07
Antimony	< 6.20E−05	< 6.20E−05	1.97E−04	< 1.07E−04	< 1.38E−05	< 1.38E−05	< 1.33E−05
Arsenic	9.52E−04	9.09E−04	7.53E−04	8.71E−04	1.97E−04	2.31E−04	2.60E−04
Beryllium	9.06E−06	9.28E−06	1.84E−05	1.22E−05	2.31E−06	< 7.20E−07	8.84E−06
Cadmium	1.06E−04	2.91E−04	4.79E−04	2.92E−04	8.12E−05	1.52E−04	5.79E−05
Chromium	5.68E−04	9.23E−04	1.19E−03	8.94E−04	2.72E−04	6.78E−04	1.52E−04
Lead	5.68E−03	2.92E−03	8.04E−03	5.54E−03	2.41E−03	9.18E−04	1.11E−04
Manganese	1.88E−02	1.72E−02	6.08E−01	2.15E−01	2.63E−03	3.78E−03	6.43E−03
Mercury	1.65E−04	9.02E−05	2.45E−04	1.67E−04	1.34E−04	8.62E−05	6.10E−05
Nickel	3.55E−04	6.10E−04	7.81E−04	5.82E−04	3.17E−04	4.51E−04	1.19E−04
Phosphorus	1.92E−02	3.09E−02	2.16E−02	2.39E−02	< 3.52E−03	4.71E−03	< 3.47E−03
Selenium	1.97E−03	3.70E−04	5.12E−04	9.51E−04	4.60E−04	4.51E−04	4.29E−04
Totals	0.05	0.05	0.64	0.25	0.01	0.01	0.01
PM (Metals train)	4.83	5.64	4.84	5.10	2.21	2.19	3.07
Filterable PM−10	3.42	3.62	3.75	3.60	1.98	1.99	2.64
Condensible PM	5.14	5.05	4.22	4.80	0.26	0.06	1.48
Total PM	9.97	10.69	9.06	9.90	2.47	2.25	4.55
Total PM−10	8.56	8.67	7.97	8.40	2.24	2.05	4.12
CO (metals runs)	55.36	56.16	46.5	52.67	25.98	26.38	26.35
CO (PM10 & 202 runs)	43.74	62.62	60.71	55.69	19.09	28.91	26.67
CO (Method 0010 runs)	51	57.91	61.65	56.85	25.09	27.07	27.34
			Overall Average	55.07			
NOx (metals runs)	6.85	9.04	7.03	7.64	3	3.22	2.46
NOx (PM10 & 202 runs)	5.55	7.95	7.34	6.95	1.85	2.96	2.9
NOx (Method 0010 runs)	7.61	5.3	6.56	6.49	3.01	3.03	2.98
			Overall Average	7.03			
T.Fluoride (Method 13B)	0.048	0.295	3.248	1.197	0.307	0.173	0.524
HF (Method 26)	9.275	11.036	3.593	2.56	1.2	3.094	0.329
THC	0.72	0.8	0.81	0.78	0.29	1.97	2.26
Acetone	3.94E−03	2.79E−03	1.29E−02	6.54E−03	5.96E−03	6.15E−03	1.09E−02
Acrylonitrile	4.43E−04	< 1.73E−04	< 1.50E−04	< 2.55E−04	< 3.70E−05	1.48E−04	2.18E−04
Benzene	9.60E−03	9.50E−03	6.70E−03	8.60E−03	3.87E−03	4.24E−03	4.12E−03
Bromomethane	5.62E−04	7.44E−04	1.19E−03	8.32E−04	3.27E−04	3.38E−04	4.70E−04
2−butanone	< 1.62E−04	< 2.53E−06	< 2.57E−06	< 5.55E−05	1.03E−03	< 3.27E−04	4.79E−03
Carbon Disulfide	2.66E−04	3.32E−04	2.15E−04	2.71E−04	1.07E−04	1.35E−04	1.50E−04
Carbon Tetrachloride	< 2.47E−06	< 2.53E−06	< 2.57E−06	< 2.52E−06	< 1.65E−06	< 1.63E−06	< 1.67E−06
Chloroform	< 4.94E−06	< 5.05E−06	< 5.13E−06	< 5.04E−06	< 3.30E−06	< 3.25E−06	< 3.33E−06
Chloromethane	1.50E−02	1.68E−02	2.30E−03	1.14E−02	8.41E−03	1.12E−02	1.16E−02
Ethylbenzene	2.20E−04	1.07E−04	1.00E−04	1.42E−04	8.16E−05	6.73E−05	1.10E−04
2−Hexanone	< 2.47E−06	< 2.53E−06	< 2.57E−06	< 2.52E−06	< 1.65E−06	< 1.63E−06	< 1.67E−06
Iodomethane	2.66E−03	3.64E−03	3.88E−03	3.39E−03	1.55E−03	1.83E−03	2.07E−03
Methylene Chloride	1.72E−04	6.90E−05	1.33E−04	1.25E−04	2.59E−04	1.76E−03	4.41E−04
M−/p−xylene	4.23E−04	1.85E−04	8.35E−04	4.81E−04	4.64E−04	1.68E−04	2.56E−04
O−xylene	< 6.95E−05	< 2.99E−05	9.00E−05	6.31E−05	7.60E−05	4.77E−05	7.56E−05
Styrene	< 2.47E−06	< 5.85E−06	< 2.57E−06	< 3.63E−06	< 1.65E−06	< 1.63E−06	< 4.64E−06
Tetrachloroethane	< 2.47E−06	< 2.53E−06	< 2.57E−06	< 2.52E−06	< 1.65E−06	< 1.63E−06	< 1.67E−06
Toluene	2.05E−03	1.08E−03	2.14E−03	1.76E−03	3.91E−03	4.00E−03	3.82E−03
1,1,1−trichloroethane	< 2.47E−06	< 2.53E−06	< 2.57E−06	< 2.52E−06	< 9.45E−06	< 1.63E−06	< 1.67E−06
Trichloroethene	< 2.47E−06	< 2.53E−06	< 2.57E−06	< 2.52E−06	< 1.65E−06	< 1.63E−06	< 1.67E−06
Trichlorofluoromethane	1.17E−04	7.75E−05	9.50E−05	9.65E−05	< 7.55E−05	< 4.56E−05	1.56E−04
Vinyl Acetate	< 2.47E−06	< 2.53E−06	< 2.57E−06	< 2.52E−06	< 1.65E−06	< 1.63E−06	< 1.67E−06
Bis(2−ethylhexyl)phthalate	6.49E−04	4.68E−04	3.13E−04	4.77E−04	3.44E−04	< 9.55E−09	3.21E−04
Dibenzofuran	5.81E−04	1.73E−04	< 1.70E−08	< 2.51E−04	< 9.70E−09	< 9.55E−09	< 9.60E−09
Dimethylphthalate	< 1.69E−08	< 1.71E−08	5.10E−04	< 1.70E−04	< 9.70E−09	< 9.55E−09	< 9.60E−09
Di−n−butylphthalate	< 1.69E−08	3.04E−04	< 1.70E−08	< 1.01E−04	3.63E−04	< 9.55E−09	1.28E−04
2−methylphenol	< 1.69E−08	< 1.71E−08	< 1.70E−08	< 1.70E−08	< 9.70E−09	< 9.55E−09	< 9.60E−09
Naphthalene	1.71E−02	< 1.71E−08	< 1.70E−08	< 5.70E−03	< 9.70E−09	< 9.55E−09	< 9.60E−09
Phenol	< 1.69E−08	3.18E−03	4.36E−04	< 1.21E−03	< 9.70E−09	1.33E−03	1.59E−03
Totals	< 0.05	< 0.04	< 0.03	< 0.04	< 0.03	< 0.03	< 0.04
THC	0.72	0.8	0.81	0.78	0.29	1.97	2.26

< = 1/2 of detect limit	OUTLET B			OUTLET TOTALS			Average Outlet	Dryer Contribution	
Units (lb/hr)	Run 1B	Run 2B	Run 3B	Run 1A/1B	Run 2A/2B	Run 3A/3B			
PM	19.39	20.15	20.78	21.60	22.34	23.85	22.60	17.49	342.78%
Antimony	< 3.55E−05	< 3.58E−05	3.15E−05	< 4.91E−05	< 4.96E−05	< 4.48E−05	< 4.78E−05	−5.92E−05	−55.31%
Arsenic	9.19E−05	1.85E−04	9.80E−05	2.89E−04	4.16E−04	3.58E−04	3.54E−04	−5.17E−04	−59.34%
Beryllium	2.33E−06	< 7.35E−07	< 7.30E−07	4.64E−06	< 1.46E−06	< 9.57E−06	< 5.22E−06	−7.02E−06	−57.36%
Cadmium	2.71E−04	2.80E−04	2.63E−04	3.52E−04	4.32E−04	3.21E−04	3.68E−04	7.64E−05	26.15%
Chromium	2.40E−04	6.81E−04	3.91E−04	5.12E−04	1.36E−03	5.43E−04	8.05E−04	−8.90E−05	−9.96%
Lead	2.12E−03	7.04E−04	3.96E−05	4.53E−03	1.62E−03	1.51E−04	2.10E−03	−3.44E−03	−62.08%
Manganese	3.57E−03	4.30E−03	3.37E−03	6.20E−03	8.08E−03	9.80E−03	8.03E−03	−2.07E−01	−96.26%
Mercury	1.62E−04	3.90E−05	5.98E−05	2.96E−04	1.26E−04	1.21E−04	1.81E−04	1.41E−05	8.46%
Nickel	2.03E−04	3.66E−04	2.67E−04	5.20E−04	8.17E−04	3.86E−04	5.74E−04	−7.67E−06	−1.32%
Phosphorus	9.05E−03	< 3.59E−03	< 3.57E−03	< 1.26E−02	< 8.30E−03	< 7.04E−03	< 9.30E−03	−1.46E−02	−61.09%
Selenium	1.73E−04	4.67E−04	3.76E−04	6.33E−04	9.18E−04	8.05E−04	7.85E−04	−1.65E−04	−17.39%
Totals	0.02	0.01	0.01	0.03	0.02	0.02	0.02	−0.23	−90.91%
PM (Metals train)	19.39	20.15	20.78	21.60	22.34	23.85	22.60	17.49	342.78%
Filterable PM−10	2.53	1.72	2.26	4.51	3.71	4.91	4.38	0.78	21.63%
Condensible PM	0.51	0.19	0.41	0.77	0.25	1.88	0.97	−3.84	−79.87%
Total PM	19.90	20.34	21.19	22.37	22.59	25.73	23.56	13.66	137.89%
Total PM−10	3.04	1.91	2.67	5.28	3.96	6.79	5.34	−3.06	−36.39%
CO (metals runs)	24.89	24.63	22.84	50.87	51.01	49.19	50.36	−2.32	−4.40%
CO (PM10 & 202 runs)	26.7	29.59	29.33	45.79	58.50	56.00	53.43	−2.26	−4.06%
CO (Method 0010 runs)	23.13	25.25	23.35	48.22	52.32	50.69	50.41	−6.44	−11.33%
						Overall Average Outlet	51.40	−3.67	−6.67%
NOx (metals runs)	2.35	2.73	2.61	5.35	5.95	5.27	5.52	−2.12	−27.71%
NOx (PM10 & 202 runs)	2.46	2.63	3.01	4.31	5.59	5.91	5.27	−1.68	−24.14%
NOx (Method 0010 runs)	3.01	2.65	2.33	6.02	5.68	5.31	5.67	−0.82	−12.63%
						Overall Average Outlet	5.49	−1.54	−21.89%
T.Fluoride (Method 13B)				0.31	0.17	0.52	0.33	−0.86	−72.04%
HF (Method 26)	0.014	2.384	2.197	1.21	5.48	2.53	3.07	0.51	19.92%
THC	0.98	0.79	1.24	1.27	2.76	3.50	2.51	1.73	223.16%
Acetone	9.61E−03	9.47E−03	9.83E−03	1.56E−02	1.56E−02	2.07E−02	1.73E−02	1.08E−02	164.49%
Acrylonitrile	2.21E−04	< 1.02E−04	2.13E−04	< 2.58E−04	< 2.50E−04	4.31E−04	< 3.13E−04	5.75E−05	22.51%
Benzene	6.12E−03	4.99E−03	4.59E−03	9.99E−03	9.23E−03	8.71E−03	9.31E−03	7.10E−04	8.26%
Bromomethane	4.35E−04	< 1.87E−04	4.69E−04	7.62E−04	< 5.25E−04	9.39E−04	< 7.42E−04	−9.02E−05	−10.84%
2−butanone	1.44E−03	< 7.95E−04	2.60E−03	2.47E−03	< 1.12E−03	7.39E−03	< 3.66E−03	3.60E−03	6491.93%
Carbon Disulfide	1.80E−04	1.63E−04	1.81E−04	2.87E−04	2.98E−04	3.31E−04	3.05E−04	3.43E−05	12.67%
Carbon Tetrachloride	< 1.55E−06	< 1.55E−06	< 1.44E−06	< 3.20E−06	< 3.17E−06	< 3.10E−06	< 3.16E−06	6.37E−07	25.26%
Chloroform	< 1.55E−06	< 1.55E−06	< 1.44E−06	< 4.85E−06	< 4.80E−06	< 4.77E−06	< 4.80E−06	−2.37E−07	−4.70%
Chloromethane	1.29E−02	1.02E−02	1.35E−02	2.13E−02	2.14E−02	2.51E−02	2.26E−02	1.12E−02	98.86%
Ethylbenzene	1.19E−04	6.89E−05	6.00E−05	2.01E−04	1.36E−04	1.70E−04	1.69E−04	2.66E−05	18.69%
2−Hexanone	< 1.55E−06	< 1.55E−06	< 1.44E−06	< 3.20E−06	< 3.17E−06	< 3.10E−06	< 3.16E−06	6.37E−07	25.26%
Iodomethane	2.19E−03	2.17E−03	2.41E−03	3.74E−03	4.00E−03	4.48E−03	4.07E−03	6.80E−04	20.04%
Methylene Chloride	2.07E−04	3.45E−04	6.79E−05	4.66E−04	2.11E−03	5.09E−04	1.03E−03	9.02E−04	723.50%
M−/p−xylene	2.26E−04	1.47E−04	1.66E−04	6.90E−04	3.15E−04	4.22E−04	4.76E−04	−5.33E−06	−1.11%
O−xylene	7.16E−05	4.65E−05	4.56E−05	1.48E−04	9.42E−05	1.21E−04	1.21E−04	5.79E−05	91.71%
Styrene	< 4.26E−05	< 5.20E−05	< 1.31E−05	< 4.43E−05	< 5.36E−05	< 1.77E−05	< 3.85E−05	3.49E−05	962.15%
Tetrachloroethane	< 1.55E−06	< 1.55E−06	< 1.44E−06	< 3.20E−06	< 3.17E−06	< 3.10E−06	< 3.16E−06	6.37E−07	25.26%
Toluene	3.52E−03	2.93E−03	3.44E−03	7.43E−03	6.93E−03	7.26E−03	7.21E−03	5.45E−03	310.25%
1,1,1−trichloroethane	< 1.55E−06	< 5.95E−06	< 1.44E−06	< 1.10E−05	< 7.58E−06	< 3.10E−06	< 7.23E−06	4.71E−06	186.71%
Trichloroethene	< 1.55E−06	< 1.55E−06	< 1.44E−06	< 3.20E−06	< 3.17E−06	< 3.10E−06	< 3.16E−06	6.37E−07	25.26%
Trichlorofluoromethane	1.05E−04	< 2.92E−05	8.71E−05	< 1.81E−04	< 7.50E−05	2.43E−04	< 1.66E−04	6.97E−05	72.21%
Vinyl Acetate	< 1.55E−06	< 1.55E−06	< 1.44E−06	< 3.20E−06	< 3.17E−06	< 3.10E−06	< 3.16E−06	6.37E−07	25.26%
Bis(2−ethylhexyl)phthalate	8.94E−04	4.49E−03	9.08E−04	1.24E−03	< 4.49E−03	1.23E−03	< 2.32E−03	1.84E−03	386.50%
Dibenzofuran	< 1.00E−08	< 9.75E−09	< 9.55E−09	< 1.97E−08	< 1.93E−08	< 1.92E−08	< 1.94E−08	−2.51E−04	−99.99%
Dimethylphthalate	< 1.00E−08	< 9.75E−09	< 9.55E−09	< 1.97E−08	< 1.93E−08	< 1.92E−08	< 1.94E−08	−1.70E−04	−99.99%
Di−n−butylphthalate	3.82E−05	8.63E−05	1.75E−04	4.01E−04	< 8.63E−05	3.03E−04	< 2.64E−04	1.62E−04	160.01%
2−methylphenol	< 1.00E−08	< 9.75E−09	< 9.55E−09	< 1.97E−08	< 1.93E−08	< 1.92E−08	< 1.94E−08	2.38E−09	14.02%
Naphthalene	< 1.00E−08	< 9.75E−09	< 1.92E−08	< 1.97E−08	< 1.93E−08	< 2.88E−08	< 2.26E−08	−5.70E−03	−100.00%
Phenol	5.86E−04	9.24E−04	7.67E−04	< 5.86E−04	2.25E−03	2.36E−03	< 1.73E−03	5.27E−04	43.72%
Totals	< 0.04	< 0.04	< 0.04	< 0.07	< 0.07	< 0.08	< 0.07	0.03	71.46%
THC	0.98	0.79	1.24	1.27	2.76	3.50	2.51	1.73	223.16%

MIDWEST RESEARCH INSTITUTE
401 Harrison Oaks Boulevard Suite 350
CARY, NORTH CAROLINA 27513-2413
(919) 677-0249 FAX (919) 677-0065

Memo

TO Steven Vozzo, NCDEM

DATE 10/17/94

SUBJECT: PINE HALL PROCESS DATA AND EMISSION FACTORS

ENCLOSED ARE SUMMARY TABLES OF THE PROCESS DATA FROM THE 10/92 EMISSION TEST AT PINE HALL BRICK. ALSO, A SUMMARY OF THE EMISSION FACTORS DEVELOPED FROM THE PINE HALL DATA IS INCLUDED. RON MYERS ASKED ME TO SEND YOU THESE, AND IF YOU HAVE ANY QUESTIONS, PLEASE CALL ME @ 677-0249 X5224. THANKS.

BRIAN SHRAGER

MLCC-803-2
PRINTED IN U.S.A.

Draft Table 11.3-4 (Metric And English Units)
EMISSION FACTORS FOR BRICK MANUFACTURING OPERATIONS[a]

EMISSION FACTOR RATING: D

Source	TOC[b]		Methane		Hydrogen Fluoride		Hydorchloric acid	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Brick dryer[c] (SCC 3-05-003-XX)	0.026[d]	0.052[d]	0.015[e]	0.031[e]	ND	ND	ND	ND
Natural gas-fired kiln (SCC 3-05-003-11)	0.041[f]	0.081[f]	0.042[f]	0.084[f]	0.15[g]	0.30[g]	0.0091[f]	0.018[f]
Coal-fired kiln (SCC 3-05-003-13)	0.041[d]	0.081[d]	0.055[e]	0.11[e]	0.15[g]	0.30[g]	ND	ND
Sawdust-fired kiln (SCC 3-05-003-10)	0.031[h]	0.063[h]	ND	ND	0.15[g]	0.30[g]	ND	ND
Sawdust-fired kiln and sawdust dryer[j] (SCC 3-05-003-XX)	0.10	0.20	ND	ND	0.089	0.18	ND	ND

[a]Emission factor units are mass of pollutant per mass of fired bricks produced. Factors represent uncontrolled emissions unless noted. SCC = Source Classification Code. ND = no data.
[b]Total organic compounds reported "as methane"; measured using EPA Method 25A.
[c]Brick dryer heated with waste heat from the cooling section of the kiln.
[d]References 9-10.
[e]Reference 9.
[f]Reference 8.
[g]References 8-9,11. Data from kilns firing natural gas, coal, and sawdust are averaged together because fuel type does not effect HF emissions.
[h]Reference 11.
[j]Reference 11. Sawdust dryer heated with the exhaust stream from a sawdust-fired kiln.

FAXED TO RON MYERS 1/17/95. NEED DECISION ON HOW TO HANDLE DISCREPANCY BETWEEN TOC + Methane WHERE Methane EF > TOC EF.

615-282-4661

Ask Dave McNees about Indiana Brick Dryer. Coal-fired? Why SO_2?

Send (Pine Hall) process rates and emission factor summary to:

Steven Vozzo
NCDEM
3800 Barrett Dr.
Raleigh, NC 27609

In line dryer heated w/waste heat

Dave's question: Are NO_x + CO from Belden higher than G. Shale?

Look @ the use of background concentrations -- were they subtracted out for stone crushing emission factors.

Transfer points - logarithmic curve for emission factors based on moisture content

Nelson Cooney
10/20/94

Trend towards gas-fired

Include in AP-42 section (No number, chapter name) oil-fired

Reference oil combustion section for NO_x, CO, SO_2

Oil-fired Kilns - 1 oil-fired
← 31 w/oil as standby
Gas-fired → 120 of 155
Sawdust → 15
Coal → 16

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FAX TRANSMISSION

TO: Kevin Holewinski
FROM: Brian Shrager /Ext. 5224
TIME: 2:00 pm
DATE: 3/13/95

THIS FAX CONSISTS OF 8 PAGES (INCLUDING THIS PAGE)
RECEIVING FAX NUMBER: (412) 394-7959

COMMENTS: The last paragraph on pg. 5 includes a short discussion of flashing. I did not include most of the figures because they are photographs that are not clear and not very useful. If you need more information on flashing, the Brick Institute of America may be able to help you.

Brian

478/FRM

MRI

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Date: July 13, 1993
(Finalized September 3, 1993)

Subject: Site Visit--Belden Brick Company
Review and Update Remaining Sections of Chapter 8
(Mineral Products Industry) of AP-42,
EPA Contract 68-D2-0159, Work Assignment 12
MRI Project 3612

From: Brian Shrager BS

To: Ron Myers
EPA/EIB/EFMS (MD-14)
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

I. Purpose

The purpose of the visit was to evaluate the feasibility of emission testing at this site for the purpose of developing emission factors for AP-42.

II. Place and Date

Belden Brick Company
Dover Road
Sugarcreek, Ohio 44681

Date: June 9, 1993

III. Attendees

Belden Brick Company (Belden)

John Jensen, Environmental Engineer

Midwest Research Institute (MRI)

Richard Marinshaw
Brian Shrager

IV. Discussion

The group began a tour of Belden's Sugarcreek, Ohio operations by viewing the mining operations that provide the raw materials for all of Belden's Sugarcreek plants. Belden has 32 open pits, one of which is shown in Figure 1, from which the materials are mined. The pits include deposits of three types of shale (Nos. 5A, 4, and 3A), No. 4 fire clay, and No. 5 fire clay, in addition to limestone, sandstone, and coal. Figure 2 shows the profile of a typical "Belden hill" from which these raw materials are mined. The raw materials are mined by power shovels and transported to the plants by truck. Figure 3 shows an exposed seam of 3A shale at a "Belden hill" or open pit mine. Mr. Jensen pointed out the regional geologic formations and emphasized Belden's use of different raw material blends for production of different types of brick. The group proceeded to a facility where the raw materials are test fired on a weekly basis. Belden maintains detailed records of the material characteristics and locations within the pits. Mr. Jensen explained that it is vital to the production operations to know exactly how a particular material will look when it is fired in a kiln. The group then visited Plant 6, which consists of a central crushing, grinding, and screening operation, a central brick forming operation, eight brick dryers, and three kilns. Plant 6 produces 36 to 40 million bricks per year. The grinding room operates 8 hours per day, 5 days per week, and the kilns operate continuously. The typical raw material moisture content was not known at the time of the visit.

From Plant 6, the group proceeded to Plant 8, which consists of two primary crushers in a separate building; a central grinding, screening, and raw material storage area; a central brick forming operation that includes two extruding lines; a soft mud line; a dryer for the soft mud line; six drying tunnels for the extruding lines; a preheater for the soft mud line; and three kilns. Plant 8 produces 70 million bricks per year. The grinding room operates 8 hours per day, 5 days per week, and the kilns operate continuously.

The group also visited Plants 3 and 4, but these plants are not typical of the brick manufacturing industry and are not good candidates for testing. Plant 3 is a new facility that has a very large grinding room and tunnel kiln, and Plant 4 uses periodic kilns to fire bricks. Figures 4 and 5 show the Plant 4 brickyard and periodic kilns. Figure 6 shows a periodic kiln. The following paragraphs describe the process operations in Plants 6 and 8 in more detail.

Plant 6

Figure 7 presents a process flow diagram for Plant 6. Production begins at the grinding room, which is a large metal building that contains separate fire clay and shale processing lines. Each identical line consists of a hopper, double-roll primary crusher, crushed material storage bins, a grinder, and three screens. The raw material is transported from the mine by truck in loads of approximately 23 Megagrams (Mg) (25 tons). The trucks dump the material into the fire clay or shale hoppers from which the material transported by drag chains to double roll primary crushers. From each crusher, the material is conveyed to storage bins, then to the grinder and screens. All material is ground prior to screening. Oversize material from the screens is conveyed back to the grinder for further size reduction. Undersized material from the screens is conveyed to the fine clay/shale storage bins located in an adjacent building. Emissions from each line (crusher, grinder, screens and conveyor transfer points) are ducted to separate fabric filtration systems that are located just outside of the grinding room. Figure 8 shows a vibrating screen with the hood and ductwork that leads to the fabric filter. Figure 9 shows the fabric filter inlet duct for the clay processing line. The duct is of sufficient length for testing, but two smaller ducts from the processing line tie into the main duct downstream of the potential test area. Figures 10 and 11 show the fabric filter outlet ducts for the clay and shale processing lines, respectively. The shale line outlet duct is 0.84 meters (m) (29 inches [in.]) in diameter and is 3.7 to 4.0 m (12 to 13 feet [ft]) in length. The clay line outlet duct is 0.74 m (33 in.) in diameter and is 3.8 m (12.3 ft) in length. The air flow rate for each screen hood is about 2,400 cubic feet per minute (ft^3/min) and the air flow rate through each crusher and grinder pickup point and conveyor transfer point hood is 600 ft^3/min. The system carrying velocity is 4,500 feet per minute (ft/min). Because nearly all of the emission points in the grinding room are hooded, fugitive particulate matter (PM) emissions are negligible.

The grinding room product is conveyed to the fine clay/shale storage bins located in a building adjacent to the grinding room. The grinding room and conveyors are shown in Figure 12. Material from the fine clay/shale storage bins is conveyed to the mill room.

In the mill room, the material is conveyed to one of four extrusion lines. Lines 1 and 4 process shale, and lines 2 and 3 process fire clay. However, clay and shale can be mixed on any of the four lines. Approximately one-third of the bricks produced in Plant 6 are made from a blend of shales, one-third are made from fire clay blends, and the remaining third are made from a mixture of fire clays and shales.

Each extrusion line includes a pug mill, vacuum chamber, and die. The pug mills mix the material with water to raise the material moisture content and discharge the material directly into the vacuum chambers. The vacuum chambers de-air and compact the material. Next, the material is continuously augered through the dies. This is referred to as the "stiff extrusion process." The material is extruded in four continuous columns, the outsides of which are lubricated with No. 2 oil, which facilitates cutting. The columns then pass through rotating wire cutters and are cut into the desired brick dimensions.

Several additives are mixed with the raw material (as needed) before extrusion. Iron chromite and manganese dioxide are used for coloring purposes, and barium carbonate is added to keep sulfates from rising to the surface of the brick. Additive feed is controlled by computer.

After cutting, the bricks are stacked by hand onto the kiln cars. On average, each car carries 3,472 bricks. From the stacking area, the bricks are transported to eight dryers (shown in Figure 13), which are heated by waste heat from the cooling section of the kilns and by Dutch oven type heaters, which are additional gas-fired burners located on the top of the dryers. These dryers maintain temperatures ranging from 49°C (120°F) at the entrances to 177°C (350°F) at the exits. Three stacks (shown in Figure 14) vent emissions from the eight dryers to the atmosphere. Dryers 1, 2, and 3 share a stack, dryers 4 and 5 share a stack, and dryers 6, 7, and 8 share a stack. The dryer stacks are circular in cross section and are made of steel. From the dryers, the cars are transported to the kilns for firing.

Plant 6 has three natural gas-fired tunnel kilns that are used to fire the bricks. Kilns 1 and 2 are 104 m (340 ft) long, and kiln 3 is 119 m (390 ft) long. Each kiln consists of six sections, including the offtake, oxidation, preheat, firing, rapid cool, and cooling sections. Kilns firing fire clay products maintain temperatures ranging from 204°C (400°F) at the offtake section to about 1149°C (2100°F) at the hottest point of the firing section. Kilns firing shale products maintain temperatures ranging from 204°C (400°F) at the offtake section to about 1071°C (1960°F) at the hottest point of the firing section. Between the firing and rapid cool sections is the zero point of each kiln. The zero point is the theoretical point beyond which combustion gases do not pass. Beyond the zero point, only the waste heat (no combustion gases) from the fired bricks in the cooling section is ducted to the brick dryers.

Emissions from the kilns are ducted to two stacks (shown in Figure 15), one serving kilns 1 and 2, and one serving kiln 3. The stack serving kilns 1 and 2 is brick and has dimensions of 1.5 x 1.6 m (60 x 64 in). This stack is split in the center, effectively creating two 1.5 x 0.81 m (60 x 32 in.) stacks. The side of the stack that vents emissions from kiln 2 is equipped with 5 in. sampling ports. The stack serving kiln 3 is also brick and is 1.7 m (68 in.) square in cross section. This stack is equipped with 5 in. sampling ports. There are no emission control devices on either of the two stacks. Emissions from the kiln are likely to be PM, sulfur dioxide, nitrogen oxides, carbon monoxide, fluorides, and other inorganic and organic compounds from combustion or vaporization of the raw materials.

Plant 8

Figure 16 presents a process flow diagram for Plant 8. Production begins at the primary crusher building. The raw material is dumped by truck into the fire clay or shale hoppers that feed the primary crushers. From each crusher, the material is conveyed to storage bins that are located in the grinding room. The grinding room is a large metal building that contains separate fire clay and shale processing lines and includes four baghouses, two of which contain dual fabric filters. Figure 17 shows a rim discharge grinder, Figures 18 and 19 show some of the vibrating screens and hoods, Figure 20 shows several screens and a fabric filter, and Figure 21 shows a fabric filter. Because of the number of fabric filter ducts that would require testing, this grinding room is not considered a good candidate for an emission test.

The grinding room product is conveyed to the fine clay storage bins. Material from the fine clay storage bins is conveyed to the mill room.

In the mill room, the material is conveyed to one of two extrusion lines or to the soft mud line. Most of the bricks produced in Plant 8 are made from a blend of clays and shales. The extrusion lines are similar to the Plant 6 extrusion lines. The soft mud line uses a completely different method to form bricks. A double pug mill increases the material moisture content to about 28 percent. This "soft" material is forced into sand-lined molds, which are inverted, depositing the molded material onto wooden pallets that support the material so that it will retain the proper brick dimensions. The pallets transport the "soft" bricks to a dryer, which hardens the bricks so that they can be mechanically set onto kiln cars. The drying process takes 20 hours, and the finishing temperature in the dryer is about 66°C (150°F).

After forming and drying, the soft mud bricks are mechanically set onto kiln cars. After forming and cutting, the extruded bricks are hand set onto kiln cars. On average, each car carries 5,616 bricks. From the stacking area, the soft mud bricks are transported to a holding area and then to a preheater, and the extruded bricks are transported to six holding rooms/dryers, which are heated by waste heat from the cooling section of the kilns. These dryers maintain temperatures ranging from 49°C (120°F) at the entrances to 177°C (350°F) at the exits. Three stacks vent emissions from the preheaters and dryers to the atmosphere. The preheater has one stack; dryers 1, 2, and 3 share a stack; and dryers 4, 5, and 6 share a stack. From the dryers, the cars are transported to the kilns for firing.

Plant 8 has three natural gas-fired tunnel kilns that are used to fire the bricks. The kilns have a considerably larger capacity than the Plant 6 kilns, and they include a flashing zone, where coal, natural gas, or zinc can be introduced into the kiln atmosphere, creating smoke that adds color to the surface of the bricks. The smoke is drawn into the firing section of the kiln. Kilns firing fire clay products maintain temperatures ranging from 204°C (400°F) at the offtake section to about 1149°C (2100°F) at the hottest point of the firing section. Kilns firing shale products maintain temperatures ranging from 204°C (400°F) at the offtake section to about 1071°C (1960°F) at the hottest point of the firing section. Between the firing and rapid cool sections is the zero point of each kiln. At the zero point in each kiln, the combustion gases are drawn away from the cooling zone, and the waste heat (no combustion gases) from the fired bricks in the cooling section is drawn to the ducts that lead to the brick dryers and preheaters.

Emissions from the kiln are ducted to two stacks, one serving kiln 1 (shown in Figure 22), and one serving kilns 2 and 3 (shown in Figure 23). Both stacks are constructed with brick and are 1.4 m (56 in.) square in cross section. The stack serving kilns 2 and 3 is equipped with a 5-in. sampling port. There are no emission control devices on either of the two stacks. Figure 23 shows both kiln stacks above the roof of Plant 8. Emissions from the kiln are likely to be PM, sulfur dioxide, nitrogen oxides, carbon monoxide, fluorides, and other inorganic and organic compounds from combustion or vaporization of the raw materials.

V. Conclusions

The sources being considered for testing are the grinding room and the kilns. It appears feasible to test controlled PM and PM-10 emissions from the Plant 6 grinding room. The grinding room appears typical of the industry, except for the separate processing lines for shale and fire clay. The Plant 8 grinding room is not typical of the industry and is not a good candidate for testing.

Testing of emissions from the dryers and kilns at either plant should be relatively straightforward. However, the flashing process used in the Plant 8 kilns is not standard industry practice, and may effect kiln emissions. Sampling ports would have to be installed in the dryer stacks at either plant.

Trucks carrying raw material to the primary crushers produce some fugitive dust emissions at both plants, but fugitive dust emissions from plant traffic appear to be minimal. Also, there are no open storage piles at either plant.

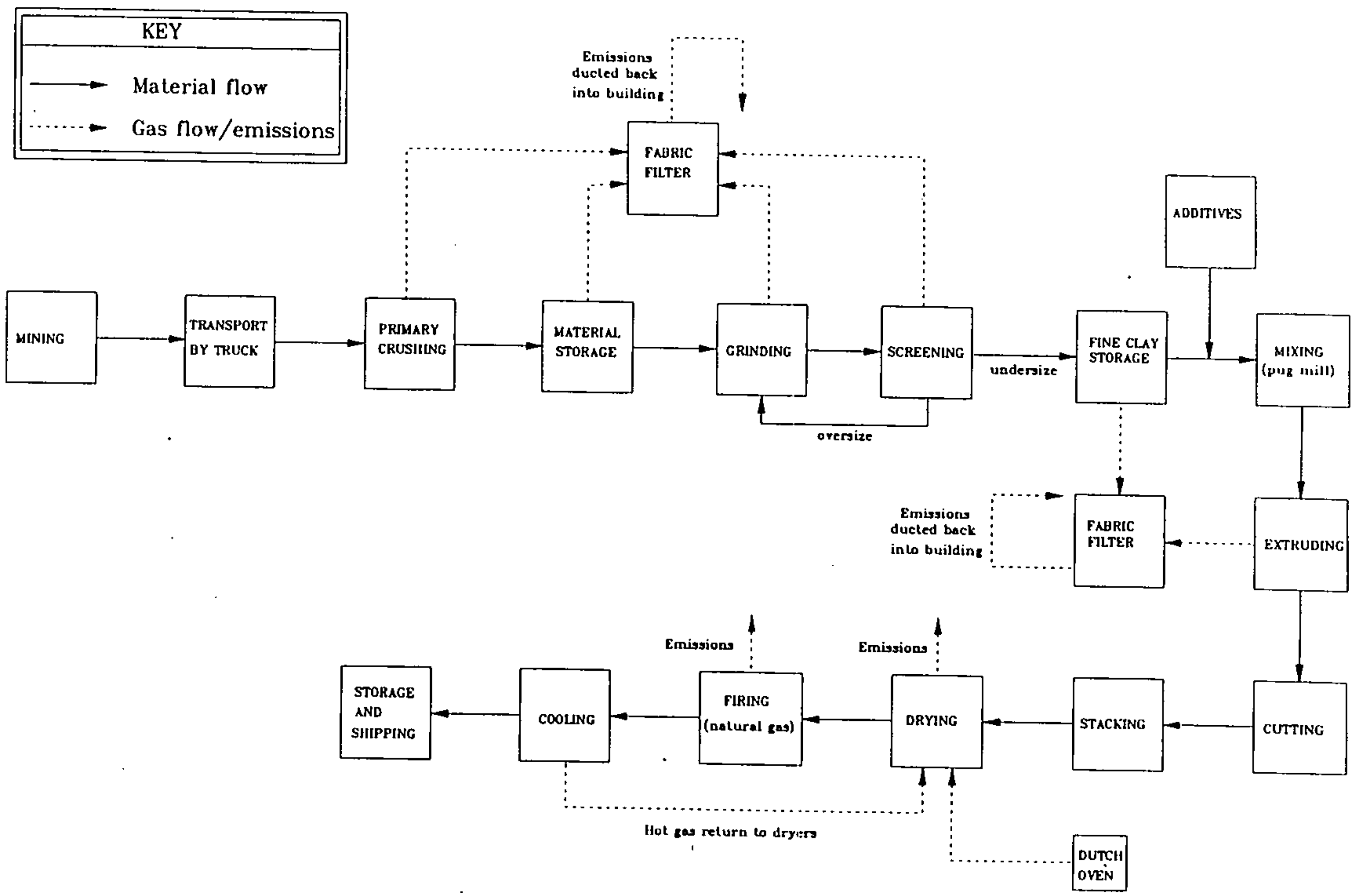

FIGURE 7. PROCESS FLOW DIAGRAM FOR BELDEN BRICK, PLANT 6, SUGARCREEK, OHIO.

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VIA FACSIMILE: (919) 677-0065

Mr. Brian Shrager
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, NC 27513

Dear Mr. Shrager:

As you know, I am interested in finding out whether the emissions data, which forms the basis for the existing AP-42 document developed by US EPA in 1986, includes data generated during "flashing" operations. Therefore, please let me know whether the existing AP-42 document does take "flashing" emissions into account.

Very truly yours,

Kevin P. Holewinski

Kevin P. Holewinski

cc: George Van Cleve, Esq.

General Shale w/ condensible fractions 4/25/95

KILN EMISSION FACTORS (LB/TON)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
Filterable PM	0.683	0.615	0.652	0.650
PM-10	0.505	0.383	0.450	0.446
Condensible PM	0.134	0.221	0.156	0.170
Condensible inorganic PM	0.067	0.19	0.11	0.12
Condensible organic PM	0.068	0.029	0.046	0.048
CO2	298	276	290	288
Filterable PM	0.641	0.669	0.761	0.690
CO2	279	276	303	286
Antimony	1.54E-05	1.27E-05	1.47E-05	1.43E-05
Arsenic	1.27E-04	1.31E-04	1.40E-04	1.33E-04
Beryllium	1.44E-05	1.56E-05	1.66E-05	1.55E-05
Cadmium	4.29E-06	3.44E-06	2.17E-06	3.30E-06
Chromium	7.22E-05	7.50E-05	8.65E-05	7.79E-05
Lead	8.91E-05	9.11E-05	7.72E-05	8.58E-05
Manganese	4.75E-05	4.52E-05	4.71E-05	4.66E-05
Mercury	9.84E-05	8.76E-05	1.02E-04	9.59E-05
Nickel	1.56E-04	1.63E-04	1.98E-04	1.72E-04
Phosphorus	5.26E-04	5.25E-04	5.84E-04	5.45E-04
Selenium	4.33E-04	4.20E-04	5.18E-04	4.57E-04
CO	0.866	0.903	0.944	0.904
NOx	0.717	0.660	0.749	0.709
Hydrogen fluoride	0.0596	0.0815	0.2380	0.126
TOC as carbon	0.184	0.103	0.055	0.114
Methane/ethane as carbon	0.0888	0.0766	0.0833	0.083
TNMNEOC	0.0951	0.0267	-0.0286	0.031
CO2	210	210	256	225
Chloromethane	1.04E-04	4.78E-05	1.69E-04	1.07E-04
Bromomethane	2.20E-05	2.37E-05	2.57E-05	2.38E-05
Trichlorofluoromethane	6.90E-06	3.48E-06	3.02E-05	1.35E-05
Carbon disulfide	4.95E-08	3.36E-06	3.42E-06	2.28E-06
Acetone	9.26E-04	3.92E-04	7.26E-04	6.81E-04
Methylene chloride	2.39E-06	ND	ND	ND
Chloroform	ND	ND	ND	ND
Vinyl acetate	ND	ND	ND	ND
2-butanone	2.87E-04	2.61E-04	2.04E-04	2.51E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND
Benzene	2.99E-04	2.84E-04	2.80E-04	2.88E-04
Trichloroethane	ND	ND	ND	ND
Toluene	3.12E-04	2.36E-04	2.02E-04	2.50E-04
Tetrachloroethane	ND	ND	ND	ND
2-hexanone	ND	ND	ND	ND
Ethylbenzene	2.69E-05	1.87E-05	1.78E-05	2.11E-05
M-/p-xylene	1.82E-04	1.21E-04	9.22E-05	1.32E-04
O xylene	6.25E-05	4.22E-05	3.60E-05	4.69E-05
Styrene	ND	ND	ND	ND
Chloroethane	1.01E-05	1.03E-05	1.40E-05	1.15E-05
1,1-dichloroethane	9.29E-07	7.74E-07	1.34E-05	5.02E-06
Chlorobenzene	2.43E-05	2.43E-05	1.43E-05	2.10E-05
Phenol	ND	4.79E-05	5.71E-05	5.25E-05
Naphthalene	1.67E-05	ND	3.94E-06	1.03E-05
2-methylphenol	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Dibenzofuran	ND	4.18E-07	ND	ND
Di-n-butylphthalate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	ND	2.86E-05	1.17E-04	7.30E-05
1,4-dichlorobenzene	6.87E-07	4.18E-06	4.79E-06	3.22E-06
Isophorone	8.68E-05	1.05E-06	1.10E-06	2.96E-05
Benzoic acid	1.60E-04	1.90E-04	3.89E-04	2.46E-04
2-methylnaphthalene	1.44E-06	1.26E-06	2.51E-06	1.73E-06
Diethylphthalate	2.42E-06	8.84E-07	7.92E-07	1.36E-06
Butylbenzylphthalate	1.26E-06	1.25E-06	1.22E-06	1.24E-06
Di-n-octylphthalate	1.36E-05	1.35E-05	7.92E-06	1.17E-05

7/3/96

AP-42 SECTION 11.3
REF. 9

BACKGROUND REPORT
REF. 2

GENERAL SHALE EMISSION FACTORS--ENGLISH UNITS

GRINDING ROOM

EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	
Filterable PM	0.700	0.247	0.338	
Filterable PM-10	0.556	0.205	0.168	
PROCESS RATES (TONS OF GROUND MATERIAL PRODUCED/HR)				
	59.5	59.5	59.5	
EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.0118	0.00415	0.00568	0.00720
Filterable PM-10	0.00934	0.00345	0.00282	0.00520
EMISSION FACTORS (kg/Mg)				AVERAGE
Filterable PM	0.00588	0.00208	0.00284	0.00360
Filterable PM-10	0.00467	0.00172	0.00141	0.00260

PROCESS RATES (TONS OF BRICK PRODUCED PER HOUR)				
	RUN 1	RUN 2	RUN 3	
JULY 28	6.88	6.88	6.88	
JULY 29	6.58	6.58	6.58	
JULY 30	6.88	6.88	6.88	
JULY 31	6.58	6.58	6.58	

BRICK DRYER EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	
TOC as propane	0.396	0.383	0.407	
Methane/ethane as propane	0.226	0.174	0.151	
TNMNEOC as propane	0.170	0.209	0.256	
CO2-- % dry volume	0.1	0.8	0.8	

BRICK DRYER EMISSION FACTORS (LB/TON)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
TOC as propane	0.060	0.058	0.062	0.060
Methane/ethane as propane	0.034	0.026	0.023	0.028
TNMNEOC as propane	0.026	0.032	0.039	0.032
CO2	14.4	117.0	115.3	82.3

BRICK DRYER EMISSION FACTORS (kg/Mg)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
TOC as carbon	0.0301	0.0291	0.0309	0.0300
Methane/ethane as carbon	0.0172	0.0132	0.01145	0.0140
CO2	7.21	58.5	57.7	41.1

KILN EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	AVERAGE
Filterable PM	4.49	4.05	4.29	
PM-10	3.32	2.52	2.96	
Condensible PM	0.883	1.454	1.026	
CO2-- % dry volume	6.62	6.58	6.47	
Filterable PM	4.41	4.6	5.01	
CO2-- % dry volume	6.53	6.34	6.62	
Antimony	1.06E-04	8.74E-05	9.67E-05	
Arsenic	8.71E-04	9.01E-04	9.21E-04	
Beryllium	9.94E-05	1.07E-04	1.09E-04	
Cadmium	2.95E-05	2.37E-05	1.43E-05	
Chromium	4.97E-04	5.16E-04	5.69E-04	
Lead	6.13E-04	6.27E-04	5.08E-04	
Manganese	3.27E-04	3.11E-04	3.10E-04	
Mercury	6.77E-04	6.03E-04	6.69E-04	
Nickel	1.07E-03	1.12E-03	1.30E-03	
Phosphorus	3.62E-03	3.61E-03	3.84E-03	
Selenium	2.98E-03	2.89E-03	3.41E-03	
CO	5.96	6.21	6.21	
NOx	4.93	4.54	4.93	
Hydrogen fluoride	0.410	0.561	1.566	
TOC as propane	1.479	0.832	0.435	
Methane/ethane as propane	0.713	0.616	0.669	
TNMNEOC as propane	0.766	0.216	—	
CO2-- % dry volume	4.5	4.5	5.6	
Chloromethane	0.000685	(0.000629/2)	0.00111	
Bromomethane	0.000145	0.000156	0.000169	
Trichlorofluoromethane	4.54E-05	2.29E-05	0.000199	
Carbon disulfide	(6.52E-07/2)	2.21E-05	2.25E-05	
Acetone	6.09E-03	2.58E-03	4.78E-03	
Methylene chloride	1.57E-05	0	0	
Chloroform	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Vinyl acetate	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
2-butanone	0.00189	0.00172	0.00134	
1,1,1-trichloroethane	(6.52E-07/2)	(6.63E-07/2)	(0.000337/2)	
Carbon tetrachloride	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Benzene	1.97E-03	1.87E-03	1.84E-03	
Trichloroethane	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Toluene	2.05E-03	1.55E-03	1.33E-03	
Tetrachloroethane	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
2-hexanone	(5.22E-06/2)	(5.52E-06/2)	(5.5E-06/2)	
Ethylbenzene	1.77E-04	1.23E-04	1.17E-04	
M-/p-xylene	1.20E-03	7.94E-04	6.07E-04	
O-xylene	4.11E-04	2.78E-04	2.37E-04	
Styrene	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Chloroethane	6.65E-05	6.77E-05	9.19E-05	
1,1-dichloroethane	6.11E-06	5.09E-06	8.79E-05	
Chlorobenzene	1.60E-04	1.60E-04	9.41E-05	
Phenol	0	0.000315	0.000393	
Naphthalene	0.00011	0	2.71E-05	
2-methylphenol	(1.3E-05/2)	(1.48E-05/2)	(1.49E-05/2)	
Dimethylphthalate	(4.46E-06/2)	(5.56E-06/2)	(5.72E-06/2)	
Dibenzofuran	(3.83E-06/2)	2.75E-06	(4.91E-06/2)	
Di-n-butylphthalate	0	0	0	
Bis(2-ethylhexy)phthalate	0	1.88E-04	8.08E-04	
1,4-dichlorobenzene	(9.04E-06/2)	2.75E-05	3.15E-05	
Isophorone	5.71E-04	6.93E-06	7.26E-06	
Benzoic acid	0.00105	0.00125	0.00256	
2-methylnaphthalene	9.46E-06	8.26E-06	1.65E-05	
Diethylphthalate	1.59E-05	5.82E-06	5.21E-06	
Butylbenzylphthalate	(1.66E-05/2)	8.20E-06	8.02E-06	
Di-n-octylphthalate	(0.000179/2)	8.88E-05	5.21E-05	

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

KILN EMISSION FACTORS (LB/TON)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
Filterable PM	0.683	0.615	0.652	0.650
PM-10	0.505	0.383	0.450	0.446
Condensible PM	0.134	0.221	0.156	0.170
Condensible inorganic PM	0.067	0.19	0.11	0.12
Condensible organic PM	0.068	0.029	0.046	0.048
CO2	298	276	290	288
Filterable PM	0.641	0.669	0.761	0.690
CO2	279	276	303	286
Antimony	1.54E-05	1.27E-05	1.47E-05	1.43E-05
Arsenic	1.27E-04	1.31E-04	1.40E-04	1.33E-04
Beryllium	1.44E-05	1.56E-05	1.66E-05	1.55E-05
Cadmium	4.29E-06	3.44E-06	2.17E-06	3.30E-06
Chromium	7.22E-05	7.50E-05	8.65E-05	7.79E-05
Lead	8.91E-05	9.11E-05	7.72E-05	8.58E-05
Manganese	4.75E-05	4.52E-05	4.71E-05	4.66E-05
Mercury	9.84E-05	8.76E-05	1.02E-04	9.59E-05
Nickel	1.56E-04	1.63E-04	1.98E-04	1.72E-04
Phosphorus	5.26E-04	5.25E-04	5.84E-04	5.45E-04
Selenium	4.33E-04	4.20E-04	5.18E-04	4.57E-04
CO	0.866	0.903	0.944	0.904
NOx	0.717	0.660	0.749	0.709
Hydrogen fluoride	0.0596	0.0815	0.2380	0.126
TOC as propane	0.225	0.126	0.0662	0.139
Methane/ethane as propane	0.108	0.094	0.102	0.101
TNMNEOC as propane	0.116	0.033	—	0.0746
CO2	210	210	256	225
Chloromethane*	1.04E-04	4.78E-05	1.69E-04	1.07E-04
Bromomethane	2.20E-05	2.37E-05	2.57E-05	2.38E-05
Trichlorofluoromethane	6.90E-06	3.48E-06	3.02E-05	1.35E-05
Carbon disulfide*	4.95E-08	3.36E-06	3.42E-06	2.28E-06
Acetone	9.26E-04	3.92E-04	7.26E-04	6.81E-04
Methylene chloride	2.39E-06	0.00E+00	0.00E+00	7.95E-07
Chloroform***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Vinyl acetate***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
2-butanone	2.87E-04	2.61E-04	2.04E-04	2.51E-04
1,1,1-trichloroethane***	4.95E-08	5.04E-08	2.56E-05	8.57E-06
Carbon tetrachloride***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Benzene	2.99E-04	2.84E-04	2.80E-04	2.88E-04
Trichloroethane***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Toluene	3.12E-04	2.36E-04	2.02E-04	2.50E-04
Tetrachloroethane***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
2-hexanone***	3.97E-07	4.19E-07	4.18E-07	4.11E-07
Ethylbenzene	2.69E-05	1.87E-05	1.78E-05	2.11E-05
M-/p-xylene	1.82E-04	1.21E-04	9.22E-05	1.32E-04
O-xylene	6.25E-05	4.22E-05	3.60E-05	4.69E-05
Styrene***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Chloroethane	1.01E-05	1.03E-05	1.40E-05	1.15E-05
1,1-dichloroethane	9.29E-07	7.74E-07	1.34E-05	5.02E-06
Chlorobenzene	2.43E-05	2.43E-05	1.43E-05	2.10E-05
Phenol	0.00E+00	4.79E-05	5.71E-05	3.50E-05
Naphthalene	1.67E-05	0.00E+00	3.94E-06	6.89E-06
2-methylphenol***	9.88E-07	1.12E-06	1.08E-06	1.07E-06
Dimethylphthalate***	3.39E-07	4.22E-07	4.16E-07	3.92E-07
Dibenzofuran**	2.91E-07	4.18E-07	3.57E-07	3.55E-07
Di-n-butylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bis(2-ethylhexy)phthalate	0.00E+00	2.86E-05	1.17E-04	4.87E-05
1,4-dichlorobenzene*	6.87E-07	4.18E-06	4.79E-06	3.22E-06
Isophorone	8.68E-05	1.05E-06	1.10E-06	2.96E-05
Benzoic acid	1.60E-04	1.90E-04	3.89E-04	2.46E-04
2-methylnaphthalene	1.44E-06	1.26E-06	2.51E-06	1.73E-06
Diethylphthalate	2.42E-06	8.84E-07	7.92E-07	1.36E-06
Butylbenzylphthalate*	1.26E-06	1.25E-06	1.22E-06	1.24E-06
Di-n-octylphthalate*	1.36E-05	1.35E-05	7.92E-06	1.17E-05

*Includes one non-detect run.

**Includes two non-detect runs.

***Includes three non-detect runs.

= validated compound

( ) = quantity is estimated

Pine Hall with condensible fractions 4/25/95

KILN EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.281	0.336	0.288	0.302
CO (Average of 9 runs)	2.93	3.45	3.31	3.23
NOx (Average of 9 Runs)	0.392	0.435	0.409	0.412
Filterable PM-10	0.198	0.210	0.218	0.209
Condensible PM	0.297	0.294	0.245	0.279
Condensible organic PM	0.0663	0.0674	0.108	0.0807
Condensible inorganic PM	0.231	0.226	0.137	0.198
Hydrogen fluoride	0.539	0.642	0.208	0.463
TOC as carbon	0.0431	0.0479	0.0485	0.0465
Antimony	ND	ND	1.17E-05	ND
Arsenic	5.53E-05	5.41E-05	4.48E-05	5.14E-05
Beryllium	5.27E-07	5.52E-07	1.10E-06	7.25E-07
Cadmium	6.16E-06	1.73E-05	2.85E-05	1.73E-05
Chromium	3.30E-05	5.49E-05	7.08E-05	5.29E-05
Lead	3.29E-04	1.74E-04	4.79E-04	3.27E-04
Manganese	1.09E-03	1.02E-03	3.62E-02	0.0128
Mercury	9.59E-06	5.37E-06	1.46E-05	9.85E-06
Nickel	2.06E-05	3.63E-05	4.65E-05	3.45E-05
Phosphorus	1.12E-03	1.84E-03	1.29E-03	0.00141
Selenium	1.15E-04	2.20E-05	3.05E-05	5.57E-05
Total Fluorides	2.77E-03	1.72E-02	1.89E-01	0.0696
Acetone	2.36E-04	1.67E-04	7.72E-04	3.92E-04
Acrylonitrile	2.65E-05	ND	ND	ND
Benzene	5.75E-04	5.69E-04	4.01E-04	5.15E-04
Bromomethane	3.37E-05	4.46E-05	7.13E-05	4.98E-05
2-butanone	ND	ND	ND	ND
Carbon disulfide	1.59E-05	1.99E-05	1.29E-05	1.62E-05
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	8.98E-04	1.01E-03	1.38E-04	6.81E-04
Ethylbenzene	1.32E-05	6.41E-06	5.99E-06	8.52E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	1.59E-04	2.18E-04	2.32E-04	2.03E-04
Methylene chloride	1.03E-05	4.13E-06	7.96E-06	7.47E-06
M-/p-xylene	2.53E-05	1.11E-05	5.00E-05	2.88E-05
O-xylene	ND	ND	5.39E-06	ND
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	1.23E-04	6.47E-05	1.28E-04	1.05E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	7.01E-06	4.64E-06	5.69E-06	5.78E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	3.89E-05	2.80E-05	1.87E-05	2.85E-05
Dibenzofuran	3.48E-05	1.04E-05	1.02E-09	1.51E-05
Dimethylphthalate	ND	ND	3.05E-05	ND
Di-n-butylphthalate	ND	1.82E-05	ND	ND
2-methylphenol	ND	ND	ND	ND
Naphthalene	1.02E-03	ND	ND	ND
Phenol	1.01E-09	1.90E-04	2.61E-05	7.22E-05
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

TOTAL KILN AND SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B)				
Filterable PM	1.26	1.33	1.42	1.34
CO (Average of 9 runs)	2.83	3.16	3.05	3.01
NOx (Average of 9 Runs)	0.307	0.337	0.322	0.322
Filterable PM-10	0.261	0.216	0.285	0.254
Condensible PM	0.0445	0.0143	0.110	0.0561
Condensible organic PM	0.0316	0.0107	0.0878	0.0434
Condensible inorganic PM	0.0129	0.00365	0.0217	0.0128
Hydrogen fluoride	0.0706	0.318	0.146	0.178
TOC as carbon	0.0760	0.165	0.210	0.150
Antimony	ND	ND	1.88E-06	ND
Arsenic	1.68E-05	2.48E-05	2.13E-05	2.10E-05
Beryllium	2.70E-07	8.66E-08	5.70E-07	3.09E-07
Cadmium	2.05E-05	2.57E-05	1.91E-05	2.18E-05
Chromium	2.98E-05	8.09E-05	3.23E-05	4.77E-05
Lead	2.63E-04	9.65E-05	8.96E-06	1.23E-04
Manganese	3.60E-04	4.81E-04	5.83E-04	4.75E-04
Mercury	1.72E-05	7.49E-06	7.19E-06	1.06E-05
Nickel	3.02E-05	4.86E-05	2.30E-05	3.39E-05
Phosphorus	7.31E-04	4.94E-04	4.19E-04	5.48E-04
Selenium	3.68E-05	5.46E-05	4.79E-05	4.65E-05
Total Fluorides	VOID	0.0101	0.0305	0.0203
Acetone	9.32E-04	9.35E-04	0.00124	0.00104
Acrylonitrile	1.54E-05	1.49E-05	2.58E-05	1.87E-05
Benzene	5.98E-04	5.53E-04	5.22E-04	5.57E-04
Bromomethane	4.56E-05	3.14E-05	5.62E-05	4.44E-05
2-butanone	1.48E-04	6.72E-05	4.43E-04	2.19E-04
Carbon disulfide	1.72E-05	1.78E-05	1.98E-05	1.83E-05
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	0.00128	0.00128	0.00150	0.00135
Ethylbenzene	1.20E-05	8.16E-06	1.02E-05	1.01E-05
2-hexanone	ND	ND	ND	ND
Iodomethane	2.24E-04	2.40E-04	2.68E-04	2.44E-04
Methylene chloride	2.79E-05	1.26E-04	3.05E-05	6.15E-05
M-/p-xylene	4.13E-05	1.89E-05	2.53E-05	2.85E-05
O-xylene	8.84E-06	5.64E-06	7.26E-06	7.25E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	4.45E-04	4.15E-04	4.35E-04	4.32E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.08E-05	4.49E-06	1.46E-05	9.95E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	7.41E-05	2.69E-04	7.36E-05	1.39E-04
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	2.40E-05	5.17E-06	1.81E-05	1.58E-05
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	3.51E-05	1.35E-04	1.41E-04	1.04E-04
Ethane	ND	ND	ND	ND
Methane	ND	24.2	ND	ND

Filename: Beldmetl.wq1
Date: 08-Jul-96
Facility: Belden Brick
Location: Sugarcreek, Ohio
Source: Plant 6
Test date: November 8-12, 1993.

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
Metals	Stack temperature	Deg F	429	429	435	
	Pressure	in. HG				
	Moisture	%	4.4	4.3	4.7	
	Oxygen	%	17.6	18.4	17.8	
	Volumetric flow, actual	acfm	37260	44462	35729	
	Volumetric flow, standard*	dscfm	20713	24738	19683	0
	Isokinetic variation	%	92.7	99.3	99.5	
Circle: Production or feed rate Capacity:		TPH	3.48	3.48	3.48	
All runs below detection limit. All conc. shown represent one-half of the detection limit.	Pollutant concentrations:					
	Arsenic	G/dscf	3.629E-07	2.837E-07	3.554E-07	
	Beryllium	G/dscf	7.056E-09	5.516E-09	6.91E-09	
	Pollutant mass flux rates:					
	Arsenic	lb/hr	6.44E-05	6.02E-05	6.00E-05	
	Beryllium	lb/hr	1.25E-06	1.17E-06	1.17E-06	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Arsenic	lb/ton	1.9E-05	1.7E-05	1.7E-05	1.8E-05
	Beryllium	lb/ton	3.6E-07	3.4E-07	3.4E-07	3.4E-07
	Emission factors (METRIC UNITS):					AVERAGE
	Arsenic	kg/Mg	9.3E-06	8.6E-06	8.6E-06	8.8E-06
	Beryllium	kg/Mg	1.8E-07	1.7E-07	1.7E-07	1.7E-07

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

KILN EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	AVERAGE
Filterable PM	4.49	4.05	4.29	
PM-10	3.32	2.52	2.96	
Condensible PM	0.883	1.454	1.026	
CO2-- % dry volume	6.62	6.58	6.47	
Filterable PM	4.41	4.6	5.01	
CO2-- % dry volume	6.53	6.34	6.62	
Antimony	1.06E-04	8.74E-05	9.67E-05	
Arsenic	8.71E-04	9.01E-04	9.21E-04	
Beryllium	9.94E-05	1.07E-04	1.09E-04	
Cadmium	2.95E-05	2.37E-05	1.43E-05	
Chromium	4.97E-04	5.16E-04	5.69E-04	
Lead	6.13E-04	6.27E-04	5.08E-04	
Manganese	3.27E-04	3.11E-04	3.10E-04	
Mercury	6.77E-04	6.03E-04	6.69E-04	
Nickel	1.07E-03	1.12E-03	1.30E-03	
Phosphorus	3.62E-03	3.61E-03	3.84E-03	
Selenium	2.98E-03	2.89E-03	3.41E-03	
CO	5.96	6.21	6.21	
NOx	4.93	4.54	4.93	
Hydrogen fluoride	0.410	0.561	1.566	
TOC as carbon	1.21	0.68	0.36	
Methane/ethane as carbon	0.584	0.504	0.548	
TNMNEOC	0.626	0.176	—	
CO2-- % dry volume	4.5	4.5	5.6	
Chloromethane	0.000685	(0.000629/2)	0.00111	
Bromomethane	0.000145	0.000156	0.000169	
Trichlorofluoromethane	4.54E-05	2.29E-05	0.000199	
Carbon disulfide	(6.52E-07/2)	2.21E-05	2.25E-05	
Acetone	6.09E-03	2.58E-03	4.78E-03	
Methylene chloride	1.57E-05	0	0	
Chloroform	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Vinyl acetate	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
2-butanone	0.00189	0.00172	0.00134	
1,1,1-trichloroethane	(6.52E-07/2)	(6.63E-07/2)	(0.000337/2)	
Carbon tetrachloride	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Benzene	1.97E-03	1.87E-03	1.84E-03	
Trichloroethane	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Toluene	2.05E-03	1.55E-03	1.33E-03	
Tetrachloroethane	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
2-hexanone	(5.22E-06/2)	(5.52E-06/2)	(5.5E-06/2)	
Ethylbenzene	1.77E-04	1.23E-04	1.17E-04	
M-/p-xylene	1.20E-03	7.94E-04	6.07E-04	
O-xylene	4.11E-04	2.78E-04	2.37E-04	
Styrene	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Chloroethane	6.65E-05	6.77E-05	9.19E-05	
1,1-dichloroethane	6.11E-06	5.09E-06	8.79E-05	
Chlorobenzene	1.60E-04	1.60E-04	9.41E-05	
Phenol	0	0.000315	0.000393	
Naphthalene	0.00011	0	2.71E-05	
2-methylphenol	(1.3E-05/2)	(1.48E-05/2)	(1.49E-05/2)	
Dimethylphthalate	(4.46E-06/2)	(5.56E-06/2)	(5.72E-06/2)	
Dibenzofuran	(3.83E-06/2)	2.75E-06	(4.91E-06/2)	
Di-n-butylphthalate	0	0	0	
Bis(2-ethylhexy)phthalate	0	1.88E-04	8.08E-04	
1,4-dichlorobenzene	(9.04E-06/2)	2.75E-05	3.15E-05	
Isophorone	5.71E-04	6.93E-06	7.26E-06	
Benzoic acid	0.00105	0.00125	0.00256	
2-methylnaphthalene	9.46E-06	8.26E-06	1.65E-05	
Diethylphthalate	1.59E-05	5.82E-06	5.21E-06	
Butylbenzylphthalate	(1.66E-05/2)	8.20E-06	8.02E-06	
Di-n-octylphthalate	(0.000179/2)	8.88E-05	5.21E-05	

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

7/3/96

PINE HALL EMISSION FACTORS--ENGLISH UNITS

GRINDING ROOM

	RUN 1	RUN 2	RUN 3	
EMISSION RATES (LB/HR)				
Filterable PM	2.27+3.786	1.724+1.872	2.907+2.762	
Filterable PM-10	0.183+0.442	0.171+0.247	0.163+0.228	
PROCESS RATES (TONS/HR)				
	196	223	211	
EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.0309	0.0161	0.0269	0.0246
Filterable PM-10	0.00319	0.00187	0.00185	0.00231

KILNS

	RUN 1	RUN 2	RUN 3	
KILN EMISSION RATES (LB/HR)				
Filterable PM	4.83	5.64	4.84	5.10E+00
CO	55.36	56.16	46.5	5.27E+01
NOx	6.85	9.04	7.03	7.64E+00
PM-10	3.42	3.62	3.75	3.60E+00
Condensible PM	5.14	5.05	4.22	4.80E+00
CO	43.74	62.26	60.71	5.56E+01
NOx	5.55	7.95	7.34	6.95E+00
Hydrogen fluoride	9.275	11.036	3.593	7.97E+00
THC as propane	0.881	0.972	0.994	9.49E-01
CO	51	57.91	61.65	5.69E+01
NOx	7.61	5.3	6.56	6.49E+00
Antimony*	(0.000124/2)	(0.000124/2)	0.000197	1.07E-04
Arsenic	9.52E-04	9.09E-04	7.53E-04	8.71E-04
Beryllium	9.06E-06	9.28E-06	1.84E-05	1.22E-05
Cadmium	1.06E-04	2.91E-04	4.79E-04	2.92E-04
Chromium	5.68E-04	9.23E-04	1.19E-03	8.94E-04
Lead	5.66E-03	2.92E-03	8.04E-03	5.54E-03
Manganese	1.88E-02	1.72E-02	6.08E-01	2.15E-01
Mercury	1.65E-04	9.02E-05	2.45E-04	1.67E-04
Nickel	3.55E-04	6.10E-04	7.81E-04	5.82E-04
Phosphorus	1.92E-02	3.09E-02	2.16E-02	2.39E-02
Selenium	1.97E-03	3.70E-04	5.12E-04	9.51E-04
Total Fluorides	0.048	0.295	3.248	1.20E+00
Acetone	3.94E-03	2.79E-03	1.29E-02	6.54E-03
Acrylonitrile*	4.43E-04	(0.000346/2)	(0.0003/2)	2.55E-04
Benzene	9.60E-03	9.50E-03	6.70E-03	8.60E-03
Bromomethane	5.62E-04	7.44E-04	1.19E-03	8.32E-04
2-butanone*	(0.000323/2)	(5.05E-06/2)	(5.13E-06/2)	5.55E-05
Carbon disulfide	2.66E-04	3.32E-04	2.15E-04	2.71E-04
Carbon tetrachloride*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Chloroform*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Chloromethane	1.50E-02	1.68E-02	2.30E-03	1.14E-02
Ethylbenzene	2.20E-04	1.07E-04	1.00E-04	1.42E-04
2-hexanone*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Iodomethane	2.66E-03	3.64E-03	3.88E-03	3.39E-03
Methylene chloride	1.72E-04	6.90E-05	1.33E-04	1.25E-04
M-/p-xylene	4.23E-04	1.85E-04	8.35E-04	4.81E-04
O-xylene*	(0.000139/2)	(5.97E-05/2)	9.00E-05	6.31E-05
Styrene*	(4.94E-06/2)	(1.17E-05/2)	(5.13E-06/2)	3.63E-06
Tetrachloroethane*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Toluene	2.05E-03	1.08E-03	2.14E-03	1.76E-03
1,1,1-trichloroethane*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Trichloroethane*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Trichlorofluoromethane	1.17E-04	7.75E-05	9.50E-05	9.65E-05
Vinyl acetate*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Bis(2-ethylhexy)phthalate	6.49E-04	4.68E-04	3.13E-04	4.77E-04
Dibenzofuran*	5.81E-04	1.73E-04	(3.4E-08/2)	2.51E-04
Dimethylphthalate*	(3.38E-08/2)	(3.42E-08/2)	5.10E-04	1.70E-04
Di-n-butylphthalate*	(3.38E-08/2)	3.04E-04	(3.4E-08/2)	1.01E-04
2-methylphenol*	(3.38E-08/2)	(3.42E-08/2)	(3.4E-08/2)	1.70E-08
Naphthalene*	1.71E-02	(3.42E-08/2)	(3.4E-08/2)	5.70E-03
Phenol*	(3.38E-08/2)	3.18E-03	4.36E-04	1.21E-03
Ethane**	ND	ND	ND	0.00E+00
Methane**	ND	ND	ND	0.00E+00
PROCESS RATES (TONS OF BRICK PRODUCED PER HOUR)				
OCT. 29-30	17.6	17.6	17.6	
NOV. 2	17.2	17.2	17.2	
NOV. 3	17.3	17.3	17.3	
NOV. 4	17.2	17.2	17.2	
NOV. 5	16.8	16.8	16.8	
NOV. 6-7	16.7	16.7	16.7	

*Data shown in parentheses represent non-detect runs.
VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

KILN EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.281	0.336	0.288	0.302
CO (Average of 9 runs)	2.93	3.45	3.31	3.23
NOx (Average of 9 Runs)	0.392	0.435	0.409	0.412
Filterable PM-10	0.198	0.210	0.218	0.209
Condensible PM	0.297	0.294	0.245	0.279
Condensible organic PM	0.0663	0.0674	0.108	0.0807
Condensible inorganic PM	0.231	0.226	0.137	0.198
Hydrogen fluoride	0.539	0.642	0.208	0.463
THC as propane	0.0527	0.0582	0.0595	0.0568
Antimony*	3.60E-06	3.69E-06	1.17E-05	6.34E-06
Arsenic	5.53E-05	5.41E-05	4.48E-05	5.14E-05
Beryllium	5.27E-07	5.52E-07	1.10E-06	7.25E-07
Cadmium	6.16E-06	1.73E-05	2.85E-05	1.73E-05
Chromium	3.30E-05	5.49E-05	7.08E-05	5.29E-05
Lead	3.29E-04	1.74E-04	4.79E-04	3.27E-04
Manganese	1.09E-03	1.02E-03	3.62E-02	0.0128
Mercury	9.59E-06	5.37E-06	1.46E-05	9.85E-06
Nickel	2.06E-05	3.63E-05	4.65E-05	3.45E-05
Phosphorus	1.12E-03	1.84E-03	1.29E-03	0.00141
Selenium	1.15E-04	2.20E-05	3.05E-05	5.57E-05
Total Fluorides	2.77E-03	1.72E-02	1.89E-01	0.0696
Acetone	2.36E-04	1.67E-04	7.72E-04	3.92E-04
Acrylonitrile*	2.65E-05	1.04E-05	8.98E-06	1.53E-05
Benzene	5.75E-04	5.69E-04	4.01E-04	5.15E-04
Bromomethane	3.37E-05	4.46E-05	7.13E-05	4.98E-05
2-butanone*	9.67E-06	1.51E-07	1.54E-07	3.33E-06
Carbon disulfide	1.59E-05	1.99E-05	1.29E-05	1.62E-05
Carbon tetrachloride*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Chloroform*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Chloromethane	8.98E-04	1.01E-03	1.38E-04	6.81E-04
Ethylbenzene	1.32E-05	6.41E-06	5.99E-06	8.52E-06
2-hexanone*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Iodomethane	1.59E-04	2.18E-04	2.32E-04	2.03E-04
Methylene chloride	1.03E-05	4.13E-06	7.96E-06	7.47E-06
M-/p-xylene	2.53E-05	1.11E-05	5.00E-05	2.88E-05
O-xylene*	4.16E-06	1.79E-06	5.39E-06	3.78E-06
Styrene*	1.48E-07	3.50E-07	1.54E-07	2.17E-07
Tetrachloroethane*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Toluene	1.23E-04	6.47E-05	1.28E-04	1.05E-04
1,1,1-trichloroethane*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Trichloroethane*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Trichlorofluoromethane	7.01E-06	4.64E-06	5.69E-06	5.78E-06
Vinyl acetate*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Bis(2-ethylhexy)phthalate	3.89E-05	2.80E-05	1.87E-05	2.85E-05
Dibenzofuran*	3.48E-05	1.04E-05	1.02E-09	1.51E-05
Dimethylphthalate*	1.01E-09	1.02E-09	3.05E-05	1.02E-05
Di-n-butylphthalate*	1.01E-09	1.82E-05	1.02E-09	6.07E-06
2-methylphenol*	1.01E-09	1.02E-09	1.02E-09	1.02E-09
Naphthalene*	1.02E-03	1.02E-09	1.02E-09	3.41E-04
Phenol*	1.01E-09	1.90E-04	2.61E-05	7.22E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	ND	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

= ND run

SAWDUST DRYER OUTLETS

SAWDUST DRYER OUTLET A EMISSION RATES (LB/HR)				
Filterable PM	2.21	2.19	3.07	
CO	25.98	26.38	26.35	
NOx	3.00	3.22	2.46	
PM-10	1.98	1.99	2.64	
Condensible PM	0.261	0.0556	1.48	
CO	19.09	28.91	26.67	
NOx	1.85	2.96	2.90	
Hydrogen fluoride	1.2	3.094	0.329	
THC as propane	0.359	2.40	2.76	
CO	25.09	27.07	27.34	
NOx	3.01	3.03	2.98	
Antimony*	(2.72E-05/2)	(2.76E-05/2)	(2.65E-05/2)	1.36E-05
Arsenic	1.97E-04	2.31E-04	2.60E-04	2.29E-04
Beryllium*	2.31E-06	(1.44E-06/2)	8.84E-06	3.96E-06
Cadmium	8.12E-05	1.52E-04	5.79E-05	9.70E-05
Chromium	2.72E-04	6.78E-04	1.52E-04	3.67E-04
Lead	2.41E-03	9.18E-04	1.11E-04	1.15E-03
Manganese	2.63E-03	3.78E-03	6.43E-03	4.28E-03
Mercury	1.34E-04	8.62E-05	6.10E-05	9.37E-05
Nickel	3.17E-04	4.51E-04	1.19E-04	2.96E-04
Phosphorus*	(0.00704/2)	4.71E-03	(0.00693/2)	ND
Selenium	4.60E-04	4.51E-04	4.29E-04	4.47E-04
Total Fluorides	VOID	0.173	0.524	0.349
Acetone	5.96E-03	6.15E-03	1.09E-02	7.67E-03
Acrylonitrile	(7.39E-05/2)	1.48E-04	2.18E-04	1.34E-04
Benzene	3.87E-03	4.24E-03	4.12E-03	4.08E-03
Bromomethane	3.27E-04	3.38E-04	4.70E-04	3.78E-04
2-butanone*	1.03E-03	(0.000653/2)	4.79E-03	2.05E-03
Carbon disulfide	1.07E-04	1.35E-04	1.50E-04	1.31E-04
Carbon tetrachloride*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Chloroform*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Chloromethane	8.41E-03	1.12E-02	1.16E-02	1.04E-02
Ethylbenzene	8.16E-05	6.73E-05	1.10E-04	8.63E-05
2-hexanone*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Iodomethane	1.55E-03	1.83E-03	2.07E-03	1.82E-03
Methylene chloride	2.59E-04	1.76E-03	4.41E-04	8.20E-04
M-/p-xylene	4.64E-04	1.68E-04	2.56E-04	2.96E-04
O-xylene	7.60E-05	4.77E-05	7.56E-05	6.64E-05
Styrene*	(3.3E-06/2)	(3.25E-06/2)	(9.28E-06/2)	2.64E-06
Tetrachloroethane*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Toluene	3.91E-03	4.00E-03	3.82E-03	3.91E-03
1,1,1-trichloroethane*	(1.89E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.41E-06
Trichloroethane*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Trichlorofluoromethane*	(0.000151/2)	(9.15E-05/2)	1.56E-04	ND
Vinyl acetate*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Bis(2-ethylhexy)phthalate*	3.44E-04	(1.91E-08/2)	3.21E-04	2.22E-04
Dibenzofuran*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Dimethylphthalate*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Di-n-butylphthalate/	3.63E-04	(1.91E-08/2)	1.28E-04	1.64E-04
2-methylphenol*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Naphthalene*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Phenol*	(1.94E-08/2)	1.33E-03	1.59E-03	9.73E-04
Ethane**	ND	ND	ND	ND
Methane**	ND	4.04E+02	ND	ND

*Data shown in parentheses represent non-detect runs.
VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLET A– EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.128	0.130	0.183	0.147
CO (Average of 9 runs)	1.37	1.61	1.57	1.52
NOx (Average of 9 Runs)	0.154	0.180	0.163	0.166
Filterable PM-10	0.114	0.116	0.154	0.128
Condensible PM	0.015	0.003	0.086	0.035
Hydrogen fluoride	0.070	0.180	0.019	0.090
THC as propane	0.0215	0.1438	0.1653	0.110
Antimony*	7.91E-07	8.21E-07	7.89E-07	8.00E-07
Arsenic	1.15E-05	1.38E-05	1.55E-05	1.36E-05
Beryllium*	1.34E-07	4.29E-08	5.26E-07	2.34E-07
Cadmium	4.72E-06	9.05E-06	3.45E-06	5.74E-06
Chromium	1.58E-05	4.04E-05	9.05E-06	2.17E-05
Lead	1.40E-04	5.46E-05	6.61E-06	6.71E-05
Manganese	1.53E-04	2.25E-04	3.83E-04	0.0003
Mercury	7.79E-06	5.13E-06	3.63E-06	5.52E-06
Nickel	1.84E-05	2.68E-05	7.08E-06	1.75E-05
Phosphorus*	2.05E-04	2.80E-04	2.06E-04	0.00023
Selenium	2.67E-05	2.68E-05	2.55E-05	2.64E-05
Total Fluorides	VOID	1.01E-02	3.05E-02	0.0135
Acetone	3.57E-04	3.68E-04	6.53E-04	4.59E-04
Acrylonitrile	2.21E-06	8.86E-06	1.31E-05	8.04E-06
Benzene	2.32E-04	2.54E-04	2.47E-04	2.44E-04
Bromomethane	1.96E-05	2.02E-05	2.81E-05	2.27E-05
2-butanone*	6.17E-05	1.96E-05	2.87E-04	1.23E-04
Carbon disulfide	6.41E-06	8.08E-06	8.98E-06	7.82E-06
Carbon tetrachloride*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Chloroform*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Chloromethane	5.04E-04	6.71E-04	6.95E-04	6.23E-04
Ethylbenzene	4.89E-06	4.03E-06	6.59E-06	5.17E-06
2-hexanone*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Iodomethane	9.28E-05	1.10E-04	1.24E-04	1.09E-04
Methylene chloride	1.55E-05	1.05E-04	2.64E-05	4.91E-05
M-/p-xylene	2.78E-05	1.01E-05	1.53E-05	1.77E-05
O-xylene	4.55E-06	2.86E-06	4.53E-06	3.98E-06
Styrene*	9.88E-08	9.73E-08	2.78E-07	1.58E-07
Tetrachloroethane*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Toluene	2.34E-04	2.40E-04	2.29E-04	2.34E-04
1,1,1-trichloroethane*	5.66E-08	9.73E-08	9.97E-08	8.45E-08
Trichloroethane*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Trichlorofluoromethane*	4.52E-06	2.74E-06	9.34E-06	5.53E-06
Vinyl acetate*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Bis(2-ethylhexy)phthalate*	2.06E-05	5.72E-10	1.92E-05	1.33E-05
Dibenzofuran*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Dimethylphthalate*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Di-n-butylphthalate/	2.17E-05	5.72E-10	7.66E-06	9.80E-06
2-methylphenol*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Naphthalene*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Phenol*	5.81E-10	7.96E-05	9.52E-05	5.83E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	2.42E+01	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLET B EMISSION RATES (LB/HR)				
Filterable PM	19.39	20.15	20.78	
CO	24.89	24.63	22.84	
NOx	2.35	2.73	2.81	
PM-10	2.53	1.72	2.26	
Condensible PM	0.509	0.191	0.408	
CO	26.7	29.59	29.33	
NOx	2.46	2.63	3.01	
Hydrogen fluoride	0.014	2.384	2.197	
THC as propane	1.200	0.96	1.52	
CO	23.13	25.25	23.35	
NOx	3.01	2.65	2.33	
Antimony*	(7.1E-05/2)	(7.16E-05/2)	3.15E-05	3.43E-05
Arsenic	9.19E-05	1.85E-04	9.80E-05	1.25E-04
Beryllium*	2.33E-06	(1.47E-06/2)	(1.46E-06/2)	1.27E-06
Cadmium	2.71E-04	2.80E-04	2.63E-04	2.71E-04
Chromium	2.40E-04	6.81E-04	3.91E-04	4.37E-04
Lead	2.12E-03	7.04E-04	3.96E-05	9.55E-04
Manganese	3.57E-03	4.30E-03	3.37E-03	3.75E-03
Mercury	1.62E-04	3.96E-05	5.98E-05	8.71E-05
Nickel	2.03E-04	3.66E-04	2.67E-04	2.79E-04
Phosphorus*	9.05E-03	(0.00717/2)	(0.00714/2)	5.40E-03
Selenium	1.73E-04	4.67E-04	3.76E-04	3.39E-04
Total Fluorides	NA	NA	NA	NA
Acetone	9.61E-03	9.47E-03	9.83E-03	9.64E-03
Acrylonitrile*	2.21E-04	(0.000203/2)	2.13E-04	1.79E-04
Benzene	6.12E-03	4.99E-03	4.59E-03	5.23E-03
Bromomethane*	4.35E-04	(0.000373/2)	4.69E-04	3.64E-04
2-butanone*	1.44E-03	(0.00159/2)	2.60E-03	1.61E-03
Carbon disulfide	1.80E-04	1.63E-04	1.81E-04	1.75E-04
Carbon tetrachloride*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Chloroform*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Chloromethane	1.29E-02	1.02E-02	1.35E-02	1.22E-02
Ethylbenzene	1.19E-04	6.89E-05	6.00E-05	8.26E-05
2-hexanone*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Iodomethane	2.19E-03	2.17E-03	2.41E-03	2.26E-03
Methylene chloride	2.07E-04	3.45E-04	6.79E-05	2.07E-04
M-/p-xylene	2.26E-04	1.47E-04	1.66E-04	1.80E-04
O-xylene	7.16E-05	4.65E-05	4.56E-05	5.46E-05
Styrene*	(8.52E-05/2)	(0.000104/2)	(2.87E-06/2)	3.20E-05
Tetrachloroethane*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Toluene	3.52E-03	2.93E-03	3.44E-03	3.30E-03
1,1,1-trichloroethane*	(3.1E-06/2)	(1.19E-05/2)	(2.87E-06/2)	2.98E-06
Trichloroethane*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Trichlorofluoromethane*	1.05E-04	(5.84E-05/2)	8.71E-05	7.38E-05
Vinyl acetate*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Bis(2-ethylhexy)phthalate	8.94E-04	4.49E-03	9.08E-04	2.10E-03
Dibenzofuran*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Dimethylphthalate*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Di-n-butylphthalate	3.82E-05	8.63E-05	1.75E-04	9.98E-05
2-methylphenol*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Naphthalene*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Phenol	5.86E-04	9.24E-04	7.67E-04	7.59E-04
Ethane**	ND	ND	ND	ND
Methane**	ND	ND	ND	ND

*Data shown in parentheses represent non-detect runs.
VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLET B– EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	1.127	1.199	1.237	1.188
CO (Average of 9 runs)	1.46	1.55	1.48	1.50
NOx (Average of 9 Runs)	0.153	0.157	0.159	0.156
Filterable PM-10	0.146	0.100	0.132	0.126
Condensible PM	0.029	0.011	0.024	0.021
Hydrogen fluoride	0.001	0.139	0.127	0.089
THC as propane	0.0719	0.0575	0.0909	0.073
Antimony*	2.06E-06	2.13E-06	1.88E-06	2.02E-06
Arsenic	5.34E-06	1.10E-05	5.83E-06	7.40E-06
Beryllium*	1.35E-07	4.38E-08	4.35E-08	7.42E-08
Cadmium	1.58E-05	1.67E-05	1.57E-05	1.60E-05
Chromium	1.40E-05	4.05E-05	2.33E-05	2.59E-05
Lead	1.23E-04	4.19E-05	2.36E-06	5.58E-05
Manganese	2.08E-04	2.56E-04	2.01E-04	0.00022
Mercury	9.42E-06	2.36E-06	3.56E-06	5.11E-06
Nickel	1.18E-05	2.18E-05	1.59E-05	1.65E-05
Phosphorus*	5.26E-04	2.13E-04	2.13E-04	0.00032
Selenium	1.01E-05	2.78E-05	2.24E-05	2.01E-05
Total Fluorides	NA	NA	NA	NA
Acetone	5.75E-04	5.67E-04	5.89E-04	5.77E-04
Acrylonitrile*	1.32E-05	6.08E-06	1.28E-05	1.07E-05
Benzene	3.66E-04	2.99E-04	2.75E-04	3.13E-04
Bromomethane*	2.60E-05	1.12E-05	2.81E-05	2.18E-05
2-butanone*	8.62E-05	4.76E-05	1.56E-04	9.65E-05
Carbon disulfide	1.08E-05	9.76E-06	1.08E-05	1.05E-05
Carbon tetrachloride*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Chloroform*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Chloromethane	7.72E-04	6.11E-04	8.08E-04	7.31E-04
Ethylbenzene	7.13E-06	4.13E-06	3.59E-06	4.95E-06
2-hexanone*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Iodomethane	1.31E-04	1.30E-04	1.44E-04	1.35E-04
Methylene chloride	1.24E-05	2.07E-05	4.07E-06	1.24E-05
M-/p-xylene	1.35E-05	8.80E-06	9.94E-06	1.08E-05
O-xylene	4.29E-06	2.78E-06	2.73E-06	3.27E-06
Styrene*	2.55E-06	3.11E-06	8.59E-08	1.92E-06
Tetrachloroethane*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Toluene	2.11E-04	1.75E-04	2.06E-04	1.97E-04
1,1,1-trichloroethane*	9.28E-08	3.56E-07	8.59E-08	1.78E-07
Trichloroethane*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Trichlorofluoromethane*	6.29E-06	1.75E-06	5.22E-06	4.42E-06
Vinyl acetate*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Bis(2-ethylhexy)phthalate *	5.35E-05	2.69E-04	5.44E-05	1.26E-04
Dibenzofuran*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Dimethylphthalate*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Di-n-butylphthalate *	2.29E-06	5.17E-06	1.05E-05	5.98E-06
2-methylphenol*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Naphthalene*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Phenol	3.51E-05	5.53E-05	4.59E-05	4.54E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	ND	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc.. Therefore, emissions for these pollutants cannot be estimated.

TOTAL SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B - KILN)				
Filterable PM	0.975	0.994	1.13	1.03
CO (Average of 9 runs)	-0.100	-0.290	-0.260	-0.217
NOx (Average of 9 Runs)	-0.0850	-0.0980	-0.0870	-0.0900
Filterable PM-10	0.0629	0.0055	0.0670	0.0451
Condensible PM	-0.252	-0.279	-0.136	-0.222
Hydrogen fluoride	-0.469	-0.323	-0.062	-0.284
THC as propane	0.0406	0.143	0.197	0.127
Antimony*	-7.50E-07	-7.38E-07	-9.06E-06	-3.52E-06
Arsenic	-3.86E-05	-2.93E-05	-2.35E-05	-3.05E-05
Beryllium*	-2.57E-07	-4.66E-07	-5.26E-07	-4.16E-07
Cadmium	1.43E-05	8.39E-06	-9.41E-06	4.43E-06
Chromium	-3.26E-06	2.60E-05	-3.85E-05	-5.27E-06
Lead	-6.57E-05	-7.73E-05	-4.70E-04	-2.04E-04
Manganese	-7.33E-04	-5.43E-04	-3.56E-02	-1.23E-02
Mercury	7.62E-06	2.12E-06	-7.39E-06	7.81E-07
Nickel	9.59E-06	1.23E-05	-2.35E-05	-5.32E-07
Phosphorus*	-3.85E-04	-1.35E-03	-8.67E-04	-8.66E-04
Selenium	-7.77E-05	3.26E-05	1.74E-05	-9.22E-06
Total Fluorides	-2.77E-03	-7.09E-03	-1.58E-01	-5.61E-02
Acetone	6.96E-04	7.68E-04	4.69E-04	6.45E-04
Acrylonitrile*	-1.11E-05	4.58E-06	1.68E-05	3.44E-06
Benzene	2.34E-05	-1.62E-05	1.20E-04	4.25E-05
Bromomethane*	1.20E-05	-1.31E-05	-1.50E-05	-5.40E-06
2-butanone*	1.38E-04	6.70E-05	4.42E-04	2.16E-04
Carbon disulfide	1.26E-06	-2.04E-06	6.95E-06	2.06E-06
Carbon tetrachloride*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Chloroform*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Chloromethane	3.78E-04	2.75E-04	1.37E-03	6.73E-04
Ethylbenzene	-1.16E-06	1.75E-06	4.19E-06	1.59E-06
2-hexanone*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Iodomethane	6.47E-05	2.16E-05	3.59E-05	4.07E-05
Methylene chloride	1.76E-05	1.22E-04	2.25E-05	5.40E-05
M-/p-xylene	1.60E-05	7.78E-06	-2.47E-05	-3.19E-07
O-xylene	4.68E-06	3.85E-06	1.87E-06	3.47E-06
Styrene*	2.50E-06	2.86E-06	2.10E-07	1.86E-06
Tetrachloroethane*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Toluene	3.22E-04	3.50E-04	3.07E-04	3.26E-04
1,1,1-trichloroethane*	1.50E-09	3.02E-07	3.20E-08	1.12E-07
Trichloroethane*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Trichlorofluoromethane*	3.80E-06	-1.53E-07	8.87E-06	4.17E-06
Vinyl acetate*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Bis(2-ethylhexy)phthalate	3.53E-05	2.41E-04	5.49E-05	1.10E-04
Dibenzofuran*	-3.48E-05	-1.04E-05	1.29E-10	-1.50E-05
Dimethylphthalate*	1.68E-10	1.32E-10	-3.05E-05	-1.02E-05
Di-n-butylphthalate	2.40E-05	-1.30E-05	1.81E-05	9.71E-06
2-methylphenol*	1.68E-10	1.32E-10	1.29E-10	1.43E-10
Naphthalene*	-1.02E-03	1.32E-10	1.29E-10	-3.41E-04
Phenol	3.51E-05	-5.54E-05	1.15E-04	3.16E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	2.42E+01	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc.. Therefore, emissions for these pollutants cannot be estimated.

NEGATIVE VALUES INDICATE POLLUTANT REMOVAL FROM EXHAUST STREAM

TOTAL KILN AND SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B)

Filterable PM	1.26	1.33	1.42	1.34
CO (Average of 9 runs)	2.83	3.16	3.05	3.01
NOx (Average of 9 Runs)	0.307	0.337	0.322	0.322
Filterable PM-10	0.261	0.216	0.285	0.254
Condensible PM	0.0445	0.0143	0.110	0.0561
Condensible organic PM	0.0316	0.0107	0.0878	0.0434
Condensible inorganic PM	0.0129	0.00365	0.0217	0.0128
Hydrogen fluoride	0.0706	0.318	0.146	0.178
THC as propane	0.0934	0.201	0.256	0.184
Antimony*	2.85E-06	2.95E-06	2.66E-06	~~ND~~ 2.82E-06
Arsenic	1.68E-05	2.48E-05	2.13E-05	2.10E-05
Beryllium*	2.70E-07	8.66E-08	5.70E-07	3.09E-07
Cadmium	2.05E-05	2.57E-05	1.91E-05	2.18E-05
Chromium	2.98E-05	8.09E-05	3.23E-05	4.77E-05
Lead	2.63E-04	9.65E-05	8.96E-06	1.23E-04
Manganese	3.60E-04	4.81E-04	5.83E-04	4.75E-04
Mercury	1.72E-05	7.49E-06	7.19E-06	1.06E-05
Nickel	3.02E-05	4.86E-05	2.30E-05	3.39E-05
Phosphorus*	7.31E-04	4.94E-04	4.19E-04	5.48E-04
Selenium	3.68E-05	5.46E-05	4.79E-05	4.65E-05
Total Fluorides	VOID	0.0101	0.0305	0.0203
Acetone	9.32E-04	9.35E-04	0.00124	0.00104
Acrylonitrile*	1.54E-05	1.49E-05	2.58E-05	1.87E-05
Benzene	5.98E-04	5.53E-04	5.22E-04	5.57E-04
Bromomethane*	4.56E-05	3.14E-05	5.62E-05	4.44E-05
2-butanone*	1.48E-04	6.72E-05	4.43E-04	2.19E-04
Carbon disulfide	1.72E-05	1.78E-05	1.98E-05	1.83E-05
Carbon tetrachloride*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Chloroform*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Chloromethane	0.00128	0.00128	0.00150	0.00135
Ethylbenzene	1.20E-05	8.16E-06	1.02E-05	1.01E-05
2-hexanone*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Iodomethane	2.24E-04	2.40E-04	2.68E-04	2.44E-04
Methylene chloride	2.79E-05	1.26E-04	3.05E-05	6.15E-05
M-/p-xylene	4.13E-05	1.89E-05	2.53E-05	2.85E-05
O-xylene	8.84E-06	5.64E-06	7.26E-06	7.25E-06
Styrene*	2.65E-06	3.21E-06	3.64E-07	2.07E-06
Tetrachloroethane*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Toluene	4.45E-04	4.15E-04	4.35E-04	4.32E-04
1,1,1-trichloroethane*	1.49E-07	4.54E-07	1.86E-07	2.63E-07
Trichloroethane*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Trichlorofluoromethane*	1.08E-05	4.49E-06	1.46E-05	9.95E-06
Vinyl acetate*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Bis(2-ethylhexy)phthalate	7.41E-05	2.69E-04	7.36E-05	1.39E-04
Dibenzofuran*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Dimethylphthalate*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Di-n-butylphthalate	2.40E-05	5.17E-06	1.81E-05	1.58E-05
2-methylphenol*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Naphthalene*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Phenol	3.51E-05	1.35E-04	1.41E-04	1.04E-04
Ethane**	ND	ND	ND	ND
Methane**	ND	24.2	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc.. Therefore, emissions for these pollutants cannot be estimated.

CO2 EMISSION FACTORS--FROM PM/METALS, PM10/COND PM, SEMI-VOST TESTS

Kiln Outlet

Concentration (%)	Flow rate (dscfm)	Emission rate (lb/hr)	Process rate (ton/hr)	Emission factor (lb/ton)
PM/METALS TEST				
4.9	28005	9402	17.2	547
4.8	32033	10535	16.8	627
4.6	28862	9097	16.8	541
PM-10/COND. PM TEST				
4.8	24714	8128	17.3	470
4.9	29814	10010	17.2	582
5.1	28690	10025	17.2	583
SEMI-VOST TEST				
4.5	26998	8324	16.7	498
4.3	27968	8240	16.7	493
4.4	28623	8629	16.7	517
AVERAGE EMISSION FACTOR				540

Sawdust dryer outlets

Concentration (%)	Flow rate (dscfm)	Emission rate (lb/hr)	Process rate (ton/hr)	Emission factor (lb/ton)
PM/METALS TEST				
3.30	17170+16507	7615	17.2	443
3.35	16756+16044	7529	16.8	448
3.25	17273+15595	7319	16.8	436
PM-10/COND. PM TEST				
3.01	16845+18067	7188	17.3	416
3.43	17177+18081	8286	17.2	482
3.30	18099+18311	8233	17.2	479
SEMI-VOST TEST				
3.40	17689+16895	8057	16.7	482
3.30	17558+16954	7803	16.7	467
3.30	17918+15821	7629	16.7	457
AVERAGE EMISSION FACTOR				457

Filename: BRICK3.WQ1

CHATTAHOOCHEE BRICK COMPANY--ATLANTA

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			KILN	DRYER	Run 3	Run 4
1	Stack temperature	Deg F	242	94		
	Moisture	%	4.23	3.2		
	Oxygen	%	15.8	19.8		
	Volumetric flow, actual	acfm	17660	44837		
	Volumetric flow, standard	dscfm	13128	41571		
	Isokinetic variation	%	NA	NA		
Circle: Production or feed rate Capacity:		TPH	10.66	10.66		
	Pollutant concentrations:					
	CO2	%	3.6%	0.0%		
	SO2	ppmv	98.76	0		
	NOx	ppmv	37.31	0		
	CO	ppmv	130.14	0		
	TOC as propane	ppmv	1.28	1.34		
	Pollutant mass flux rates:					
	CO2	lb/hr	3238	0		
	SO2	lb/hr	12.9	0		
	NOx	lb/hr	3.51	0		
	CO	lb/hr	7.45	0		
	TOC as propane	lb/hr	0.115	0.382		
	Emission factors:					
	CO2	lb/ton	304	0		
	SO2	lb/ton	1.21	0		
	NOx	lb/ton	0.329	0		
	CO	lb/ton	0.699	0		
	TOC as propane	lb/ton	0.0108	0.0358		

AVERAGE OF A SINGLE CONTINOUS RUN. 180 READINGS TAKEN @ 30 SECOND INTERVALS.

Filename: TRIANGLE.WQ1
TRAINGLE BRICK-MERRY OAKS, NC
BRICK KILN NO. 2 STACK

7/5/96
w/ VOC as propane

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	AVERAGE
1	Stack temperature	Deg F	510	517	508		
	Pressure	in. HG	30.47	30.47	30.47		
	Moisture	%	7.1	7.2	7.1		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	29680	29114	28491		
	Volumetric flow, standard*	dscfm	15285	14870	14703	0	
	Isokinetic variation	%	102.7	102.1	99.6		
Circle: Production or feed rate Capacity:		TPH	10.56	10.56	10.56		
	Pollutant concentrations:						
	CO	ppmdv	92.8	91.8	95.6		
	CO2	%	2.4	2.4	2.4		
	NOx	ppmdv	12	12.6	12.7		
	SO2	ppmdv	5.1	4.2	4		
	TOC as propane	ppmdv	6.83	7.20	7.47		
	Methane (all runs non-detect)**	ppmdv	1.98	1.91	1.92		
	Antimony	G/dscf	0	2.67E-07	1.58E-05		
	Arsenic	G/dscf	6.13E-07	9.42E-07	4.16E-06		
	Beryllium (all runs non-detect)**	G/dscf	3.35E-08	3.46E-08	3.75E-08		
	Cadmium	G/dscf	2.65E-07	5.85E-07	5.82E-07		
	Chromium	G/dscf	1.39E-06	1.88E-06	1.91E-06		
	Cobalt (all runs non-detect)**	G/dscf	3.35E-07	3.46E-07	3.75E-07		
	Lead	G/dscf	1.08E-06	1.01E-06	1.96E-05		
	Manganese	G/dscf	8.01E-06	6.47E-06	6.42E-06		
	Mercury (all runs non-detect)**	G/dscf	7.87E-07	8.13E-07	8.82E-07		
	Nickel	G/dscf	1.2E-06	1.6E-06	3.68E-07		
	Selenium	G/dscf	3.68E-06	3.51E-06	3.39E-06		
	Pollutant mass flux rates:						
	CO	lb/hr	6.19	5.95	6.13		
	CO2	lb/hr	2514	2446	2418		
	NOx	lb/hr	1.31	1.34	1.34		
	SO2	lb/hr	0.778	0.623	0.587		
	TOC as propane	lb/hr	0.716	0.734	0.752		
	Methane (all runs non-detect)**	lb/hr	0.0377	0.0354	0.0352		
	Antimony	lb/hr	0.00E+00	3.40E-05	1.99E-03		
	Arsenic	lb/hr	8.03E-05	1.20E-04	5.24E-04		
	Beryllium (all runs non-detect)**	lb/hr	2.19E-06	2.20E-06	2.36E-06		
	Cadmium	lb/hr	3.47E-05	7.46E-05	7.33E-05		
	Chromium	lb/hr	1.82E-04	2.40E-04	2.41E-04		
	Cobalt (all runs non-detect)**	lb/hr	2.19E-05	2.20E-05	2.36E-05		
	Lead	lb/hr	1.41E-04	1.29E-04	2.47E-03		
	Manganese	lb/hr	1.05E-03	8.25E-04	8.09E-04		
	Mercury (all runs non-detect)**	lb/hr	5.16E-05	5.18E-05	5.56E-05		
	Nickel	lb/hr	1.57E-04	2.04E-04	4.64E-05		
	Selenium	lb/hr	4.82E-04	4.47E-04	4.27E-04		
	Emission factors (ENGLISH UNITS):						AVERAGE
	CO	lb/ton	0.59	0.56	0.58		0.58
	CO2	lb/ton	238	232	229		233
	NOx	lb/ton	0.12	0.13	0.13		0.13
	SO2	lb/ton	0.074	0.059	0.056		0.063
	TOC as propane	lb/ton	0.068	0.069	0.071		0.069
	Methane (all runs non-detect)**	lb/ton	0.0036	0.0034	0.0033		0.0034
	Antimony	lb/ton	0.0E+00	3.2E-06	1.9E-04		6.4E-05
	Arsenic	lb/ton	7.6E-06	1.1E-05	5.0E-05		2.3E-05
	Beryllium (all runs non-detect)**	lb/ton	2.1E-07	2.1E-07	2.2E-07		2.1E-07
	Cadmium	lb/ton	3.3E-06	7.1E-06	6.9E-06		5.8E-06
	Chromium	lb/ton	1.7E-05	2.3E-05	2.3E-05		2.1E-05
	Cobalt (all runs non-detect)**	lb/ton	2.1E-06	2.1E-06	2.2E-06		2.1E-06
	Lead	lb/ton	1.3E-05	1.2E-05	2.3E-04		8.6E-05
	Manganese	lb/ton	9.9E-05	7.8E-05	7.7E-05		8.5E-05
	Mercury (all runs non-detect)**	lb/ton	4.9E-06	4.9E-06	5.3E-06		5.0E-06
	Nickel	lb/ton	1.5E-05	1.9E-05	4.4E-06		1.3E-05
	Selenium	lb/ton	4.6E-05	4.2E-05	4.0E-05		4.3E-05

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
**CONCENTRATIONS SHOWN REPRESENT THE POLLUTANT DETECTION LIMIT FOR EACH TEST RUN. EMISSION RATES AND FACTORS CALCULATED USING ONE-HALF OF THE DETECTION LIMIT.

Emission factors (METRIC UNITS):						AVERAGE
CO	kg/Mg	0.29	0.28	0.29		0.29
CO2	kg/Mg	119	116	115		116
NOx	kg/Mg	0.062	0.064	0.063		0.063
SO2	kg/Mg	0.037	0.029	0.028		0.031
THC as methane	kg/Mg	0.034	0.035	0.036		0.035
Methane (all runs non-detect)**	kg/Mg	0.0018	0.0017	0.0017		0.0017
Antimony	kg/Mg	0.0E+00	1.6E-06	9.4E-05		3.2E-05
Arsenic	kg/Mg	3.8E-06	5.7E-06	2.5E-05		1.1E-05
Beryllium (all runs non-detect)**	kg/Mg	1.0E-07	1.0E-07	1.1E-07		1.1E-07
Cadmium	kg/Mg	1.6E-06	3.5E-06	3.5E-06		2.9E-06
Chromium	kg/Mg	8.6E-06	1.1E-05	1.1E-05		1.0E-05
Cobalt (all runs non-detect)**	kg/Mg	1.0E-06	1.0E-06	1.1E-06		1.1E-06
Lead	kg/Mg	6.7E-06	6.1E-06	1.2E-04		4.3E-05
Manganese	kg/Mg	5.0E-05	3.9E-05	3.8E-05		4.2E-05
Mercury (all runs non-detect)**	kg/Mg	2.4E-06	2.5E-06	2.6E-06		2.5E-06
Nickel	kg/Mg	7.4E-06	9.7E-06	2.2E-06		6.4E-06
Selenium	kg/Mg	2.3E-05	2.1E-05	2.0E-05		2.1E-05

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: TRIANGLE.WQ1
TRAINGLE BRICK--MERRY OAKS, NC
BRICK KILN NO. 2 STACK

7/5/96
w/VOC as methane

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	AVERAGE
1	Stack temperature	Deg F	510	517	508		
	Pressure	in. HG	30.47	30.47	30.47		
	Moisture	%	7.1	7.2	7.1		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	29680	29114	28491		
	Volumetric flow, standard*	dscfm	15285	14870	14703	0	
	Isokinetic variation	%	102.7	102.1	99.6		
Circle: Production or feed rate Capacity:		TPH	10.56	10.56	10.56		
	Pollutant concentrations:						
	CO	ppmdv	92.8	91.8	95.6		
	CO2	%	2.4	2.4	2.4		
	NOx	ppmdv	12	12.6	12.7		
	SO2	ppmdv	5.1	4.2	4		
	THC as carbon	ppmdv	20.5	21.6	22.4		
	Methane (all runs non-detect)**	ppmdv	1.98	1.91	1.92		
	Antimony	G/dscf	0	2.67E-07	1.58E-05		
	Arsenic	G/dscf	6.13E-07	9.42E-07	4.16E-06		
	Beryllium (all runs non-detect)**	G/dscf	3.35E-08	3.46E-08	3.75E-08		
	Cadmium	G/dscf	2.65E-07	5.85E-07	5.82E-07		
	Chromium	G/dscf	1.39E-06	1.88E-06	1.91E-06		
	Cobalt (all runs non-detect)**	G/dscf	3.35E-07	3.46E-07	3.75E-07		
	Lead	G/dscf	1.08E-06	1.01E-06	1.96E-05		
	Manganese	G/dscf	8.01E-06	6.47E-06	6.42E-06		
	Mercury (all runs non-detect)**	G/dscf	7.87E-07	8.13E-07	8.82E-07		
	Nickel	G/dscf	1.2E-06	1.6E-06	3.68E-07		
	Selenium	G/dscf	3.68E-06	3.51E-06	3.39E-06		
	Pollutant mass flux rates:						
	CO	lb/hr	6.19	5.95	6.13		
	CO2	lb/hr	2514	2446	2418		
	NOx	lb/hr	1.31	1.34	1.34		
	SO2	lb/hr	0.778	0.623	0.587		
	THC as methane	lb/hr	0.783	0.802	0.821		
	Methane (all runs non-detect)**	lb/hr	0.038	0.035	0.035		
	Antimony	lb/hr	0.00E+00	3.40E-05	1.99E-03		
	Arsenic	lb/hr	8.03E-05	1.20E-04	5.24E-04		
	Beryllium (all runs non-detect)**	lb/hr	2.19E-06	2.20E-06	2.36E-06		
	Cadmium	lb/hr	3.47E-05	7.46E-05	7.33E-05		
	Chromium	lb/hr	1.82E-04	2.40E-04	2.41E-04		
	Cobalt (all runs non-detect)**	lb/hr	2.19E-05	2.20E-05	2.36E-05		
	Lead	lb/hr	1.41E-04	1.29E-04	2.47E-03		
	Manganese	lb/hr	1.05E-03	8.25E-04	8.09E-04		
	Mercury (all runs non-detect)**	lb/hr	5.16E-05	5.18E-05	5.56E-05		
	Nickel	lb/hr	1.57E-04	2.04E-04	4.64E-05		
	Selenium	lb/hr	4.82E-04	4.47E-04	4.27E-04		
	Emission factors (ENGLISH UNITS):						AVERAGE
	CO	lb/ton	0.59	0.56	0.58		0.58
	CO2	lb/ton	238	232	229		233
	NOx	lb/ton	0.12	0.13	0.13		0.13
	SO2	lb/ton	0.074	0.059	0.056		0.063
	THC as methane	lb/ton	0.074	0.076	0.078		0.076
	Methane (all runs non-detect)**	lb/ton	0.0036	0.0034	0.0033		0.0034
	Antimony	lb/ton	0.0E+00	3.2E-06	1.9E-04		6.4E-05
	Arsenic	lb/ton	7.6E-06	1.1E-05	5.0E-05		2.3E-05
	Beryllium (all runs non-detect)**	lb/ton	2.1E-07	2.1E-07	2.2E-07		2.1E-07
	Cadmium	lb/ton	3.3E-06	7.1E-06	6.9E-06		5.8E-06
	Chromium	lb/ton	1.7E-05	2.3E-05	2.3E-05		2.1E-05
	Cobalt (all runs non-detect)**	lb/ton	2.1E-06	2.1E-06	2.2E-06		2.1E-06
	Lead	lb/ton	1.3E-05	1.2E-05	2.3E-04		8.6E-05
	Manganese	lb/ton	9.9E-05	7.8E-05	7.7E-05		8.5E-05
	Mercury (all runs non-detect)**	lb/ton	4.9E-06	4.9E-06	5.3E-06		5.0E-06
	Nickel	lb/ton	1.5E-05	1.9E-05	4.4E-06		1.3E-05
	Selenium	lb/ton	4.6E-05	4.2E-05	4.0E-05		4.3E-05

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
**CONCENTRATIONS SHOWN REPRESENT THE POLLUTANT DETECTION LIMIT FOR EACH TEST RUN. EMISSION RATES AND FACTORS CALCULATED USING ONE-HALF OF THE DETECTION LIMIT.

Emission factors (METRIC UNITS):						AVERAGE
CO	kg/Mg	0.29	0.28	0.29		0.29
CO2	kg/Mg	119	116	115		116
NOx	kg/Mg	0.062	0.064	0.063		0.063
SO2	kg/Mg	0.037	0.029	0.028		0.031
THC as methane	kg/Mg	0.037	0.038	0.039		0.038
Methane (all runs non-detect)**	kg/Mg	0.0018	0.0017	0.0017		0.0017
Antimony	kg/Mg	0.0E+00	1.6E-06	9.4E-05		3.2E-05
Arsenic	kg/Mg	3.8E-06	5.7E-06	2.5E-05		1.1E-05
Beryllium (all runs non-detect)**	kg/Mg	1.0E-07	1.0E-07	1.1E-07		1.1E-07
Cadmium	kg/Mg	1.6E-06	3.5E-06	3.5E-06		2.9E-06
Chromium	kg/Mg	8.6E-06	1.1E-05	1.1E-05		1.0E-05
Cobalt (all runs non-detect)**	kg/Mg	1.0E-06	1.0E-06	1.1E-06		1.1E-06
Lead	kg/Mg	6.7E-06	6.1E-06	1.2E-04		4.3E-05
Manganese	kg/Mg	5.0E-05	3.9E-05	3.8E-05		4.2E-05
Mercury (all runs non-detect)**	kg/Mg	2.4E-06	2.5E-06	2.6E-06		2.5E-06
Nickel	kg/Mg	7.4E-06	9.7E-06	2.2E-06		6.4E-06
Selenium	kg/Mg	2.3E-05	2.1E-05	2.0E-05		2.1E-05

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: TRIANGL2.WQ1
TRAINGLE BRICK--MERRY OAKS, NC
BRICK KILN NO. 2 STACK

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
2	Stack temperature	Deg F	518	516	519		
	Pressure	in. HG	30.5	30.47	30.5		
	Moisture	%	6.8	6.5	7		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	28515	30363	29047		
	Volumetric flow, standard*	dscfm	14626	15641	14852	0	
	Isokinetic variation	%	99.4	98.6	98.9		
Circle Capacity:	Production or feed rate	TPH	10.56	10.56	10.56		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.00293	0.00246	0.00325		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	0.367	0.330	0.414	0.370	
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.035	0.031	0.039		0.0351
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.017	0.016	0.020		0.018

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: TRIANGL3.WQ1
TRAINGLE BRICK--MERRY OAKS, NC
BRICK KILN NO. 2 STACK

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
3	Stack temperature	Deg F	505	510.4	510.4		
	Pressure	in. HG	30.5	30.5	30.51		
	Moisture	%	6.2	6.2	6.2		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	28012	28091	28091		
	Volumetric flow, standard*	dscfm	14655	14615	14620	0	
	Isokinetic variation	%	100.4	100.1	99.8		
Circle: Production or feed rate		TPH	10.56	10.56	10.56		
Capacity:							
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.00602	0.00510	0.00553		
	Filterable PM-10	G/dscf	0.00447	0.00380	0.00422		
	Total condensible PM	G/dscf	0.0122	0.0165	0.0168		
	Condensible inorganic PM	G/dscf	0.0109	0.0165	0.0149		
	Condensible organic PM	G/dscf	0.0013	0	0.0019		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	0.756	0.639	0.693		
	Filterable PM-10	lb/hr	0.562	0.476	0.529	0.522	
	Total condensible PM	lb/hr	1.53	2.07	2.11		
	Condensible inorganic PM	lb/hr	1.37	2.07	1.87		
	Condensible organic PM	lb/hr	0.159	0.00	0.236		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.072	0.061	0.066		0.066
	Filterable PM-10	lb/ton	0.053	0.045	0.050		0.0494
	Condensible inorganic PM	lb/ton	0.130	0.20	0.18		0.17
	Condensible organic PM	lb/ton	0.015	0.000	0.022		0.0125
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.036	0.030	0.033		0.033
	Filterable PM-10	kg/Mg	0.027	0.023	0.025		0.025
	Condensible inorganic PM	kg/Mg	0.065	0.098	0.088		0.084
	Condensible organic PM	kg/Mg	0.0075	0.0000	0.0112		0.0062

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

PINE HALL EMISSION FACTORS–METRIC UNITS

GRINDING ROOM

(AP-42 Section 11.3, Ref. #11 Summary)

	RUN 1	RUN 2	RUN 3	
EMISSION RATES (LB/HR)				
Filterable PM	6.056	3.596	5.669	
Filterable PM-10	0.625	0.418	0.391	
PROCESS RATES (TONS/HR)				
	196	223	211	
EMISSION FACTORS (~~LB/TON~~)				AVERAGE
Filterable PM Kg/Mg	0.0154	0.0081	0.0134	0.0123
Filterable PM-10	0.00159	0.00094	0.00093	0.00115

DOWNRATE ORGANICS MARKED W/ BECAUSE 1 OR MORE SAMPLES WERE BELOW QUANTITATION LIMIT OR ABOVE CALIBRATION RANGE. QUANTITIES WERE ESTIMATED.

$\frac{ft^3}{min} \times \frac{1\ m^3}{35.3145\ ft^3} \times \frac{60\ min}{hr}$

PRIMARY CRUSHER DATA

	TSP (ug/m³)	PM-10 (ug/m³)	FLOW RATE (CFM) → (m³/hr)	PM-10 MASS EMISSION RATE ug/hr → lb/hr
11/3	1598.5	559.2	9.983 → 16.96	9484 → 2.09x10⁻⁵
11/4	1115.3	609.9	13.036 → 22.15	13509 → 2.98x10⁻⁵

PROCESS RATE (TPH): 224

EMISSION FACTOR

RUN 1	RUN 2	AVG
9.3E-8	1.33E-7	1.13E-7

GRINDING ROOM INLET AMBIENT CONC.

	TSP (ug/m³)	PM-10 (ug/m³)
10/27	81.4	64.4
10/28	126.7	53.6

SHOULD WE SUBTRACT CONC. FROM GRINDING ROOM OUTLET CONC.? NO.

KILNS

	RUN 1	RUN 2	RUN 3	
KILN EMISSION RATES (LB/HR)				
Filterable PM	4.83	5.64	4.84	5.10E+00
CO	55.36	56.16	46.5	5.27E+01
NOx	6.85	9.04	7.03	7.64E+00
PM-10	3.42	3.62	3.75	3.60E+00
Condensible PM	5.14	5.05	4.22	4.80E+00
CO	43.74	62.26	60.71	5.56E+01
NOx	5.55	7.95	7.34	6.95E+00
Hydrogen fluoride	9.275	11.036	3.593	7.97E+00
TOC as carbon	0.720	0.800	0.810	7.77E-01
CO	51	57.91	61.65	5.69E+01
NOx	7.61	5.3	6.56	6.49E+00
Antimony	ND	ND	0.000197	ND
Arsenic	9.52E-04	9.09E-04	7.53E-04	8.71E-04
Beryllium	9.06E-06	9.28E-06	1.84E-05	1.22E-05
Cadmium	1.06E-04	2.91E-04	4.79E-04	2.92E-04
Chromium	5.68E-04	9.23E-04	1.19E-03	8.94E-04
Lead	5.66E-03	2.92E-03	8.04E-03	5.54E-03
Manganese	1.88E-02	1.72E-02	6.08E-01	2.15E-01
Mercury	1.65E-04	9.02E-05	2.45E-04	1.67E-04
Nickel	3.55E-04	6.10E-04	7.81E-04	5.82E-04
Phosphorus	1.92E-02	3.09E-02	2.16E-02	2.39E-02
Selenium	1.97E-03	3.70E-04	5.12E-04	9.51E-04
Total Fluorides	0.048	0.295	3.248	1.20E+00
Acetone	3.94E-03	2.79E-03	1.29E-02	6.54E-03
Acrylonitrile	4.43E-04	ND	ND	ND
Benzene	9.60E-03	9.50E-03	6.70E-03	8.60E-03
Bromomethane	5.62E-04	7.44E-04	1.19E-03	8.32E-04
2-butanone	ND	ND	ND	ND
Carbon disulfide	2.66E-04	3.32E-04	2.15E-04	2.71E-04
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	1.50E-02	1.68E-02	2.30E-03	1.14E-02
Ethylbenzene	2.20E-04	1.07E-04	1.00E-04	1.42E-04
2-hexanone	ND	ND	ND	ND
Iodomethane	2.66E-03	3.64E-03	3.88E-03	3.39E-03
Methylene chloride	1.72E-04	6.90E-05	1.33E-04	1.25E-04
M-/p-xylene	4.23E-04	1.85E-04	8.35E-04	4.81E-04
O-xylene	ND	ND	9.00E-05	ND
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	2.05E-03	1.08E-03	2.14E-03	1.76E-03
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.17E-04	7.75E-05	9.50E-05	9.65E-05
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	6.49E-04	4.68E-04	3.13E-04	4.77E-04
Dibenzofuran	5.81E-04	1.73E-04	(3.4E-08/2)	2.51E-04
Dimethylphthalate	ND	ND	5.10E-04	ND
Di-n-butylphthalate	ND	3.04E-04	ND	ND
2-methylphenol	ND	ND	ND	ND
Naphthalene	1.71E-02	ND	ND	ND
Phenol	(3.38E-08/2)	3.18E-03	4.36E-04	1.21E-03
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND
PROCESS RATES (TONS OF BRICK PRODUCED PER HOUR)				
OCT. 29-30	17.6	17.6	17.6	
NOV. 2	17.2	17.2	17.2	
NOV. 3	17.3	17.3	17.3	
NOV. 4	17.2	17.2	17.2	
NOV. 5	16.8	16.8	16.8	
NOV. 6-7	16.7	16.7	16.7	

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

KILN EMISSION FACTORS (kg/Mg)				AVERAGE
Filterable PM	0.140	0.168	0.144	0.151
CO (Average of 9 runs)	1.47	1.73	1.66	1.62
NOx (Average of 9 Runs)	0.196	0.218	0.205	0.206
Filterable PM-10	0.099	0.105	0.109	0.104
Condensible PM	0.148	0.147	0.123	0.139
Hydrogen fluoride	0.270	0.321	0.104	0.231
TOC as carbon	0.0216	0.0240	0.0243	0.0233
Antimony	ND	ND	5.86E-06	ND
Arsenic	2.77E-05	2.71E-05	2.24E-05	2.57E-05
Beryllium	2.63E-07	2.76E-07	5.48E-07	3.62E-07
Cadmium	3.08E-06	8.66E-06	1.43E-05	8.67E-06
Chromium	1.65E-05	2.75E-05	3.54E-05	2.65E-05
Lead	1.65E-04	8.69E-05	2.39E-04	1.64E-04
Manganese	5.47E-04	5.12E-04	1.81E-02	0.0064
Mercury	4.80E-06	2.68E-06	7.29E-06	4.92E-06
Nickel	1.03E-05	1.82E-05	2.32E-05	1.72E-05
Phosphorus	5.58E-04	9.20E-04	6.43E-04	0.00071
Selenium	5.73E-05	1.10E-05	1.52E-05	2.78E-05
Total Fluorides	1.39E-03	8.58E-03	9.44E-02	0.0348
Acetone	1.18E-04	8.35E-05	3.86E-04	1.96E-04
Acrylonitrile	1.33E-05	ND	ND	ND
Benzene	2.87E-04	2.84E-04	2.01E-04	2.57E-04
Bromomethane	1.68E-05	2.23E-05	3.56E-05	2.49E-05
2-butanone	ND	ND	ND	ND
Carbon disulfide	7.96E-06	9.94E-06	6.44E-06	8.11E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	4.49E-04	5.03E-04	6.89E-05	3.40E-04
Ethylbenzene	6.59E-06	3.20E-06	2.99E-06	4.26E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	7.96E-05	1.09E-04	1.16E-04	1.02E-04
Methylene chloride	5.15E-06	2.07E-06	3.98E-06	3.73E-06
M-/p-xylene	1.27E-05	5.54E-06	2.50E-05	1.44E-05
O-xylene	ND	ND	2.69E-06	ND
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	6.14E-05	3.23E-05	6.41E-05	5.26E-05
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	3.50E-06	2.32E-06	2.84E-06	2.89E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	1.94E-05	1.40E-05	9.37E-06	1.43E-05
Dibenzofuran	1.74E-05	5.18E-06	5.09E-10	7.53E-06
Dimethylphthalate	ND	ND	1.53E-05	ND
Di-n-butylphthalate	ND	9.10E-06	ND	ND
2-methylphenol	ND	ND	ND	ND
Naphthalene	5.12E-04	ND	ND	ND
Phenol	5.06E-10	9.52E-05	1.31E-05	3.61E-05
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

SAWDUST DRYER OUTLETS

SAWDUST DRYER OUTLET A EMISSION RATES (LB/HR)				
Filterable PM	2.21	2.19	3.07	
CO	25.98	26.38	26.35	
NOx	3.00	3.22	2.46	
PM-10	1.98	1.99	2.64	
Condensible PM	0.261	0.0556	1.48	
CO	19.09	28.91	26.67	
NOx	1.85	2.96	2.90	
Hydrogen fluoride	1.2	3.094	0.329	
TOC as carbon	0.29	1.97	2.26	
CO	25.09	27.07	27.34	
NOx	3.01	3.03	2.98	
Antimony	(2.72E-05/2)	(2.76E-05/2)	(2.65E-05/2)	ND
Arsenic	1.97E-04	2.31E-04	2.60E-04	2.29E-04
Beryllium	2.31E-06	(1.44E-06/2)	8.84E-06	3.96E-06
Cadmium	8.12E-05	1.52E-04	5.79E-05	9.70E-05
Chromium	2.72E-04	6.78E-04	1.52E-04	3.67E-04
Lead	2.41E-03	9.18E-04	1.11E-04	1.15E-03
Manganese	2.63E-03	3.78E-03	6.43E-03	4.28E-03
Mercury	1.34E-04	8.62E-05	6.10E-05	9.37E-05
Nickel	3.17E-04	4.51E-04	1.19E-04	2.96E-04
Phosphorus	(0.00704/2)	4.71E-03	(0.00693/2)	ND
Selenium	4.60E-04	4.51E-04	4.29E-04	4.47E-04
Total Fluorides	VOID	0.173	0.524	0.349
Acetone	5.96E-03	6.15E-03	1.09E-02	7.67E-03
Acrylonitrile	(7.39E-05/2)	1.48E-04	2.18E-04	1.34E-04
Benzene	3.87E-03	4.24E-03	4.12E-03	4.08E-03
Bromomethane	3.27E-04	3.38E-04	4.70E-04	3.78E-04
2-butanone	1.03E-03	(0.000653/2)	4.79E-03	2.05E-03
Carbon disulfide	1.07E-04	1.35E-04	1.50E-04	1.31E-04
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	8.41E-03	1.12E-02	1.16E-02	1.04E-02
Ethylbenzene	8.16E-05	6.73E-05	1.10E-04	8.63E-05
2-hexanone	ND	ND	ND	ND
Iodomethane	1.55E-03	1.83E-03	2.07E-03	1.82E-03
Methylene chloride	2.59E-04	1.76E-03	4.41E-04	8.20E-04
M-/p-xylene	4.64E-04	1.68E-04	2.56E-04	2.96E-04
O-xylene	7.60E-05	4.77E-05	7.56E-05	6.64E-05
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	3.91E-03	4.00E-03	3.82E-03	3.91E-03
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	(0.000151/2)	(9.15E-05/2)	1.56E-04	ND
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	3.44E-04	(1.91E-08/2)	3.21E-04	
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	3.63E-04	(1.91E-08/2)	1.28E-04	
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	(1.94E-08/2)	1.33E-03	1.59E-03	
Ethane	ND	ND	ND	ND
Methane	ND	4.04E+02	ND	ND

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

SAWDUST DRYER OUTLET A--	EMISSION FACTORS (kg/Mg)			AVERAGE
Filterable PM	0.064	0.065	0.091	0.074
CO (Average of 9 runs)	0.69	0.81	0.79	0.76
NOx (Average of 9 Runs)	0.077	0.090	0.082	0.083
Filterable PM-10	0.057	0.058	0.077	0.064
Condensible PM	0.008	0.002	0.043	0.017
Hydrogen fluoride	0.035	0.090	0.010	0.045
TOC as carbon	0.0087	0.0590	0.0677	0.045
Antimony	ND	ND	ND	ND
Arsenic	5.73E-06	6.88E-06	7.74E-06	6.78E-06
Beryllium	6.72E-08	2.14E-08	2.63E-07	1.17E-07
Cadmium	2.36E-06	4.52E-06	1.72E-06	2.87E-06
Chromium	7.91E-06	2.02E-05	4.52E-06	1.09E-05
Lead	7.01E-05	2.73E-05	3.30E-06	3.36E-05
Manganese	7.65E-05	1.13E-04	1.91E-04	0.0001
Mercury	3.90E-06	2.57E-06	1.82E-06	2.76E-06
Nickel	9.22E-06	1.34E-05	3.54E-06	8.73E-06
Phosphorus	1.02E-04	1.40E-04	1.03E-04	0.00012
Selenium	1.34E-05	1.34E-05	1.28E-05	1.32E-05
Total Fluorides	VOID	5.03E-03	1.52E-02	0.0068
Acetone	1.78E-04	1.84E-04	3.26E-04	2.30E-04
Acrylonitrile	1.11E-06	4.43E-06	6.53E-06	4.02E-06
Benzene	1.16E-04	1.27E-04	1.23E-04	1.22E-04
Bromomethane	9.79E-06	1.01E-05	1.41E-05	1.13E-05
2-butanone	3.08E-05	9.78E-06	1.43E-04	6.13E-05
Carbon disulfide	3.20E-06	4.04E-06	4.49E-06	3.91E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	2.52E-04	3.35E-04	3.47E-04	3.11E-04
Ethylbenzene	2.44E-06	2.01E-06	3.29E-06	2.58E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	4.64E-05	5.48E-05	6.20E-05	5.44E-05
Methylene chloride	7.75E-06	5.27E-05	1.32E-05	2.46E-05
M-/p-xylene	1.39E-05	5.03E-06	7.66E-06	8.86E-06
O-xylene	2.28E-06	1.43E-06	2.26E-06	1.99E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	1.17E-04	1.20E-04	1.14E-04	1.17E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	2.26E-06	1.37E-06	4.67E-06	2.77E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	1.03E-05	2.86E-10	9.61E-06	6.64E-06
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	1.09E-05	2.86E-10	3.83E-06	4.90E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	2.90E-10	3.98E-05	4.76E-05	2.91E-05
Ethane	ND	ND	ND	ND
Methane	ND	1.21E+01	ND	ND

SAWDUST DRYER OUTLET B EMISSION RATES (LB/HR)				
Filterable PM	19.39	20.15	20.78	
CO	24.89	24.63	22.84	
NOx	2.35	2.73	2.81	
PM-10	2.53	1.72	2.26	
Condensible PM	0.509	0.191	0.408	
CO	26.7	29.59	29.33	
NOx	2.46	2.63	3.01	
Hydrogen fluoride	0.014	2.384	2.197	
TOC as carbon	0.98	0.79	1.24	
CO	23.13	25.25	23.35	
NOx	3.01	2.65	2.33	
Antimony	(7.1E-05/2)	(7.16E-05/2)	3.15E-05	ND
Arsenic	9.19E-05	1.85E-04	9.80E-05	1.25E-04
Beryllium	2.33E-06	(1.47E-06/2)	(1.46E-06/2)	ND
Cadmium	2.71E-04	2.80E-04	2.63E-04	2.71E-04
Chromium	2.40E-04	6.81E-04	3.91E-04	4.37E-04
Lead	2.12E-03	7.04E-04	3.96E-05	9.55E-04
Manganese	3.57E-03	4.30E-03	3.37E-03	3.75E-03
Mercury	1.62E-04	3.96E-05	5.98E-05	8.71E-05
Nickel	2.03E-04	3.66E-04	2.67E-04	2.79E-04
Phosphorus	9.05E-03	(0.00717/2)	(0.00714/2)	ND
Selenium	1.73E-04	4.67E-04	3.76E-04	3.39E-04
Total Fluorides	NA	NA	NA	NA
Acetone	9.61E-03	9.47E-03	9.83E-03	9.64E-03
Acrylonitrile	2.21E-04	(0.000203/2)	2.13E-04	1.79E-04
Benzene	6.12E-03	4.99E-03	4.59E-03	5.23E-03
Bromomethane	4.35E-04	(0.000373/2)	4.69E-04	3.64E-04
2-butanone	1.44E-03	(0.00159/2)	2.60E-03	1.61E-03
Carbon disulfide	1.80E-04	1.63E-04	1.81E-04	1.75E-04
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	1.29E-02	1.02E-02	1.35E-02	1.22E-02
Ethylbenzene	1.19E-04	6.89E-05	6.00E-05	8.26E-05
2-hexanone	ND	ND	ND	ND
Iodomethane	2.19E-03	2.17E-03	2.41E-03	2.26E-03
Methylene chloride	2.07E-04	3.45E-04	6.79E-05	2.07E-04
M-/p-xylene	2.26E-04	1.47E-04	1.66E-04	1.80E-04
O-xylene	7.16E-05	4.65E-05	4.56E-05	5.46E-05
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	3.52E-03	2.93E-03	3.44E-03	3.30E-03
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.05E-04	(5.84E-05/2)	8.71E-05	7.38E-05
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	8.94E-04	4.49E-03	9.08E-04	
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	3.82E-05	8.63E-05	1.75E-04	
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	5.86E-04	9.24E-04	7.67E-04	
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

SAWDUST DRYER OUTLET B--	EMISSION FACTORS (kg/Mg)			AVERAGE
Filterable PM	0.564	0.600	0.618	0.594
CO (Average of 9 runs)	0.73	0.78	0.74	0.75
NOx (Average of 9 Runs)	0.077	0.079	0.080	0.078
Filterable PM-10	0.073	0.050	0.066	0.063
Condensible PM	0.015	0.006	0.012	0.011
Hydrogen fluoride	0.000	0.069	0.063	0.044
TOC as carbon	0.0293	0.0237	0.0371	0.030
Antimony	ND	ND	9.38E-07	ND
Arsenic	2.67E-06	5.51E-06	2.92E-06	3.70E-06
Beryllium	6.77E-08	2.19E-08	2.17E-08	3.71E-08
Cadmium	7.88E-06	8.33E-06	7.83E-06	8.01E-06
Chromium	6.98E-06	2.03E-05	1.16E-05	1.30E-05
Lead	6.16E-05	2.10E-05	1.18E-06	2.79E-05
Manganese	1.04E-04	1.28E-04	1.00E-04	0.0001
Mercury	4.71E-06	1.18E-06	1.78E-06	2.56E-06
Nickel	5.90E-06	1.09E-05	7.95E-06	8.25E-06
Phosphorus	2.63E-04	1.07E-04	1.06E-04	0.00016
Selenium	5.03E-06	1.39E-05	1.12E-05	1.00E-05
Total Fluorides	NA	NA	NA	NA
Acetone	2.88E-04	2.84E-04	2.94E-04	2.89E-04
Acrylonitrile	6.62E-06	3.04E-06	6.38E-06	5.34E-06
Benzene	1.83E-04	1.49E-04	1.37E-04	1.57E-04
Bromomethane	1.30E-05	5.58E-06	1.40E-05	1.09E-05
2-butanone	4.31E-05	2.38E-05	7.78E-05	4.83E-05
Carbon disulfide	5.39E-06	4.88E-06	5.42E-06	5.23E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	3.86E-04	3.05E-04	4.04E-04	3.65E-04
Ethylbenzene	3.56E-06	2.06E-06	1.80E-06	2.47E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	6.56E-05	6.50E-05	7.22E-05	6.76E-05
Methylene chloride	6.20E-06	1.03E-05	2.03E-06	6.19E-06
M-/p-xylene	6.77E-06	4.40E-06	4.97E-06	5.38E-06
O-xylene	2.14E-06	1.39E-06	1.37E-06	1.63E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	1.05E-04	8.77E-05	1.03E-04	9.87E-05
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	3.14E-06	8.74E-07	2.61E-06	2.21E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	2.68E-05	1.34E-04	2.72E-05	6.28E-05
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	1.14E-06	2.58E-06	5.24E-06	2.99E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	1.75E-05	2.77E-05	2.30E-05	2.27E-05
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

TOTAL SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B - KILN)				
Filterable PM	0.488	0.497	0.57	0.52
CO (Average of 9 runs)	-0.050	-0.145	-0.130	-0.108
NOx (Average of 9 Runs)	-0.0425	-0.0490	-0.0435	-0.0450
Filterable PM-10	0.0314	0.0027	0.0335	0.0226
Condensible PM	-0.126	-0.140	-0.068	-0.111
Hydrogen fluoride	-0.234	-0.162	-0.031	-0.142
TOC as carbon	0.0165	0.059	0.081	0.052
Antimony	ND	ND	-4.93E-06	ND
Arsenic	-1.93E-05	-1.47E-05	-1.18E-05	-1.52E-05
Beryllium	-1.28E-07	-2.33E-07	-2.63E-07	-2.08E-07
Cadmium	7.16E-06	4.20E-06	-4.71E-06	2.22E-06
Chromium	-1.63E-06	1.30E-05	-1.93E-05	-2.64E-06
Lead	-3.28E-05	-3.86E-05	-2.35E-04	-1.02E-04
Manganese	-3.66E-04	-2.71E-04	-1.78E-02	-6.15E-03
Mercury	3.81E-06	1.06E-06	-3.70E-06	3.90E-07
Nickel	4.80E-06	6.16E-06	-1.18E-05	-2.66E-07
Phosphorus	-1.93E-04	-6.73E-04	-4.33E-04	-4.33E-04
Selenium	-3.89E-05	1.63E-05	8.72E-06	-4.61E-06
Total Fluorides	-1.39E-03	-3.55E-03	-7.92E-02	-2.80E-02
Acetone	3.48E-04	3.84E-04	2.34E-04	3.22E-04
Acrylonitrile	-5.54E-06	7.47E-06	1.29E-05	4.94E-06
Benzene	1.17E-05	-8.08E-06	6.02E-05	2.13E-05
Bromomethane	5.99E-06	-6.57E-06	-7.51E-06	-2.70E-06
2-butanone	7.40E-05	3.36E-05	2.21E-04	1.10E-04
Carbon disulfide	6.29E-07	-1.02E-06	3.47E-06	1.03E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	1.89E-04	1.38E-04	6.83E-04	3.36E-04
Ethylbenzene	-5.81E-07	8.74E-07	2.10E-06	7.96E-07
2-hexanone	ND	ND	ND	ND
Iodomethane	3.23E-05	1.08E-05	1.80E-05	2.04E-05
Methylene chloride	8.80E-06	6.10E-05	1.13E-05	2.70E-05
M-/p-xylene	7.99E-06	3.89E-06	-1.24E-05	-1.60E-07
O-xylene	4.42E-06	2.82E-06	9.34E-07	2.72E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	1.61E-04	1.75E-04	1.53E-04	1.63E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.90E-06	-7.63E-08	4.43E-06	2.09E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	1.76E-05	1.20E-04	2.74E-05	5.52E-05
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	1.20E-05	-6.52E-06	9.07E-06	4.86E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	1.75E-05	-2.77E-05	5.75E-05	1.58E-05
Ethane	ND	ND	ND	ND
Methane	ND	1.21E+01	ND	ND

TOTAL SAWDUST DRYER AND KILN EMISSION FACTORS (kg/Mg)				AVERAGE
Filterable PM	0.628	0.665	0.710	0.668
CO (Average of 9 runs)	1.42	1.58	1.53	1.51
NOx (Average of 9 Runs)	0.154	0.169	0.161	0.161
Filterable PM-10	0.130	0.108	0.143	0.127
Condensible PM	0.0222	0.00716	0.0548	0.0281
Hydrogen fluoride	0.0353	0.159	0.0730	0.0892
TOC as carbon	0.0380	0.0826	0.105	0.0751
Antimony	ND	ND	0.000	ND
Arsenic	8.40E-06	1.24E-05	1.07E-05	1.05E-05
Beryllium	1.35E-07	4.33E-08	2.85E-07	1.54E-07
Cadmium	1.02E-05	1.29E-05	9.55E-06	1.09E-05
Chromium	1.49E-05	4.04E-05	1.62E-05	2.38E-05
Lead	1.32E-04	4.83E-05	4.48E-06	6.15E-05
Manganese	1.80E-04	2.40E-04	2.92E-04	2.37E-4 ~~0.0002~~
Mercury	8.60E-06	3.74E-06	3.60E-06	5.31E-06
Nickel	1.51E-05	2.43E-05	1.15E-05	1.70E-05
Phosphorus	3.65E-04	2.47E-04	2.09E-04	2.74E-04 ~~0.000274~~
Selenium	1.84E-05	2.73E-05	2.40E-05	2.32E-05
Total Fluorides	VOID	0.00503	0.0152	0.0101
Acetone	4.66E-04	4.68E-04	6.21E-04	5.18E-04
Acrylonitrile	7.72E-06	7.47E-06	1.29E-05	9.37E-06
Benzene	2.99E-04	2.76E-04	2.61E-04	2.79E-04
Bromomethane	2.28E-05	1.57E-05	2.81E-05	2.22E-05
2-butanone	7.40E-05	3.36E-05	2.21E-04	1.10E-04
Carbon disulfide	8.59E-06	8.92E-06	9.91E-06	9.14E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	6.38E-04	6.41E-04	7.51E-04	6.77E-04
Ethylbenzene	6.01E-06	4.08E-06	5.09E-06	5.06E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	1.12E-04	1.20E-04	1.34E-04	1.22E-04
Methylene chloride	1.40E-05	6.30E-05	1.52E-05	3.07E-05
M-/p-xylene	2.07E-05	9.43E-06	1.26E-05	1.42E-05
O-xylene	4.42E-06	2.82E-06	3.63E-06	3.62E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	2.22E-04	2.07E-04	2.17E-04	2.16E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	5.40E-06	2.24E-06	7.28E-06	4.98E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	3.71E-05	1.34E-04	3.68E-05	6.94E-05
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	1.20E-05	2.58E-06	9.07E-06	7.89E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	1.75E-05	6.75E-05	7.06E-05	5.19E-05
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

PINE HALL EMISSION FACTORS--ENGLISH UNITS

GRINDING ROOM

	RUN 1	RUN 2	RUN 3	
EMISSION RATES (LB/HR)				
Filterable PM	6.056	3.596	5.669	
Filterable PM-10	0.625	0.418	0.391	
PROCESS RATES (TONS/HR)				
	196	223	211	
EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.0309	0.0161	0.0269	0.0246
Filterable PM-10	0.00319	0.00187	0.00185	0.00231

KILNS

	RUN 1	RUN 2	RUN 3	
KILN EMISSION RATES (LB/HR)				
Filterable PM	4.83	5.64	4.84	5.10E+00
CO	55.36	56.16	46.5	5.27E+01
NOx	6.85	9.04	7.03	7.64E+00
PM-10	3.42	3.62	3.75	3.60E+00
Condensible PM	5.14	5.05	4.22	4.80E+00
CO	43.74	62.26	60.71	5.56E+01
NOx	5.55	7.95	7.34	6.95E+00
Hydrogen fluoride	9.275	11.036	3.593	7.97E+00
TOC as carbon	0.720	0.800	0.810	7.77E-01
CO	51	57.91	61.65	5.69E+01
NOx	7.61	5.3	6.56	6.49E+00
Antimony	ND	ND	0.000197	ND
Arsenic	9.52E-04	9.09E-04	7.53E-04	8.71E-04
Beryllium	9.06E-06	9.28E-06	1.84E-05	1.22E-05
Cadmium	1.06E-04	2.91E-04	4.79E-04	2.92E-04
Chromium	5.68E-04	9.23E-04	1.19E-03	8.94E-04
Lead	5.66E-03	2.92E-03	8.04E-03	5.54E-03
Manganese	1.88E-02	1.72E-02	6.08E-01	2.15E-01
Mercury	1.65E-04	9.02E-05	2.45E-04	1.67E-04
Nickel	3.55E-04	6.10E-04	7.81E-04	5.82E-04
Phosphorus	1.92E-02	3.09E-02	2.16E-02	2.39E-02
Selenium	1.97E-03	3.70E-04	5.12E-04	9.51E-04
Total Fluorides	0.048	0.295	3.248	1.20E+00
Acetone	3.94E-03	2.79E-03	1.29E-02	6.54E-03
Acrylonitrile	4.43E-04	ND	ND	ND
Benzene	9.60E-03	9.50E-03	6.70E-03	8.60E-03
Bromomethane	5.62E-04	7.44E-04	1.19E-03	8.32E-04
2-butanone	ND	ND	ND	ND
Carbon disulfide	2.66E-04	3.32E-04	2.15E-04	2.71E-04
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	1.50E-02	1.68E-02	2.30E-03	1.14E-02
Ethylbenzene	2.20E-04	1.07E-04	1.00E-04	1.42E-04
2-hexanone	ND	ND	ND	ND
Iodomethane	2.66E-03	3.64E-03	3.88E-03	3.39E-03
Methylene chloride	1.72E-04	6.90E-05	1.33E-04	1.25E-04
M-/p-xylene	4.23E-04	1.85E-04	8.35E-04	4.81E-04
O-xylene	ND	ND	9.00E-05	ND
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	2.05E-03	1.08E-03	2.14E-03	1.76E-03
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.17E-04	7.75E-05	9.50E-05	9.65E-05
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	6.49E-04	4.68E-04	3.13E-04	4.77E-04
Dibenzofuran	5.81E-04	1.73E-04	(3.4E-08/2)	2.51E-04
Dimethylphthalate	ND	ND	5.10E-04	ND
Di-n-butylphthalate	ND	3.04E-04	ND	ND
2-methylphenol	ND	ND	ND	ND
Naphthalene	1.71E-02	ND	ND	ND
Phenol	(3.38E-08/2)	3.18E-03	4.36E-04	1.21E-03
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND
PROCESS RATES (TONS OF BRICK PRODUCED PER HOUR)				
OCT. 29-30	17.6	17.6	17.6	
NOV. 2	17.2	17.2	17.2	
NOV. 3	17.3	17.3	17.3	
NOV. 4	17.2	17.2	17.2	
NOV. 5	16.8	16.8	16.8	
NOV. 6-7	16.7	16.7	16.7	

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

KILN EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.281	0.336	0.288	0.302
CO (Average of 9 runs)	2.93	3.45	3.31	3.23
NOx (Average of 9 Runs)	0.392	0.435	0.409	0.412
Filterable PM-10	0.198	0.210	0.218	0.209
Condensible PM	0.297	0.294	0.245	0.279
Hydrogen fluoride	0.539	0.642	0.208	0.463
TOC as carbon	0.0431	0.0479	0.0485	0.0465
Antimony	ND	ND	1.17E-05	ND
Arsenic	5.53E-05	5.41E-05	4.48E-05	5.14E-05
Beryllium	5.27E-07	5.52E-07	1.10E-06	7.25E-07
Cadmium	6.16E-06	1.73E-05	2.85E-05	1.73E-05
Chromium	3.30E-05	5.49E-05	7.08E-05	5.29E-05
Lead	3.29E-04	1.74E-04	4.79E-04	3.27E-04
Manganese	1.09E-03	1.02E-03	3.62E-02	0.0128
Mercury	9.59E-06	5.37E-06	1.46E-05	9.85E-06
Nickel	2.06E-05	3.63E-05	4.65E-05	3.45E-05
Phosphorus	1.12E-03	1.84E-03	1.29E-03	0.00141
Selenium	1.15E-04	2.20E-05	3.05E-05	5.57E-05
Total Fluorides	2.77E-03	1.72E-02	1.89E-01	0.0696
Acetone	2.36E-04	1.67E-04	7.72E-04	3.92E-04
Acrylonitrile	2.65E-05	ND	ND	ND
Benzene	5.75E-04	5.69E-04	4.01E-04	5.15E-04
Bromomethane	3.37E-05	4.46E-05	7.13E-05	4.98E-05
2-butanone	ND	ND	ND	ND
Carbon disulfide	1.59E-05	1.99E-05	1.29E-05	1.62E-05
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	8.98E-04	1.01E-03	1.38E-04	6.81E-04
Ethylbenzene	1.32E-05	6.41E-06	5.99E-06	8.52E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	1.59E-04	2.18E-04	2.32E-04	2.03E-04
Methylene chloride	1.03E-05	4.13E-06	7.96E-06	7.47E-06
M-/p-xylene	2.53E-05	1.11E-05	5.00E-05	2.88E-05
O-xylene	ND	ND	5.39E-06	ND
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	1.23E-04	6.47E-05	1.28E-04	1.05E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	7.01E-06	4.64E-06	5.69E-06	5.78E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	3.89E-05	2.80E-05	1.87E-05	2.85E-05
Dibenzofuran	3.48E-05	1.04E-05	1.02E-09	1.51E-05
Dimethylphthalate	ND	ND	3.05E-05	ND
Di-n-butylphthalate	ND	1.82E-05	ND	ND
2-methylphenol	ND	ND	ND	ND
Naphthalene	1.02E-03	ND	ND	ND
Phenol	1.01E-09	1.90E-04	2.61E-05	7.22E-05
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

SAWDUST DRYER OUTLETS

SAWDUST DRYER OUTLET A EMISSION RATES (LB/HR)				
Filterable PM	2.21	2.19	3.07	
CO	25.98	26.38	26.35	
NOx	3.00	3.22	2.46	
PM-10	1.98	1.99	2.64	
Condensible PM	0.261	0.0556	1.48	
CO	19.09	28.91	26.67	
NOx	1.85	2.96	2.90	
Hydrogen fluoride	1.2	3.094	0.329	
TOC as carbon	0.29	1.97	2.26	
CO	25.09	27.07	27.34	
NOx	3.01	3.03	2.98	
Antimony	(2.72E-05/2)	(2.76E-05/2)	(2.65E-05/2)	ND
Arsenic	1.97E-04	2.31E-04	2.60E-04	2.29E-04
Beryllium	2.31E-06	(1.44E-06/2)	8.84E-06	3.96E-06
Cadmium	8.12E-05	1.52E-04	5.79E-05	9.70E-05
Chromium	2.72E-04	6.78E-04	1.52E-04	3.67E-04
Lead	2.41E-03	9.18E-04	1.11E-04	1.15E-03
Manganese	2.63E-03	3.78E-03	6.43E-03	4.28E-03
Mercury	1.34E-04	8.62E-05	6.10E-05	9.37E-05
Nickel	3.17E-04	4.51E-04	1.19E-04	2.96E-04
Phosphorus	(0.00704/2)	4.71E-03	(0.00693/2)	ND
Selenium	4.60E-04	4.51E-04	4.29E-04	4.47E-04
Total Fluorides	VOID	0.173	0.524	0.349
Acetone	5.96E-03	6.15E-03	1.09E-02	7.67E-03
Acrylonitrile	(7.39E-05/2)	1.48E-04	2.18E-04	1.34E-04
Benzene	3.87E-03	4.24E-03	4.12E-03	4.08E-03
Bromomethane	3.27E-04	3.38E-04	4.70E-04	3.78E-04
2-butanone	1.03E-03	(0.000653/2)	4.79E-03	2.05E-03
Carbon disulfide	1.07E-04	1.35E-04	1.50E-04	1.31E-04
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	8.41E-03	1.12E-02	1.16E-02	1.04E-02
Ethylbenzene	8.16E-05	6.73E-05	1.10E-04	8.63E-05
2-hexanone	ND	ND	ND	ND
Iodomethane	1.55E-03	1.83E-03	2.07E-03	1.82E-03
Methylene chloride	2.59E-04	1.76E-03	4.41E-04	8.20E-04
M-/p-xylene	4.64E-04	1.68E-04	2.56E-04	2.96E-04
O-xylene	7.60E-05	4.77E-05	7.56E-05	6.64E-05
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	3.91E-03	4.00E-03	3.82E-03	3.91E-03
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	(0.000151/2)	(9.15E-05/2)	1.56E-04	ND
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	3.44E-04	(1.91E-08/2)	3.21E-04	
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	3.63E-04	(1.91E-08/2)	1.28E-04	
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	(1.94E-08/2)	1.33E-03	1.59E-03	
Ethane	ND	ND	ND	ND
Methane	ND	4.04E+02	ND	ND

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

SAWDUST DRYER OUTLET A–	EMISSION FACTORS (LB/TON)			AVERAGE
Filterable PM	0.128	0.130	0.183	0.147
CO (Average of 9 runs)	1.37	1.61	1.57	1.52
NOx (Average of 9 Runs)	0.154	0.180	0.163	0.166
Filterable PM-10	0.114	0.116	0.154	0.128
Condensible PM	0.015	0.003	0.086	0.035
Hydrogen fluoride	0.070	0.180	0.019	0.090
TOC as carbon	0.0174	0.1180	0.1353	0.090
Antimony	ND	ND	ND	ND
Arsenic	1.15E-05	1.38E-05	1.55E-05	1.36E-05
Beryllium	1.34E-07	4.29E-08	5.26E-07	2.34E-07
Cadmium	4.72E-06	9.05E-06	3.45E-06	5.74E-06
Chromium	1.58E-05	4.04E-05	9.05E-06	2.17E-05
Lead	1.40E-04	5.46E-05	6.61E-06	6.71E-05
Manganese	1.53E-04	2.25E-04	3.83E-04	0.0003
Mercury	7.79E-06	5.13E-06	3.63E-06	5.52E-06
Nickel	1.84E-05	2.68E-05	7.08E-06	1.75E-05
Phosphorus	2.05E-04	2.80E-04	2.06E-04	0.00023
Selenium	2.67E-05	2.68E-05	2.55E-05	2.64E-05
Total Fluorides	VOID	1.01E-02	3.05E-02	0.0135
Acetone	3.57E-04	3.68E-04	6.53E-04	4.59E-04
Acrylonitrile	2.21E-06	8.86E-06	1.31E-05	8.04E-06
Benzene	2.32E-04	2.54E-04	2.47E-04	2.44E-04
Bromomethane	1.96E-05	2.02E-05	2.81E-05	2.27E-05
2-butanone	6.17E-05	1.96E-05	2.87E-04	1.23E-04
Carbon disulfide	6.41E-06	8.08E-06	8.98E-06	7.82E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	5.04E-04	6.71E-04	6.95E-04	6.23E-04
Ethylbenzene	4.89E-06	4.03E-06	6.59E-06	5.17E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	9.28E-05	1.10E-04	1.24E-04	1.09E-04
Methylene chloride	1.55E-05	1.05E-04	2.64E-05	4.91E-05
M-/p-xylene	2.78E-05	1.01E-05	1.53E-05	1.77E-05
O-xylene	4.55E-06	2.86E-06	4.53E-06	3.98E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	2.34E-04	2.40E-04	2.29E-04	2.34E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	4.52E-06	2.74E-06	9.34E-06	5.53E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	2.06E-05	5.72E-10	1.92E-05	1.33E-05
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	2.17E-05	5.72E-10	7.66E-06	9.80E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	5.81E-10	7.96E-05	9.52E-05	5.83E-05
Ethane	ND	ND	ND	ND
Methane	ND	2.42E+01	ND	ND

SAWDUST DRYER OUTLET B EMISSION RATES (LB/HR)				
Filterable PM	19.39	20.15	20.78	
CO	24.89	24.63	22.84	
NOx	2.35	2.73	2.81	
PM-10	2.53	1.72	2.26	
Condensible PM	0.509	0.191	0.408	
CO	26.7	29.59	29.33	
NOx	2.46	2.63	3.01	
Hydrogen fluoride	0.014	2.384	2.197	
TOC as carbon	0.98	0.79	1.24	
CO	23.13	25.25	23.35	
NOx	3.01	2.65	2.33	
Antimony	(7.1E-05/2)	(7.16E-05/2)	3.15E-05	ND
Arsenic	9.19E-05	1.85E-04	9.80E-05	1.25E-04
Beryllium	2.33E-06	(1.47E-06/2)	(1.46E-06/2)	ND
Cadmium	2.71E-04	2.80E-04	2.63E-04	2.71E-04
Chromium	2.40E-04	6.81E-04	3.91E-04	4.37E-04
Lead	2.12E-03	7.04E-04	3.96E-05	9.55E-04
Manganese	3.57E-03	4.30E-03	3.37E-03	3.75E-03
Mercury	1.62E-04	3.96E-05	5.98E-05	8.71E-05
Nickel	2.03E-04	3.66E-04	2.67E-04	2.79E-04
Phosphorus	9.05E-03	(0.00717/2)	(0.00714/2)	ND
Selenium	1.73E-04	4.67E-04	3.76E-04	3.39E-04
Total Fluorides	NA	NA	NA	NA
Acetone	9.61E-03	9.47E-03	9.83E-03	9.64E-03
Acrylonitrile	2.21E-04	(0.000203/2)	2.13E-04	1.79E-04
Benzene	6.12E-03	4.99E-03	4.59E-03	5.23E-03
Bromomethane	4.35E-04	(0.000373/2)	4.69E-04	3.64E-04
2-butanone	1.44E-03	(0.00159/2)	2.60E-03	1.61E-03
Carbon disulfide	1.80E-04	1.63E-04	1.81E-04	1.75E-04
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	1.29E-02	1.02E-02	1.35E-02	1.22E-02
Ethylbenzene	1.19E-04	6.89E-05	6.00E-05	8.26E-05
2-hexanone	ND	ND	ND	ND
Iodomethane	2.19E-03	2.17E-03	2.41E-03	2.26E-03
Methylene chloride	2.07E-04	3.45E-04	6.79E-05	2.07E-04
M-/p-xylene	2.26E-04	1.47E-04	1.66E-04	1.80E-04
O-xylene	7.16E-05	4.65E-05	4.56E-05	5.46E-05
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	3.52E-03	2.93E-03	3.44E-03	3.30E-03
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.05E-04	(5.84E-05/2)	8.71E-05	7.38E-05
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	8.94E-04	4.49E-03	9.08E-04	
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	3.82E-05	8.63E-05	1.75E-04	
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	5.86E-04	9.24E-04	7.67E-04	
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

SAWDUST DRYER OUTLET B–	EMISSION FACTORS (LB/TON)			AVERAGE
Filterable PM	1.127	1.199	1.237	1.188
CO (Average of 9 runs)	1.46	1.55	1.48	1.50
NOx (Average of 9 Runs)	0.153	0.157	0.159	0.156
Filterable PM-10	0.146	0.100	0.132	0.126
Condensible PM	0.029	0.011	0.024	0.021
Hydrogen fluoride	0.001	0.139	0.127	0.089
TOC as carbon	0.0587	0.0473	0.0743	0.060
Antimony	ND	ND	1.88E-06	ND
Arsenic	5.34E-06	1.10E-05	5.83E-06	7.40E-06
Beryllium	1.35E-07	4.38E-08	4.35E-08	7.42E-08
Cadmium	1.58E-05	1.67E-05	1.57E-05	1.60E-05
Chromium	1.40E-05	4.05E-05	2.33E-05	2.59E-05
Lead	1.23E-04	4.19E-05	2.36E-06	5.58E-05
Manganese	2.08E-04	2.56E-04	2.01E-04	0.0002
Mercury	9.42E-06	2.36E-06	3.56E-06	5.11E-06
Nickel	1.18E-05	2.18E-05	1.59E-05	1.65E-05
Phosphorus	5.26E-04	2.13E-04	2.13E-04	0.00032
Selenium	1.01E-05	2.78E-05	2.24E-05	2.01E-05
Total Fluorides	NA	NA	NA	NA
Acetone	5.75E-04	5.67E-04	5.89E-04	5.77E-04
Acrylonitrile	1.32E-05	6.08E-06	1.28E-05	1.07E-05
Benzene	3.66E-04	2.99E-04	2.75E-04	3.13E-04
Bromomethane	2.60E-05	1.12E-05	2.81E-05	2.18E-05
2-butanone	8.62E-05	4.76E-05	1.56E-04	9.65E-05
Carbon disulfide	1.08E-05	9.76E-06	1.08E-05	1.05E-05
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	7.72E-04	6.11E-04	8.08E-04	7.31E-04
Ethylbenzene	7.13E-06	4.13E-06	3.59E-06	4.95E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	1.31E-04	1.30E-04	1.44E-04	1.35E-04
Methylene chloride	1.24E-05	2.07E-05	4.07E-06	1.24E-05
M-/p-xylene	1.35E-05	8.80E-06	9.94E-06	1.08E-05
O-xylene	4.29E-06	2.78E-06	2.73E-06	3.27E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	2.11E-04	1.75E-04	2.06E-04	1.97E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	6.29E-06	1.75E-06	5.22E-06	4.42E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	5.35E-05	2.69E-04	5.44E-05	1.26E-04
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	2.29E-06	5.17E-06	1.05E-05	5.98E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	3.51E-05	5.53E-05	4.59E-05	4.54E-05
Ethane	ND	ND	ND	ND
Methane	ND	ND	ND	ND

TOTAL SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B - KILN)				
Filterable PM	0.975	0.994	1.13	1.03
CO (Average of 9 runs)	-0.100	-0.290	-0.260	-0.217
NOx (Average of 9 Runs)	-0.0850	-0.0980	-0.0870	-0.0900
Filterable PM-10	0.0629	0.0055	0.0670	0.0451
Condensible PM	-0.252	-0.279	-0.136	-0.222
Hydrogen fluoride	-0.469	-0.323	-0.062	-0.284
TOC as carbon	0.0329	0.117	0.161	0.104
Antimony	ND	ND	-9.85E-06	ND
Arsenic	-3.86E-05	-2.93E-05	-2.35E-05	-3.05E-05
Beryllium	-2.57E-07	-4.66E-07	-5.26E-07	-4.16E-07
Cadmium	1.43E-05	8.39E-06	-9.41E-06	4.43E-06
Chromium	-3.26E-06	2.60E-05	-3.85E-05	-5.27E-06
Lead	-6.57E-05	-7.73E-05	-4.70E-04	-2.04E-04
Manganese	-7.33E-04	-5.43E-04	-3.56E-02	-1.23E-02
Mercury	7.62E-06	2.12E-06	-7.39E-06	7.81E-07
Nickel	9.59E-06	1.23E-05	-2.35E-05	-5.32E-07
Phosphorus	-3.85E-04	-1.35E-03	-8.67E-04	-8.66E-04
Selenium	-7.77E-05	3.26E-05	1.74E-05	-9.22E-06
Total Fluorides	-2.77E-03	-7.09E-03	-1.58E-01	-5.61E-02
Acetone	6.96E-04	7.68E-04	4.69E-04	6.45E-04
Acrylonitrile	-1.11E-05	1.49E-05	2.58E-05	9.89E-06
Benzene	2.34E-05	-1.62E-05	1.20E-04	4.25E-05
Bromomethane	1.20E-05	-1.31E-05	-1.50E-05	-5.40E-06
2-butanone	1.48E-04	6.72E-05	4.43E-04	2.19E-04
Carbon disulfide	1.26E-06	-2.04E-06	6.95E-06	2.06E-06
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	3.78E-04	2.75E-04	1.37E-03	6.73E-04
Ethylbenzene	-1.16E-06	1.75E-06	4.19E-06	1.59E-06
2-hexanone	ND	ND	ND	ND
Iodomethane	6.47E-05	2.16E-05	3.59E-05	4.07E-05
Methylene chloride	1.76E-05	1.22E-04	2.25E-05	5.40E-05
M-/p-xylene	1.60E-05	7.78E-06	-2.47E-05	-3.19E-07
O-xylene	8.84E-06	5.64E-06	1.87E-06	5.45E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	3.22E-04	3.50E-04	3.07E-04	3.26E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	3.80E-06	-1.53E-07	8.87E-06	4.17E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	3.53E-05	2.41E-04	5.49E-05	1.10E-04
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	2.40E-05	-1.30E-05	1.81E-05	9.71E-06
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	3.51E-05	-5.54E-05	1.15E-04	3.16E-05
Ethane	ND	ND	ND	ND
Methane	ND	2.42E+01	ND	ND

TOTAL KILN AND SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B)				
Filterable PM	1.26	1.33	1.42	1.34
CO (Average of 9 runs)	2.83	3.16	3.05	3.01
NOx (Average of 9 Runs)	0.307	0.337	0.322	0.322
Filterable PM-10	0.261	0.216	0.285	0.254
Condensible PM	0.0445	0.0143	0.110	0.0561
Hydrogen fluoride	0.0706	0.318	0.146	0.178
TOC as carbon	0.0760	0.165	0.210	0.150
Antimony	ND	ND	1.88E-06	ND
Arsenic	1.68E-05	2.48E-05	2.13E-05	2.10E-05
Beryllium	2.70E-07	8.66E-08	5.70E-07	3.09E-07
Cadmium	2.05E-05	2.57E-05	1.91E-05	2.18E-05
Chromium	2.98E-05	8.09E-05	3.23E-05	4.77E-05
Lead	2.63E-04	9.65E-05	8.96E-06	1.23E-04
Manganese	3.60E-04	4.81E-04	5.83E-04	4.75E-04
Mercury	1.72E-05	7.49E-06	7.19E-06	1.06E-05
Nickel	3.02E-05	4.86E-05	2.30E-05	3.39E-05
Phosphorus	7.31E-04	4.94E-04	4.19E-04	5.48E-04
Selenium	3.68E-05	5.46E-05	4.79E-05	4.65E-05
Total Fluorides	VOID	0.0101	0.0305	0.0203
Acetone	9.32E-04	9.35E-04	0.00124	0.00104
Acrylonitrile	1.54E-05	1.49E-05	2.58E-05	1.87E-05
Benzene	5.98E-04	5.53E-04	5.22E-04	5.57E-04
Bromomethane	4.56E-05	3.14E-05	5.62E-05	4.44E-05
2-butanone	1.48E-04	6.72E-05	4.43E-04	2.19E-04
Carbon disulfide	1.72E-05	1.78E-05	1.98E-05	1.83E-05
Carbon tetrachloride	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	0.00128	0.00128	0.00150	0.00135
Ethylbenzene	1.20E-05	8.16E-06	1.02E-05	1.01E-05
2-hexanone	ND	ND	ND	ND
Iodomethane	2.24E-04	2.40E-04	2.68E-04	2.44E-04
Methylene chloride	2.79E-05	1.26E-04	3.05E-05	6.15E-05
M-/p-xylene	4.13E-05	1.89E-05	2.53E-05	2.85E-05
O-xylene	8.84E-06	5.64E-06	7.26E-06	7.25E-06
Styrene	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND
Toluene	4.45E-04	4.15E-04	4.35E-04	4.32E-04
1,1,1-trichloroethane	ND	ND	ND	ND
Trichloroethane	ND	ND	ND	ND
Trichlorofluoromethane	1.08E-05	4.49E-06	1.46E-05	9.95E-06
Vinyl acetate	ND	ND	ND	ND
Bis(2-ethylhexy)phthalate	7.41E-05	2.69E-04	7.36E-05	1.39E-04
Dibenzofuran	ND	ND	ND	ND
Dimethylphthalate	ND	ND	ND	ND
Di-n-butylphthalate	2.40E-05	5.17E-06	1.81E-05	1.58E-05
2-methylphenol	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND
Phenol	3.51E-05	1.35E-04	1.41E-04	1.04E-04
Ethane	ND	ND	ND	ND
Methane	ND	24.2	ND	ND

CO2 EMISSION FACTORS--FROM PM/METALS, PM10/COND PM, SEMI-VOST TESTS

Kiln Outlet

Concentration (%)	Flow rate (dscfm)	Emission rate (lb/hr)	Process rate (ton/hr)	Emission factor (lb/ton)
PM/METALS TEST				
4.9	28005	9402	17.2	547
4.8	32033	10535	16.8	627
4.6	28862	9097	16.8	541
PM-10/COND. PM TEST				
4.8	24714	8128	17.3	470
4.9	29814	10010	17.2	582
5.1	28690	10025	17.2	583
SEMI-VOST TEST				
4.5	26998	8324	16.7	498
4.3	27968	8240	16.7	493
4.4	28623	8629	16.7	517
AVERAGE EMISSION FACTOR				540

Sawdust dryer outlets

Concentration (%)	Flow rate (dscfm)	Emission rate (lb/hr)	Process rate (ton/hr)	Emission factor (lb/ton)
PM/METALS TEST				
3.30	17170+16507	7615	17.2	443
3.35	16756+16044	7529	16.8	448
3.25	17273+15595	7319	16.8	436
PM-10/COND. PM TEST				
3.01	16845+18067	7188	17.3	416
3.43	17177+18081	8286	17.2	482
3.30	18099+18311	8233	17.2	479
SEMI-VOST TEST				
3.40	17689+16895	8057	16.7	482
3.30	17558+16954	7803	16.7	467
3.30	17918+15821	7629	16.7	457
AVERAGE EMISSION FACTOR				457

Filename: BRICK4A.WQ1
Date: 10-Jan-95
Facility: PINE HALL BRICK
Location: MADISON, NC
Source: SAWDUST-FIRED BRICK KILN
Test date: NOVEMBER 1992

PARTICLE SIZE DATA SUMMARY

KILN OUTLET		SAWDUST DRYER OUTLET		SAWDUST DRYER OUTLET		AVERAGE OF OUTLETS A & B
AERODYN. DIAMETER	% LESS THAN STATED SIZE	AERODYN. DIAMETER	% LESS THAN STATED SIZE	AERODYN. DIAMETER	% LESS THAN STATED SIZE	% LESS THAN STATED SIZE
PM-10	72.58%	PM-10	99.59%	PM-10	72.18%	85.88%
PM-2.5	60.48%	PM-2.5	91.43%	PM-2.5	68.88%	80.16%
PM-1	57.33%	PM-1	49.67%	PM-1	62.30%	55.99%

KILN OUTLET

RUN 2 PARTICLE DIAMETER	RUN 2 % LESS THAN STATED SIZE	RUN 3 PARTICLE DIAMETER	RUN 3 % LESS THAN STATED SIZE	RUN 4 PARTICLE DIAMETER	RUN 4 % LESS THAN STATED SIZE
10.493	66.47%	10.452	79.36%	15.112	79.35%
10	65.41%	10	79.02%	10	73.32%
6.993	58.96%	6.969	76.76%	9.41	72.62%
3.912	54.88%	3.903	66.19%	3.501	67.72%
2.5	51.53%	2.5	63.68%	2.5	66.23%
1.746	49.74%	1.747	62.33%	1.556	64.83%
1.048	45.85%	1.053	62.33%	1.556	64.83%
1	45.27%	1	61.89%	1	64.83%
0.546	39.83%	0.554	58.22%	0.929	64.83%

SAWDUST DRYER OUTLET A

RUN 2 PARTICLE DIAMETER	RUN 2 % LESS THAN STATED SIZE	RUN 3 PARTICLE DIAMETER	RUN 3 % LESS THAN STATED SIZE	RUN 4 PARTICLE DIAMETER	RUN 4 % LESS THAN STATED SIZE
10.977	99.37%	10.618	99.67%	13.288	99.83%
10	99.35%	10	99.64%	10	99.77%
7.363	99.31%	7.121	99.50%	8.313	99.74%
4.183	98.90%	4.045	88.61%	3.158	99.58%
2.5	98.28%	2.5	76.46%	2.5	99.55%
1.944	98.07%	1.879	71.58%	1.458	99.51%
1.222	45.97%	1.181	46.51%	1.458	99.51%
1	27.32%	1	39.84%	1	81.86%
0.704	2.45%	0.68	28.04%	0.518	63.29%

SAWDUST DRYER OUTLET B

RUN 2 PARTICLE DIAMETER	RUN 2 % LESS THAN STATED SIZE	RUN 3 PARTICLE DIAMETER	RUN 3 % LESS THAN STATED SIZE	RUN 4 PARTICLE DIAMETER	RUN 4 % LESS THAN STATED SIZE
10.839	31.60%	11.04	94.37%	13.504	92.94%
10	29.85%	10	94.35%	10	92.32%
7.272	24.18%	7.407	94.31%	8.449	92.05%
4.133	21.73%	4.21	94.28%	3.211	91.94%
2.5	20.81%	2.5	94.09%	2.5	91.75%
1.923	20.49%	1.959	94.03%	1.484	91.48%
1.21	19.60%	1.233	93.96%	1.484	91.48%
1	18.76%	1	76.92%	1	91.22%
0.70	17.56%	0.713	55.94%	0.928	91.18%

Emission Test Report Review Checklist--Short Form

Reviewer: BRIAN SHRAGER
Review Date: AUGUST 8, 1994

A. Background Information

1. Facility name: BELDEN BRICK--PLANT 3, KILN #1
   Location: SUGARCREEK, OHIO
2. Source category: BRICK
3. Test date: 3/3/92
4. Test sponsor: BELDEN BRICK
5. Testing contractor: CSA
6. Purpose of test: COMPLIANCE
7. Pollutants measured (include test method and indicate if valid): Filterable PM - EPA METHOD 5
   CO_2 - ORSAT → EPA METHOD 3
   SO_2 - EPA METHOD 6
   NO_x - EPA METHOD 7
8. Process overview: Attach a process description and a block diagram. Identify processes tested with letters from the beginning of the alphabet (A, B, C, etc...) and APC systems with letters from the end of the alphabet (V, W, X, etc...). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from the diagram, complete the table below.

Test ID	Process	Process ID	Emissions tested: Uncontrolled	Emissions tested: Controlled	APCD (controlled emissions only)
1	NATURAL GAS-FIRED KILN	A	✓		ID: Type: Model #:
					ID: Type: Model #:
					ID: Type: Model #:
					ID: Type: Model #:

B. Process Information .

1. Provide a brief narrative description of the process and attach process flow diagram. (Note: If the process description provided in the test report is adequate, attach a copy here.)

PROCESS RATE 15660 #/hr

Not Specified green or burned brick!

Filename: BRICK5.WQ1
BELDEN BRICK--SUGARCREEK
NATURAL GAS-FIRED KILN #1, PLANT 3

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	402	429	397	
	Moisture	%	5.51	5.45	5.69	
	Oxygen	%	16.4	16.5	16.9	
	Volumetric flow, actual	acfm	29445	29266	27610	
	Volumetric flow, standard	dscfm	16638	16045	15661	
	Isokinetic variation	%	99	103.64	103.63	
Circle: Production or feed rate, Capacity: NOT SPECIFIED!!!		TPH	7.83	7.83	7.83	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0198	0.0153	0.0190	
	CO2	%	3.2%	3.1%	3.0%	
	SO2	ppmv	16.9	18.0	15.9	
	NOx	lb/dscf	2.47E-06	2.51E-06	2.1E-06	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	2.82	2.10	2.55	
	CO2	lb/hr	3648	3408	3219	
	SO2	lb/hr	2.80	2.88	2.48	
	NOx	lb/hr	2.47	2.42	1.97	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.361	0.269	0.326	0.318
	CO2	lb/ton	466	435	411	437
	SO2	lb/ton	0.357	0.367	0.317	0.347
	NOx	lb/ton	0.315	0.309	0.252	0.292
METRIC	Filterable PM	kg/Mg	0.180	0.134	0.163	0.159
	CO2	kg/Mg	233	218	206	219
	SO2	kg/Mg	0.179	0.184	0.158	0.174
	NOx	kg/Mg	0.157	0.154	0.126	0.146

Filename: BRICK6.WQ1 (AP-42 Ref. #13)
GENERAL SHALE--MARION, VA
COAL(W/SUPPLEMENTAL NATURAL GAS)-FIRED KILN 6B

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	417	409	406		
	Pressure	in. HG	29.48	29.48	29.48		
	Moisture	%	5.8	5.37	6.98		
	Oxygen	%	16	16	16.5		
	Volumetric flow, actual	acfm	5205	5058	5058		
	Volumetric flow, standard*	dscfm	2909	2865	2826	0	
	Isokinetic variation	%	104.11	105.06	106.36		
Circle: Production or feed rate Capacity:		TPH	2.35	2.35	2.35		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.192	0.216	0.183		
	CO2	%	4.75	5.00	5.50		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	4.79	5.31	4.43		
	CO2	lb/hr	947	982	1065		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	2.04	2.26	1.89		2.06
	CO2	lb/ton	403	418	453		425
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	1.018	1.129	0.943		1.030
	CO2	kg/Mg	201	209	227		212

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK6A.WQ1
GENERAL SHALE--MARION, VA
COAL(W/SUPPLEMENTAL NATURAL GAS)-FIRED KILN 28

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	364	351	353		
	Pressure	in. HG	29.54	29.62	29.62		
	Moisture	%	3.76	3.88	4.13		
	Oxygen	%	18	16	16		
	Volumetric flow, actual	acfm	11585	10862	10145		
	Volumetric flow, standard*	dscfm	7054	6729	6253	0	
	Isokinetic variation	%	105.51	104.67	105.61		
Circle: Production or feed rate Capacity:		TPH	9.36	9.36	9.36		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.137	0.134	0.101		
	CO2	%	2.50	4.00	4.00		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	8.28	7.73	5.41		
	CO2	lb/hr	1209	1845	1714		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.885	0.826	0.578		0.763
	CO2	lb/ton	129	197	183		170
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.442	0.413	0.289		0.382
	CO2	kg/Mg	64.6	98.5	91.6		84.9

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK7.WQ1 (AP-42 Ref. #14)
GENERAL SHALE--GLASCOW, VA
COAL-FIRED KILN #21

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	451	457	452	
	Moisture	%	10.77	10.84	10.43	
	Oxygen	%	11.5	14	15.25	
	Volumetric flow, actual	acfm	5546	5180	4997	
	Volumetric flow, standard	dscfm	2829	2623	2556	
	Isokinetic variation	%	104.41	98.03	98.8	
Circle: Production or feed rate Capacity:		TPH	6.25	6.25	6.25	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.2320	0.2200	0.1430	
	CO2	%	8.5%	7.0%	5.0%	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	5.63	4.95	3.13	
	CO2	lb/hr	1648	1258	876	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.901	0.792	0.502	0.731
	CO2	lb/ton	264	201	140	202
METRIC	Filterable PM	kg/Mg	0.450	0.396	0.251	0.366
	CO2	kg/Mg	132	101	70	101

Filename: BRICK8.WQ1 (AP-42 Ref. #15)
BELDEN BRICK--SUGARCREEK
NATURAL GAS-FIRED KILN #1, PLANT 3

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			~~KILN~~ Run 1	~~DRYER~~ Run 2	Run 3	Run 4
1	Stack temperature	Deg F	462	463	471	
	Moisture	%	9.68	9.13	8.09	
	Oxygen	%	18.2	17.5	18.8	
	Volumetric flow, actual	acfm	30011	30767	30444	
	Volumetric flow, standard	dscfm	15275.067	15738.2	15615.85	
	Isokinetic variation	%	100.3	103.2	106.5	
Circle: Production or feed rate Capacity: NOT SPECIFIED!		TPH	10.77	10.77	10.77	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0202	0.0203	0.0275	
	CO2	%	2.2%	2.5%	1.8%	
	SO2	ppmv	24.77	25.59	21.74	
	NOx	lb/dscf	2.86E-06	3.45E-06	3.14E-06	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	2.64	2.74	3.68	
	CO2	lb/hr	2303	2696	1926	
	SO2	lb/hr	3.77	4.01	3.38	
	NOx	lb/hr	2.62	3.26	2.94	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.246	0.254	0.342	0.281
	CO2	lb/ton	214	250	179	214
	SO2	lb/ton	0.350	0.373	0.314	0.346
	NOx	lb/ton	0.243	0.303	0.273	0.273
METRIC	Filterable PM	kg/Mg	0.123	0.127	0.171	0.140
	CO2	kg/Mg	107	125	89	107
	SO2	kg/Mg	0.175	0.186	0.157	0.173
	NOx	kg/Mg	0.122	0.151	0.137	0.137

John Jensen (216)852-2424

Filename: BRICK9.WQ1 (AP-42 Ref. #16)
GENERAL SHALE--MOORESVILLE, IN
COAL-FIRED KILN #20

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	159	157	155		
	Pressure	in. HG	29.85	29.85	29.85		
	Moisture	%	7.55	8.66	10.74		
	Oxygen	%	17	17	17		
	Volumetric flow, actual	acfm	5402	4886	5245		
	Volumetric flow, standard*	dscfm	4250	3810	4010		
	Isokinetic variation	%	NA	NA	NA		
Circle: Production or feed rate Capacity:		TPH	13.3	13.3	13.3		
	Pollutant concentrations:						
	SO2	ppmv	407.6	361.2	350.8		
	CO2	%	3.00	3.00	3.00		
	Pollutant mass flux rates:						
	SO2	lb/hr	17.5	13.9	14.2		
	CO2	lb/hr	874	783	824		
	Emission factors (ENGLISH UNITS):						AVERAGE
	SO2	lb/ton	1.32	1.047	1.070		1.145
	CO2	lb/ton	65.7	58.9	62.0		62.2
	Emission factors (METRIC UNITS):						AVERAGE
	SO2	kg/Mg	0.659	0.524	0.535		0.573
	CO2	kg/Mg	32.8	29.4	31.0		31.1

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK9A.WQ1
GENERAL SHALE--MOORESVILLE, IN
COAL-FIRED BRICK DRYER #20

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	124	126	128		
	Pressure	in. HG	29.85	29.85	29.85		
	Moisture	%	10.44	10.52	9.22		
	Oxygen	%	17	17	17		
	Volumetric flow, actual	acfm	30118	30252	30404		
	Volumetric flow, standard*	dscfm	24256	24258	24651		
	Isokinetic variation	%	NA	NA	NA		
Circle: Production or feed rate Capacity:		TPH	13.3	13.3	13.3		
	Pollutant concentrations:						
	SO2	ppmv	130.4	158.6	142.2		
	CO2	%	3.00	3.00	3.00		
	Pollutant mass flux rates:						
	SO2	lb/hr	32.0	39.0	35.5		
	CO2	lb/hr	4987	4987	5068		
	Emission factors (ENGLISH UNITS):						AVERAGE
	SO2	lb/ton	2.41	2.928	2.666		2.667
	CO2	lb/ton	375	375	381		377
	Emission factors (METRIC UNITS):						AVERAGE
	SO2	kg/Mg	1.203	1.464	1.333		1.333
	CO2	kg/Mg	187	187	190		188

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK10.WQ1 (AP-42 Ref. #17)
GENERAL SHALE--KNOXVILLE, TN
COAL-FIRED KILN #7B

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	174	175	164		
	Pressure	in. HG	29.96	29.96	29.96		
	Moisture	%	5.29	6.3	6.97		
	Oxygen	%	18	18	18		
	Volumetric flow, actual	acfm	28329	28407	28715		
	Volumetric flow, standard*	dscfm	22374	22162	22634	0	
	Isokinetic variation	%	101.54	103.46	103.64		
Circle: Production or feed rate Capacity:		TPH	12.32	12.32	12.32		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.051	0.058	0.057		
	CO2	%	2	2	2		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	9.78	11.0	11.1		
	CO2	lb/hr	3067	3038	3102		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.794	0.894	0.898		0.862
	CO2	lb/ton	249	247	252		249
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.397	0.447	0.449		0.431
	CO2	kg/Mg	124	123	126		125

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK12.WQ1 (AP-42 Ref. #18)
GENERAL SHALE--KINGSPORT, TN
COAL-FIRED (W/ SUPPLEMENTAL NATURAL GAS) KILN #15

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	381	381	382	
	Moisture	%	5.82	6.95	6.83	
	Oxygen	%	17	17.3	16.5	
	Volumetric flow, actual	acfm	13419	13299	13307	
	Volumetric flow, standard	dscfm	8016	7847	7852	
	Isokinetic variation	%	100.09	100.91	100.93	
Circle: Production or feed rate Capacity:		TPH	5.36	5.36	5.36	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0688	0.0704	0.0801	
	CO2	%	5.0%	4.5%	5.3%	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	4.73	4.74	5.39	
	CO2	lb/hr	2746	2419	2851	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.882	0.884	1.006	0.924
	CO2	lb/ton	513	452	532	499
METRIC	Filterable PM	kg/Mg	0.441	0.442	0.503	0.462
	CO2	kg/Mg	256	226	266	249

Filename: BRICK13.WQ1 (AP-42 Ref. #19)
GENERAL SHALE--KINGSPORT, TN
COAL-FIRED KILN #29--CONTROLLED WITH PREHEATER BAGHOUSE

D. Emission Data/Mass Flux Rates/Emission Factors

			Values reported			
Test ID	Parameter	Units	Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	310	308	313	
	Moisture	%	6.47	5.66	4.78	
	Oxygen	%	16	17	17	
	Volumetric flow, actual	acfm	28137	28106	27869	
	Volumetric flow, standard	dscfm	18216	18402	18299	
	Isokinetic variation	%	102.23	104.75	104.05	
Circle: Production or feed rate Capacity:		TPH	9.16	9.16	9.16	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.003	0.0022	0.0024	
	CO2	%	4.5	4.0	3.5	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.468	0.347	0.376	
	CO2	lb/hr	5617	5043	4388	
	Emission factors:					AVERAGE
	Filterable PM	lb/ton	0.0511	0.0379	0.0411	0.0434
	CO2	lb/ton	613	550	479	547

Filename: BRICK13A.WQ1
GENERAL SHALE--KINGSPORT, TN
COAL CRUSHER

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
	Stack temperature	Deg F	133	132			
	Pressure	in. HG	30.19	30.19			
	Moisture	%	5.29	5.52			
	Oxygen	%	20.5	21			
	Volumetric flow, actual	acfm	2807	2848			
	Volumetric flow, standard	dscfm	2388	2422	0	0	
	Isokinetic variation	%	107.54	109.08			
Circle: Production or feed rate Capacity:		TPH	ND	ND			
	Pollutant concentrations:						
	Filterable PM	mg/dscf	0.245	0.411			
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	0.077	0.132			
	Emission factors:						AVERAGE
	Filterable PM	lb/ton	ERR	ERR			

Filename: BRICK14.WQ1 (AP-42 Ref. #20)
Date: 09-Jan-95
Facility: CHATHAM BRICK AND TILE COMPANY
Location: GULF, NORTH CAROLINA
Source: SAWDUST-FIRED BRICK KILN
Test date: AUGUST 19, 1980

CO_2 DATA CANNOT BE USED FOR EMISSION FACTOR DEVELOPMENT BECAUSE VOLUMETRIC FLOW RATES WERE NOT DETERMINED DURING EACH TEST RUN

PARTICLE SIZE DATA SUMMARY

2 test runs.
% determined from graph.

PARTICLE DIAMETER	% LESS THAN STATED SIZE
PM-10	84%
PM-2.5	36%
PM-1	30%

Filename: BRICK15D.WQ1 (AP-42 Ref. #21)
Date: 10-Jan-95
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	EMISSION FACTORS	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
SUM OF	(ENGLISH UNITS):					
NORTH,	Filterable PM	lb/ton	1.6	1.7	1.6	1.6
SOUTH, &	Condensible inorganic PM	lb/ton	0.13	0.14	0.11	0.13
BOTTOM	CO2	lb/ton	283	318	312	304
KILN	SO2	lb/ton	0.45	ND	ND	0.45
STACKS	NOx	lb/ton	1.6	ND	ND	1.6
	METRIC UNITS:					AVERAGE
	Filterable PM	kg/Mg	0.78	0.84	0.82	0.81
	Condensible inorganic PM	kg/Mg	0.065	0.071	0.057	0.064
	CO2	kg/Mg	142	159	156	152
	SO2	kg/Mg	0.23	ND	ND	0.23
	NOx	kg/Mg	0.81	ND	ND	0.81

Filename: BRICK15C.WQ1
Date: 10-Jan-95
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
4	Stack temperature	Deg F	84.1	82.1	81.9	
DRYER	Pressure	in. HG	29.84	30.42	29.8	
STACK	Moisture	%	2.94	2.79	3.49	
	Oxygen	%	20.4	20.4	20.4	
	Volumetric flow, actual	acfm	48700	48800	48900	
	Volumetric flow, standard*	dscfm	45747	46977	45798	0
	Isokinetic variation	%	98.8	103.3	104.6	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.001	0.002	0.001	
	Condensible inorganic PM	gr/dscf	0.003	0.001	0.002	
	CO2	% vol	<0.1	<0.1	<0.1	
	SO2	ppmdv	13.2	ND	ND	
	NOx	ppmdv	14.5	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.392	0.805	0.393	
	Condensible inorganic PM	lb/hr	1.176	0.403	0.785	
	CO2	lb/hr	ND	ND	ND	
	SO2	lb/hr	6.02	ND	ND	
	NOx	lb/hr	4.75	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.054	0.11	0.054	0.073
	Condensible inorganic PM	lb/ton	0.16	0.055	0.11	0.11
	CO2	lb/ton	ND	ND	ND	ND
	SO2	lb/ton	0.83	ND	ND	0.83
	NOx	lb/ton	0.65	ND	ND	0.65
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.027	0.055	0.027	0.037
	Condensible inorganic PM	kg/Mg	0.081	0.028	0.054	0.054
	CO2	kg/Mg	ND	ND	ND	ND
	SO2	kg/Mg	0.41	ND	ND	0.41
	NOx	kg/Mg	0.33	ND	ND	0.33

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15E.WQ1
Date: 10-Jan-95
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: LOW-ASH COAL-FIRED KILN
Test date: JANUARY 1980

PARTICLE SIZE DATA SUMMARY

KILN OUTLET STACKS

AERODYN. DIAMETER	% LESS THAN STATED SIZE
PM-10	57.53%
PM-2.5	23.37%
PM-1	9.77%

Single test run!

KILN OUTLET STACKS

NORTH KILN STACK		SOUTH KILN STACK	
PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE
10	56.80%	10	58.27%
8.6	52.60%	7.5	52.40%
5.4	43.00%	4.9	46.30%
3.6	30.20%	3.3	35.30%
2.5	19.60%	2.5	27.14%
2.5	19.60%	2.3	25.10%
1.5	10.00%	1.4	18.70%
1	5.07%	1	14.46%
0.81	3.20%	0.73	11.60%

Filename: BRICK15.WQ1
Date: 10-Jan-95
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	520	520.1	489.1	
NORTH STACK	Pressure	in. HG	29.84	30.42	29.8	
	Moisture	%	5.95	5.69	6.59	
	Oxygen	%	16.1	16.4	16.3	
	Volumetric flow, actual	acfm	13500	13200	13300	
	Volumetric flow, standard*	dscfm	6822	6819	6884	0
	Isokinetic variation	%	103.9	102.3	98.2	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.133	0.146	0.151	
	Condensible inorganic PM	gr/dscf	0.011	0.015	0.01	
	CO2	% vol	3.3	3.4	3.2	
	SO2	ppmdv	36.5	ND	ND	
	NOx	ppmdv	134	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	7.778	8.533	8.909	
	Condensible inorganic PM	lb/hr	0.643	0.877	0.590	
	CO2	lb/hr	1543	1589	1510	
	SO2	lb/hr	2.48	ND	ND	
	NOx	lb/hr	6.55	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	1.1	1.2	1.2	1.2
	Condensible inorganic PM	lb/ton	0.09	0.12	0.08	0.10
	CO2	lb/ton	213	219	208	213
	SO2	lb/ton	0.34	ND	ND	0.34
	NOx	lb/ton	0.90	ND	ND	0.90
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.54	0.59	0.61	0.58
	Condensible inorganic PM	kg/Mg	0.044	0.060	0.041	0.048
	CO2	kg/Mg	106	109	104	107
	SO2	kg/Mg	0.17	ND	ND	0.17
	NOx	kg/Mg	0.45	ND	ND	0.45

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15A.WQ1
Date: 10-Jan-95
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	184.5	192.8	197.4	
SOUTH	Pressure	in. HG	29.84	30.42	29.8	
STACK	Moisture	%	2.45	2.57	3.27	
	Oxygen	%	19.5	19	18.7	
	Volumetric flow, actual	acfm	13300	13100	13000	
	Volumetric flow, standard*	dscfm	10601	10496	10059	0
	Isokinetic variation	%	101.9	102	102	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.035	0.036	0.035	
	Condensible inorganic PM	gr/dscf	0.002	0.001	0.002	
	CO2	% vol	0.7	1	1.1	
	SO2	ppmdv	7.52	ND	ND	
	NOx	ppmdv	40.2	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	3.180	3.239	3.018	
	Condensible inorganic PM	lb/hr	0.182	0.090	0.172	
	CO2	lb/hr	509	719	758	
	SO2	lb/hr	0.80	ND	ND	
	NOx	lb/hr	3.05	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.44	0.45	0.42	0.43
	Condensible inorganic PM	lb/ton	0.025	0.012	0.024	0.020
	CO2	lb/ton	70	99	104	91
	SO2	lb/ton	0.11	ND	ND	0.11
	NOx	lb/ton	0.42	ND	ND	0.42
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.22	0.22	0.21	0.22
	Condensible inorganic PM	kg/Mg	0.013	0.006	0.012	0.010
	CO2	kg/Mg	35	50	52	46
	SO2	kg/Mg	0.055	ND	ND	0.055
	NOx	kg/Mg	0.21	ND	ND	0.21

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15B.WQ1
Date: 10-Jan-95
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
3	Stack temperature	Deg F	136.8	130.9	144.4	
BOTTOM STACK	Pressure	in. HG	29.84	30.42	29.8	
	Moisture	%	0.747	0.654	1.476	
	Oxygen	%	20.2	20.2	20.2	
	Volumetric flow, actual	acfm	4790	4680	4640	
	Volumetric flow, standard*	dscfm	4195	4224	3978	0
	Isokinetic variation	%	101	102.6	102.6	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.004	0.004	0.003	
	Condensible inorganic PM	gr/dscf	0.003	0.002	0.002	
	CO_2	% vol	<0.1	<0.1	<0.1	
	SO_2	ppmdv	<3.65	ND	ND	
	NO_x	ppmdv	71.7	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.144	0.145	0.102	
	Condensible inorganic PM	lb/hr	0.108	0.072	0.068	
	CO_2	lb/hr	ND	ND	ND	
	SO_2	lb/hr	ND	ND	ND	
	NO_x	lb/hr	2.15	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.020	0.020	0.014	0.018
	Condensible inorganic PM	lb/ton	0.015	0.010	0.009	0.011
	CO_2	lb/ton	ND	ND	ND	ND
	SO_2	lb/ton	ND	ND	ND	ND
	NO_x	lb/ton	0.30	ND	ND	0.30
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.0099	0.010	0.0070	0.0090
	Condensible inorganic PM	kg/Mg	0.0074	0.0050	0.0047	0.0057
	CO_2	kg/Mg	ND	ND	ND	ND
	SO_2	kg/Mg	ND	ND	ND	ND
	NO_x	kg/Mg	0.15	ND	ND	0.15

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Section 4 Reference 17
AP-42 Reference 22

Emission Test Report Review Checklist--Short Form

Reviewer: BRIAN SHRAGER
Review Date: 4/18/95

A. Background Information

1. Facility name: ACME BRICK
   Location: Sealy, Texas
2. Source category: Brick Mfg.
3. Test date: 6/18/91
4. Test sponsor: Acme Brick
5. Testing contractor: Armstrong Environmental, Inc.
6. Purpose of test: Compliance
7. Pollutants measured (include test method and indicate if valid):
   KILN { PM - Method 5
   HF - Method 13
   SO_2 - Method 6
   CO_2 - Method 3 w/ Fyrite Analyzer }
   DRYER { HF - Method 13
   SO_2 - Method 6 }
8. Process overview: Attach a process description and a block diagram. Identify processes tested with letters from the beginning of the alphabet (A, B, C, etc...) and APC systems with letters from the end of the alphabet (V, W, X, etc...). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from the diagram, complete the table below.

Test ID	Process	Process ID	Emissions tested: Uncontrolled	Emissions tested: Controlled	APCD (controlled emissions only)
1	Brick Kiln	A		X	ID: Type: Dry Scrubber Model #:
2	Brick dryer	B	X		ID: Type: Model #:
					ID: Type: Model #:
					ID: Type: Model #:

B. Process Information

1. Provide a brief narrative description of the process and attach process flow diagram. (Note: If the process description provided in the test report is adequate, attach a copy here.) None provided.

Natural gas-fired Kiln - 16 cars/day

Controlled by dry scrubber. (uses limestone) ? # bricks per car and lb/brick

Brick dryer preceeds Kiln.

C. 1. List any APCD parameters (supplied in the test report) below.

			Readings			
APCD ID	Parameter	Units	Run 1	Run 2	Run 3	Run 4
Z	No Details Provided!					
Type of APCD: Dry Scrubber						
Type of APCD:						
Type of APCD:						

2. Include any additional information (such as capture techniques for fugitive systems) and descriptions of the air pollution control systems (use a separate page if necessary).

Filename: ACME1.WQ1
Date: 19-Apr-95
Facility: Acme Brick
Location: Sealy, TX
Source: Natural gas-fired tunnel kiln with dry packed bed scrubber (limestone media)
Test date: 06/18/91

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	281.2	282.5	281.3	
	Pressure	in. HG	29.9	29.9	29.9	
	Moisture	%	8.142	7.705	7.77	
	Oxygen	%	18	18	18.5	
	Volumetric flow, actual	acfm	48005	47607	48024	
	Volumetric flow, standard*	dscfm	31391	31225	31527	0
	Isokinetic variation	%	97.33	97.68	97.72	
Circle: Production or feed rate Capacity:		TPH	19.2	19.2	19.2	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0153	0.0158	0.0181	
	Hydrogen fluoride	ppmdv	0.6934	0.7869	0.865	
	SO2	ppmdv	38.94	40.49	39.81	
	CO2	% dv	3	4	3	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	4.107	4.241	4.903	
	Hydrogen fluoride	lb/hr	0.0678	0.0765	0.0849	
	SO2	lb/hr	12.2	12.6	12.5	
	CO2	lb/hr	6454	8560	6482	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.21	0.22	0.26	0.23
	Hydrogen fluoride	lb/ton	0.0035	0.0040	0.0044	0.0040
	SO2	lb/ton	0.64	0.66	0.65	0.65
	CO2	lb/ton	336	446	338	373
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.11	0.11	0.13	0.12
	Hydrogen fluoride	kg/Mg	0.0018	0.0020	0.0022	0.0020
	SO2	kg/Mg	0.32	0.33	0.33	0.32
	CO2	kg/Mg	168	223	169	187

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: ACME2.WQ1
Date: 19-Apr-95
Facility: Acme Brick
Location: Sealy, TX
Source: Brick dryer
Test date: 06/18/91

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	105.8	108.5	108.5	
	Pressure	in. HG	29.81	29.83	29.83	
	Moisture	%	5.292	4.544	6.748	
	Oxygen	%	21	21	21	
	Volumetric flow, actual	acfm	67975	66414	67078	
	Volumetric flow, standard*	dscfm	59859	58696	57914	0
	Isokinetic variation	%	NA	NA	NA	
Circle: Production or feed rate Capacity:		TPH	19.2	19.2	19.2	
	Pollutant concentrations:					
	Hydrogen fluoride	ppmdv	ND	ND	ND	
	SO2	ppmdv	0.7167	0.7625	0.8938	
	CO2	% dv	0	0	0	
	Pollutant mass flux rates:					
	Hydrogen fluoride	lb/hr	ND	ND	ND	
	SO2	lb/hr	0.4	0.4	0.5	
	CO2	lb/hr	0	0	0	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Hydrogen fluoride	lb/ton	ND	ND	ND	ND
	SO2	lb/ton	0.022	0.023	0.027	0.024
	CO2	lb/ton	0	0	0	0
	Emission factors (METRIC UNITS):					AVERAGE
	Hydrogen fluoride	kg/Mg	ND	ND	ND	ND
	SO2	kg/Mg	0.011	0.012	0.013	0.012
	CO2	kg/Mg	0	0	0	0

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK18.WQ1
Date: 19-Apr-95
Facility: Lee Brick and Tile Company
Location: Sanford, NC
Source: Coal-fired tunnel kiln
Test date: 01/24/78
Comments: Only one test run performed on each stack. Test is not valid.

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	478			
Waste heat stack	Pressure	in. HG	29.4			
	Moisture	%	6.6			
	Oxygen	%	16			
	Volumetric flow, actual	acfm	7816			
	Volumetric flow, standard*	dscfm	4210			0
	Isokinetic variation	%	103.28			
Brick production rate		TPH	10.37			
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.3309			
	CO2	% dv	5			
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	11.94			
	CO2	lb/hr	1443			
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	1.2			1.2
	CO2	lb/ton	139			139
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.58			0.58
	CO2	kg/Mg	70			70

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

TOTAL EMISSION FACTORS FOR BOTH STACKS

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	3.8			3.84
	CO2	lb/ton	369			369
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.9			1.92
	CO2	kg/Mg	185			185

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	239			
Dryer stack	Pressure	in. HG	29.36			
	Moisture	%	0.61			
	Oxygen	%	19.5			
	Volumetric flow, actual	acfm	31486			
	Volumetric flow, standard*	dscfm	23197			0
	Isokinetic variation	%	101.36			
Brick production rate		TPH	10.37			
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1400			
	CO2	% dv	1.5			
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	27.84			
	CO2	lb/hr	2385			
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	2.7			2.7
	CO2	lb/ton	230			230
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.3			1.3
	CO2	kg/Mg	115			115

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK19.WQ1
Date: 19-Apr-95
Facility: Lee Brick and Tile Company
Location: Sanford, NC
Source: Coal-fired tunnel kiln
Test date: 02/09/78

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	306	303	308	
South stack	Pressure	in. HG	29.9	29.9	29.9	
	Moisture	%	3.84	4.35	4.17	
	Oxygen	%	19	19	19	
	Volumetric flow, actual	acfm	31560	32827	31912	
	Volumetric flow, standard*	dscfm	20905	21714	21012	0
	Isokinetic variation	%	96.8	96.1	99.5	
Brick production rate		TPH	8.3	8.3	8.3	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1337	0.1206	0.1076	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	23.96	22.45	19.38	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	2.9	2.7	2.3	2.6
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.4	1.4	1.2	1.3

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	336	336	335	
North stack	Pressure	in. HG	29.9	29.9	29.9	
	Moisture	%	3.35	3.6	3.5	
	Oxygen	%	19	19	19	
	Volumetric flow, actual	acfm	2376	2226	2281	
	Volumetric flow, standard*	dscfm	1522	1422	1461	0
	Isokinetic variation	%	98.7	97.6	95.4	
Brick production rate		TPH	8.3	8.3	8.3	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1541	0.1554	0.1367	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	2.01	1.89	1.71	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.24	0.23	0.21	0.23
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.12	0.11	0.10	0.11

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT. % MOISTURE AND STACK PRESSURE BACKCALCULATED FROM dscfm PROVIDED IN REPORT.

TOTAL EMISSION FACTORS FOR BOTH STACKS

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	3.1	2.9	2.5	2.9
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.6	1.5	1.3	1.4

Sect. 4, Ref 21
AP-42 Ref 23

Filename: BRICK21.WQ1
Date: 19-Apr-95
Facility: Chatham Brick and Tile Company
Location: Sanford, NC
Source: Sawdust fired tunnel kiln
Test date: 07/18/79

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	341	344	323	
Waste heat stack	Pressure	in. HG	29.76	29.76	29.99	
	Moisture	%	6.6	7	6.5	
	Oxygen	%	18.7	18.7	18.7	
	Volumetric flow, actual	acfm	19677	19577	19522	
	Volumetric flow, standard*	dscfm	12050	11893	12337	0
	Isokinetic variation	%	102.3	101.3	102.6	
Brick production rate		TPH	5.2	5.2	5.2	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0131	0.0110	0.0170	
	CO2 *	% dv	1.8	1.8	1.8	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	1.35	1.12	1.80	
	CO2	lb/hr	1486	1467	1522	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.26	0.22	0.35	0.27
	CO2	lb/ton	286	282	293	287
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.13	0.11	0.17	0.14
	CO2	kg/Mg	143	141	146	143

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

TOTAL EMISSION FACTORS FOR BOTH STACKS

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.42	0.29	0.44	0.38
	CO2	lb/ton	672	635	654	654
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.21	0.14	0.22	0.19
	CO2	kg/Mg	336	318	327	327

* ONLY 1 CO_2 measurement for all three runs.

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	124	124	116	
Dryer stack	Pressure	in. HG	29.78	29.78	30.01	
	Moisture	%	4.4	6	5.4	
	Oxygen	%	18.7	18.7	18.7	
	Volumetric flow, actual	acfm	18917	17596	17527	
	Volumetric flow, standard*	dscfm	16274	14884	15245	0
	Isokinetic variation	%	93.8	99.4	96.5	
Brick production rate		TPH	5.2	5.2	5.2	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0058	0.0030	0.0038	
	CO2	% dv	1.8	1.8	1.8	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.81	0.38	0.50	
	CO2	lb/hr	2008	1836	1881	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.16	0.074	0.10	0.11
	CO2	lb/ton	386	353	362	367
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.078	0.037	0.048	0.054
	CO2	kg/Mg	193	177	181	183

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Emission Test Report Review Checklist--Short Form

Reviewer: BRIAN SHRAGER
Review Date: AUGUST 8, 1994

A. Background Information

1. Facility name: CHATTAHOOCHEE BRICK COMPANY

   Location: ATLANTA, GA

2. Source category: BRICK

3. Test date: 3/9/93

4. Test sponsor: GENERAL SHALE

5. Testing contractor: GUARDIAN SYSTEMS, INC.

6. Purpose of test: TO PROVIDE BASELINE EMISSION DATA

7. Pollutants measured (include test method and indicate if valid): SO_2 - EPA METHOD 6C ✓
   NO_x - EPA METHOD 7E ✓
   CO - EPA METHOD 10 ✓
   VOC - EPA METHOD 25A ✓
   CO_2 - ORSAT (EPA METHOD 3) ✓

8. Process overview: Attach a process description and a block diagram. Identify processes tested with letters from the beginning of the alphabet (A, B, C, etc...) and APC systems with letters from the end of the alphabet (V, W, X, etc...). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from the diagram, complete the table below.

Test ID	Process	Process ID	Emissions tested: Uncontrolled	Emissions tested: Controlled	APCD (controlled emissions only)
1	COAL-FIRED BRICK KILN	A	✓		ID: Type: Model #:
2	BRICK DRYER	B	✓		ID: Type: Model #:
					ID: Type: Model #:
					ID: Type: Model #:

B. Process Information

1. Provide a brief narrative description of the process and attach process flow diagram. (Note: If the process description provided in the test report is adequate, attach a copy here.)

Sulfur Content of Coal
1.09%

Ash Content
4.38%

Process Rate

$5331.69 \frac{Bricks}{Hr} \times 4 \frac{lb}{brick}$ (product) $= \frac{2132.76}{2000} = 10.66 \frac{ton}{hr}$

Note: Rate in test report is green bricks (4.625 #/brick) + lbs of coal burned.

Filename: BRICK3.WQ1
CHATTAHOOCHEE BRICK COMPANY--ATLANTA

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			KILN	DRYER	Run 3	Run 4
1	Stack temperature	Deg F	242	94		
	Moisture	%	4.23	3.2		
	Oxygen	%	15.8	19.8		
	Volumetric flow, actual	acfm	17660	44837		
	Volumetric flow, standard	dscfm	13128	41571		
	Isokinetic variation	%	NA	NA		
Circle: Production or feed rate Capacity:		TPH	10.66	10.66		
	Pollutant concentrations:					
	CO_2	%	3.6%	0.0%		
	SO_2	ppmv	98.76	0		
	NOx	ppmv	37.31	0		
	CO	ppmv	130.14	0		
	TOC	ppmv	3.85	4.03		
	Pollutant mass flux rates:					
	CO_2	lb/hr	3238	0		
	SO_2	lb/hr	12.9	0		
	NOx	lb/hr	3.51	0		
	CO	lb/hr	7.45	0		
	TOC as methane	lb/hr	0.126	0.417		
	Emission factors:					
	CO_2	lb/ton	304	0		
	SO_2	lb/ton	1.21	0		
	NOx	lb/ton	0.329	0		
	CO	lb/ton	0.699	0		
	TOC as methane	lb/ton	0.0118	0.0392		

AVERAGE OF A SINGLE CONTINOUS RUN. 180 READINGS TAKEN @ 30 SECOND INTERVALS.

FINAL VOST TABLE F[illegible] BELDEN BRICK

4/[illegible]/95

AP-42 SECTION 11.3
REF.
BACKGROUND REPORT
REF. 1

TABLE 3-6. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--SPECIATED VOC (METRIC UNITS)

	Mass emission rate, kg/hr				Emission factor, kg/Mg bricks produced (a)			
	Run				Run			
Analyte	1	2	3	Ave.	1	2	3	Ave.
Chloromethane (b)	0.0027	0.00014	0.00032	0.0011	0.00086	4.5E-05	0.00010	0.00034
Chloroethane	0.0021	3.1E-06 (c)	0.00061	0.00090	0.00066	9.7E-07 (c)	0.00019	0.00028
Iodomethane (b)	0.00029	2.2E-05	0.00012	0.00015	9.3E-05	7.1E-06	3.9E-05	4.6E-05
Acetone	0.0018	0.0020	0.0042	0.0027	0.00058	0.00064	0.0013	0.00085
Carbon disulfide	7.8E-05	8.2E-05	4.2E-05	6.7E-05	2.5E-05	2.6E-05	1.3E-05	2.1E-05
2-Butanone	0.00017	0.00035	0.00054	0.00035	5.3E-05	0.00011	0.00017	0.00011
1,1,1-Trichloroethane	1.3E-05	1.0E-06 (c)	8.1E-06	7.4E-06	4.2E-06	3.3E-07 (c)	2.6E-06	2.3E-06
Benzene (b)	0.0047	0.0070	0.0019	0.0045	0.0015	0.0022	0.00062	0.0014
2-Hexanone	4.8E-06	0.00024	0.00016	0.00013	1.5E-06	7.4E-05	5.1E-05	4.2E-05
Tetrachloroethene	7.4E-07 (c)	5.9E-06	6.5E-06	4.4E-06	2.3E-07 (c)	1.9E-06	2.0E-06	1.4E-06
Toluene	0.00019	0.00026	0.00029	0.00025	6.0E-05	8.1E-05	9.2E-05	7.8E-05
Ethylbenzene	5.6E-05	6.6E-05	8.6E-05	7.0E-05	1.8E-05	2.1E-05	2.7E-05	2.2E-05
Styrene	1.8E-05	7.4E-05	4.1E-06	3.2E-05	5.6E-06	2.4E-05	1.3E-06	1.0E-05
m-/p-Xylene	8.7E-05	0.00010	0.00013	0.00011	2.7E-05	3.3E-05	4.0E-05	3.4E-05
o-Xylene	7.4E-05	9.4E-05	0.00011	9.2E-05	2.3E-05	3.0E-05	3.5E-05	2.9E-05

(a) Based on process rate of 3.16 Mg bricks per hour.

(b) Estimated values, all runs.

(c) Estimated as one-half the detection limit.

TABLE 3-6. SUMMARY OF KILN EMISSION RATES AND EMISSION FACTORS--SPECIATED VOC (ENGLISH UNITS)

	Mass emission rate, lb/hr				Emission factor, lb/ton bricks produced (a)			
	Run				Run			
Analyte	1	2	3	Ave.	1	2	3	Ave.
Chloromethane (b)	0.0060	0.00031	0.00070	0.0023	0.0017	9.0E-05	0.00020	0.00067
Chloroethane	0.0046	6.8E-06 (c)	0.0013	0.0020	0.0013	1.9E-06 (c)	0.00038	0.00057
Iodomethane (b)	0.00065	4.9E-05	0.00027	0.00032	0.00019	1.4E-05	7.7E-05	9.3E-05
Acetone	0.0040	0.0045	0.0092	0.0059	0.0012	0.0013	0.0026	0.0017
Carbon disulfide	0.00017	0.00018	9.2E-05	0.00015	4.9E-05	5.2E-05	2.7E-05	4.3E-05
2-Butanone	0.00037	0.00077	0.0012	0.00078	0.00011	0.00022	0.00034	0.00022
1,1,1-Trichloroethane	2.9E-05	2.3E-06 (c)	1.8E-05	1.6E-05	8.3E-06	6.6E-07 (c)	5.1E-06	4.7E-06
Benzene (b)	0.010	0.015	0.0043	0.010	0.0030	0.0044	0.0012	0.0029
2-Hexanone	1.1E-05	0.00052	0.00036	0.00030	3.0E-06	0.00015	0.00010	8.5E-05
Tetrachloroethene	1.6E-06 (c)	1.3E-05	1.4E-05	9.6E-06	4.7E-07 (c)	3.7E-06	4.1E-06	2.8E-06
Toluene	0.00042	0.00057	0.00064	0.00054	0.00012	0.00016	0.00018	0.00016
Ethylbenzene	0.00012	0.00015	0.00019	0.00015	3.6E-05	4.2E-05	5.5E-05	4.4E-05
Styrene	3.9E-05	0.00016	9.0E-06	7.1E-05	1.1E-05	4.7E-05	2.6E-06	2.0E-05
m-/p-Xylene	0.00019	0.00023	0.00028	0.00023	5.5E-05	6.6E-05	8.0E-05	6.7E-05
o-Xylene	0.00016	0.00021	0.00024	0.00020	4.7E-05	5.9E-05	6.9E-05	5.8E-05

(a) Based on process rate of 3.48 ton bricks per hour.

(b) Estimated values, all runs.

(c) Estimated as one-half the detection limit.

1/95

GENERAL SHALE EMISSION FACTORS--ENGLISH UNITS Date: 09-Jul-96
AP-42 SECTION 11.3, REF. 9
BACKGROUND REPORT, REF. 2

GRINDING ROOM

EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	
Filterable PM	0.700	0.247	0.338	
Filterable PM-10	0.556	0.205	0.168	
PROCESS RATES (TONS OF GROUND MATERIAL PRODUCED/HR)				
	59.5	59.5	59.5	
EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.0118	0.00415	0.00568	0.00720
Filterable PM-10	0.00934	0.00345	0.00282	0.00520
EMISSION FACTORS (kg/Mg)				AVERAGE
Filterable PM	0.00588	0.00208	0.00284	0.00360
Filterable PM-10	0.00467	0.00172	0.00141	0.00260

PROCESS RATES (TONS OF BRICK PRODUCED PER HOUR)				
	RUN 1	RUN 2	RUN 3	
JULY 28	6.88	6.88	6.88	
JULY 29	6.58	6.58	6.58	
JULY 30	6.88	6.88	6.88	
JULY 31	6.58	6.58	6.58	

BRICK DRYER EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	
TOC as propane	0.396	0.383	0.407	
Methane/ethane as propane	0.226	0.174	0.151	
TNMNEOC as propane	0.170	0.209	0.256	
CO_2-- % dry volume	0.1	0.8	0.8	

BRICK DRYER EMISSION FACTORS (LB/TON)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
TOC as propane	0.060	0.058	0.062	0.060
Methane/ethane as propane	0.034	0.026	0.023	0.028
TNMNEOC as propane	0.026	0.032	0.039	0.032
CO_2	14.4	117.0	115.3	82.3

BRICK DRYER EMISSION FACTORS (kg/Mg)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
TOC as carbon	0.0301	0.0291	0.0309	0.0300
Methane/ethane as ~~carbon~~ propane	0.0172	0.0132	0.01145	0.0140
CO_2	7.21	58.5	57.7	41.1

KILN EMISSION RATES (LB/HR)				
	RUN 1	RUN 2	RUN 3	AVERAGE
Filterable PM	4.49	4.05	4.29	
PM-10	3.32	2.52	2.96	
Condensible PM	0.883	1.454	1.026	
CO2-- % dry volume	6.62	6.58	6.47	
Filterable PM	4.41	4.6	5.01	
CO2-- % dry volume	6.53	6.34	6.62	
Antimony	1.06E-04	8.74E-05	9.67E-05	
Arsenic	8.71E-04	9.01E-04	9.21E-04	
Beryllium	9.94E-05	1.07E-04	1.09E-04	
Cadmium	2.95E-05	2.37E-05	1.43E-05	
Chromium	4.97E-04	5.16E-04	5.69E-04	
Lead	6.13E-04	6.27E-04	5.08E-04	
Manganese	3.27E-04	3.11E-04	3.10E-04	
Mercury	6.77E-04	6.03E-04	6.69E-04	
Nickel	1.07E-03	1.12E-03	1.30E-03	
Phosphorus	3.62E-03	3.61E-03	3.84E-03	
Selenium	2.98E-03	2.89E-03	3.41E-03	
CO	5.96	6.21	6.21	
NOx	4.93	4.54	4.93	
Hydrogen fluoride	0.410	0.561	1.566	
TOC as propane	1.479	0.832	0.435	
Methane/ethane as propane	0.713	0.616	0.669	
TNMNEOC as propane	0.766	0.216	---	
CO2-- % dry volume	4.5	4.5	5.6	
Chloromethane	0.000685	(0.000629/2)	0.00111	
Bromomethane	0.000145	0.000156	0.000169	
Trichlorofluoromethane	4.54E-05	2.29E-05	0.000199	
Carbon disulfide	(6.52E-07/2)	2.21E-05	2.25E-05	
Acetone	6.09E-03	2.58E-03	4.78E-03	
Methylene chloride	1.57E-05	0	0	
Chloroform	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Vinyl acetate	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
2-butanone	0.00189	0.00172	0.00134	
1,1,1-trichloroethane	(6.52E-07/2)	(6.63E-07/2)	(0.000337/2)	
Carbon tetrachloride	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Benzene	1.97E-03	1.87E-03	1.84E-03	
Trichloroethane	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Toluene	2.05E-03	1.55E-03	1.33E-03	
Tetrachloroethane	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
2-hexanone	(5.22E-06/2)	(5.52E-06/2)	(5.5E-06/2)	
Ethylbenzene	1.77E-04	1.23E-04	1.17E-04	
M-/p-xylene	1.20E-03	7.94E-04	6.07E-04	
O-xylene	4.11E-04	2.78E-04	2.37E-04	
Styrene	(6.52E-07/2)	(6.63E-07/2)	(6.6E-07/2)	
Chloroethane	6.65E-05	6.77E-05	9.19E-05	
1,1-dichloroethane	6.11E-06	5.09E-06	8.79E-05	
Chlorobenzene	1.60E-04	1.60E-04	9.41E-05	
Phenol	0	0.000315	0.000393	
Naphthalene	0.00011	0	2.71E-05	
2-methylphenol	(1.3E-05/2)	(1.48E-05/2)	(1.49E-05/2)	
Dimethylphthalate	(4.46E-06/2)	(5.56E-06/2)	(5.72E-06/2)	
Dibenzofuran	(3.83E-06/2)	2.75E-06	(4.91E-06/2)	
Di-n-butylphthalate	0	0	0	
Bis(2-ethylhexy)phthalate	0	1.88E-04	8.08E-04	
1,4-dichlorobenzene	(9.04E-06/2)	2.75E-05	3.15E-05	
Isophorone	5.71E-04	6.93E-06	7.26E-06	
Benzoic acid	0.00105	0.00125	0.00256	
2-methylnaphthalene	9.46E-06	8.26E-06	1.65E-05	
Diethylphthalate	1.59E-05	5.82E-06	5.21E-06	
Butylbenzylphthalate	(1.66E-05/2)	8.20E-06	8.02E-06	
Di-n-octylphthalate	(0.000179/2)	8.88E-05	5.21E-05	

VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT

KILN EMISSION FACTORS (LB/TON)				AVERAGE
	RUN 1	RUN 2	RUN 3	AVERAGE
Filterable PM	0.683	0.615	0.652	0.650
PM-10	0.505	0.383	0.450	0.446
Condensible PM	0.134	0.221	0.156	0.170
Condensible inorganic PM	0.067	0.19	0.11	0.12
Condensible organic PM	0.068	0.029	0.046	0.048
CO2	298	276	290	288
Filterable PM	0.641	0.669	0.761	0.690
CO2	279	276	303	286
Antimony	1.54E-05	1.27E-05	1.47E-05	1.43E-05
Arsenic	1.27E-04	1.31E-04	1.40E-04	1.33E-04
Beryllium	1.44E-05	1.56E-05	1.66E-05	1.55E-05
Cadmium	4.29E-06	3.44E-06	2.17E-06	3.30E-06
Chromium	7.22E-05	7.50E-05	8.65E-05	7.79E-05
Lead	8.91E-05	9.11E-05	7.72E-05	8.58E-05
Manganese	4.75E-05	4.52E-05	4.71E-05	4.66E-05
Mercury	9.84E-05	8.76E-05	1.02E-04	9.59E-05
Nickel	1.56E-04	1.63E-04	1.98E-04	1.72E-04
Phosphorus	5.26E-04	5.25E-04	5.84E-04	5.45E-04
Selenium	4.33E-04	4.20E-04	5.18E-04	4.57E-04
CO	0.866	0.903	0.944	0.904
NOx	0.717	0.660	0.749	0.709
Hydrogen fluoride	0.0596	0.0815	0.2380	0.126
TOC as propane	0.225	0.126	0.0662	0.139
Methane/ethane as propane	0.108	0.094	0.102	0.101
TNMNEOC as propane	0.116	0.033	---	0.0746
CO2	210	210	256	225
Chloromethane*?	1.04E-04	4.78E-05	1.69E-04	1.07E-04
Bromomethane	2.20E-05	2.37E-05	2.57E-05	2.38E-05
Trichlorofluoromethane?	6.90E-06	3.48E-06	3.02E-05	1.35E-05
Carbon disulfide*?	4.95E-08	3.36E-06	3.42E-06	2.28E-06
Acetone?	9.26E-04	3.92E-04	7.26E-04	6.81E-04
Methylene chloride	2.39E-06	0.00E+00	0.00E+00	7.95E-07
Chloroform***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Vinyl acetate***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
2-butanone?	2.87E-04	2.61E-04	2.04E-04	2.51E-04
1,1,1-trichloroethane***	4.95E-08	5.04E-08	2.56E-05	8.57E-06
Carbon tetrachloride***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Benzene?	2.99E-04	2.84E-04	2.80E-04	2.88E-04
Trichloroethane***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Toluene?	3.12E-04	2.36E-04	2.02E-04	2.50E-04
Tetrachloroethane***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
2-hexanone***	3.97E-07	4.19E-07	4.18E-07	4.11E-07
Ethylbenzene	2.69E-05	1.87E-05	1.78E-05	2.11E-05
M-/p-xylene?	1.82E-04	1.21E-04	9.22E-05	1.32E-04
O-xylene	6.25E-05	4.22E-05	3.60E-05	4.69E-05
Styrene***	4.95E-08	5.04E-08	5.02E-08	5.00E-08
Chloroethane	1.01E-05	1.03E-05	1.40E-05	1.15E-05
1,1-dichloroethane?	9.29E-07	7.74E-07	1.34E-05	5.02E-06
Chlorobenzene	2.43E-05	2.43E-05	1.43E-05	2.10E-05
Phenol	0.00E+00	4.79E-05	5.71E-05	3.50E-05
Naphthalene	1.67E-05	0.00E+00	3.94E-06	6.89E-06
2-methylphenol***	9.88E-07	1.12E-06	1.08E-06	1.07E-06
Dimethylphthalate***	3.39E-07	4.22E-07	4.16E-07	3.92E-07
Dibenzofuran**?	2.91E-07	4.18E-07	3.57E-07	3.55E-07
Di-n-butylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Bis(2-ethylhexy)phthalate	0.00E+00	2.86E-05	1.17E-04	4.87E-05
1,4-dichlorobenzene*?	6.87E-07	4.18E-06	4.79E-06	3.22E-06
Isophorone	8.68E-05	1.05E-06	1.10E-06	2.96E-05
Benzoic acid	1.60E-04	1.90E-04	3.89E-04	2.46E-04
2-methylnaphthalene?	1.44E-06	1.26E-06	2.51E-06	1.73E-06
Diethylphthalate?	2.42E-06	8.84E-07	7.92E-07	1.36E-06
Butylbenzylphthalate*?	1.26E-06	1.25E-06	1.22E-06	1.24E-06
Di-n-octylphthalate*	1.36E-05	1.35E-05	7.92E-06	1.17E-05

*Includes one non-detect run.
**Includes two non-detect runs.
***Includes three non-detect runs.
? = quantity is estimated
(shaded) = validated compound

Filename: BRICK3.WQ1
CHATTAHOOCHEE BRICK COMPANY--ATLANTA
Date: 09-Jul-96

D. Emission Data/Mass Flux Rates/Emission Factors

			Values reported			
Test ID	Parameter	Units	KILN	DRYER	Run 3	Run 4
1	Stack temperature	Deg F	242	94		
	Moisture	%	4.23	3.2		
	Oxygen	%	15.8	19.8		
	Volumetric flow, actual	acfm	17660	44837		
	Volumetric flow, standard	dscfm	13128	41571		
	Isokinetic variation	%	NA	NA		
Circle: Production or feed rate Capacity:		TPH	10.66	10.66		
	Pollutant concentrations:					
	CO2	%	3.6%	0.0%		
	SO2	ppmv	98.76	0		
	NOx	ppmv	37.31	0		
	CO	ppmv	130.14	0		
	TOC as propane	ppmv	1.28	1.34		
	Pollutant mass flux rates:					
	CO2	lb/hr	3238	0		
	SO2	lb/hr	12.9	0		
	NOx	lb/hr	3.51	0		
	CO	lb/hr	7.45	0		
	TOC as propane	lb/hr	0.115	0.382		
	Emission factors:					
	CO2	lb/ton	304	0		
	SO2	lb/ton	1.21	0		
	NOx	lb/ton	0.329	0		
	CO	lb/ton	0.699	0		
	TOC as propane	lb/ton	0.0108	0.0358		

AVERAGE OF A SINGLE CONTINOUS RUN. 180 READINGS TAKEN @ 30 SECOND INTERVALS.

PINE HALL EMISSION FACTORS--ENGLISH UNITS
AP-42 SECTION 11.3, REFERENCE 11
BACKGROUND REPORT, REFERENCE 4

Date: 09-Jul-96

GRINDING ROOM

	RUN 1	RUN 2	RUN 3	
EMISSION RATES (LB/HR)				
Filterable PM	2.27+3.786	1.724+1.872	2.907+2.762	
Filterable PM-10	0.183+0.442	0.171+0.247	0.163+0.228	
PROCESS RATES (TONS/HR)				
	196	223	211	
EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.0309	0.0161	0.0269	0.0246
Filterable PM-10	0.00319	0.00187	0.00185	0.00231

KILNS

	RUN 1	RUN 2	RUN 3	
KILN EMISSION RATES (LB/HR)				
Filterable PM	4.83	5.64	4.84	5.10E+00
CO	55.36	56.16	46.5	5.27E+01
NOx	6.85	9.04	7.03	7.64E+00
PM-10	3.42	3.62	3.75	3.60E+00
Condensible PM	5.14	5.05	4.22	4.80E+00
CO	43.74	62.26	60.71	5.56E+01
NOx	5.55	7.95	7.34	6.95E+00
Hydrogen fluoride	9.275	11.036	3.593	7.97E+00
THC as propane	0.881	0.972	0.994	9.49E-01
CO	51	57.91	61.65	5.69E+01
NOx	7.61	5.3	6.56	6.49E+00
Antimony*	(0.000124/2)	(0.000124/2)	0.000197	1.07E-04
Arsenic	9.52E-04	9.09E-04	7.53E-04	8.71E-04
Beryllium	9.06E-06	9.28E-06	1.84E-05	1.22E-05
Cadmium	1.06E-04	2.91E-04	4.79E-04	2.92E-04
Chromium	5.68E-04	9.23E-04	1.19E-03	8.94E-04
Lead	5.66E-03	2.92E-03	8.04E-03	5.54E-03
Manganese	1.88E-02	1.72E-02	6.08E-01	2.15E-01
Mercury	1.65E-04	9.02E-05	2.45E-04	1.67E-04
Nickel	3.55E-04	6.10E-04	7.81E-04	5.82E-04
Phosphorus	1.92E-02	3.09E-02	2.16E-02	2.39E-02
Selenium	1.97E-03	3.70E-04	5.12E-04	9.51E-04
Total Fluorides	0.048	0.295	3.248	1.20E+00
Acetone	3.94E-03	2.79E-03	1.29E-02	6.54E-03
Acrylonitrile*	4.43E-04	(0.000346/2)	(0.0003/2)	2.55E-04
Benzene	9.60E-03	9.50E-03	6.70E-03	8.60E-03
Bromomethane	5.62E-04	7.44E-04	1.19E-03	8.32E-04
2-butanone*	(0.000323/2)	(5.05E-06/2)	(5.13E-06/2)	5.55E-05
Carbon disulfide	2.66E-04	3.32E-04	2.15E-04	2.71E-04
Carbon tetrachloride*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Chloroform*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Chloromethane	1.50E-02	1.68E-02	2.30E-03	1.14E-02
Ethylbenzene	2.20E-04	1.07E-04	1.00E-04	1.42E-04
2-hexanone*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Iodomethane	2.66E-03	3.64E-03	3.88E-03	3.39E-03
Methylene chloride	1.72E-04	6.90E-05	1.33E-04	1.25E-04
M-/p-xylene	4.23E-04	1.85E-04	8.35E-04	4.81E-04
O-xylene*	(0.000139/2)	(5.97E-05/2)	9.00E-05	6.31E-05
Styrene*	(4.94E-06/2)	(1.17E-05/2)	(5.13E-06/2)	3.63E-06
Tetrachloroethane*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Toluene	2.05E-03	1.08E-03	2.14E-03	1.76E-03
1,1,1-trichloroethane*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Trichloroethane*	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Trichlorofluoromethane	1.17E-04	7.75E-05	9.50E-05	9.65E-05
Vinyl acetate	(4.94E-06/2)	(5.05E-06/2)	(5.13E-06/2)	2.52E-06
Bis(2-ethylhexy)phthalate	6.49E-04	4.68E-04	3.13E-04	4.77E-04
Dibenzofuran*	5.81E-04	1.73E-04	(3.4E-08/2)	2.51E-04
Dimethylphthalate*	(3.38E-08/2)	(3.42E-08/2)	5.10E-04	1.70E-04
Di-n-butylphthalate*	(3.38E-08/2)	3.04E-04	(3.4E-08/2)	1.01E-04
2-methylphenol*	(3.38E-08/2)	(3.42E-08/2)	(3.4E-08/2)	1.70E-08
Naphthalene*	1.71E-02	(3.42E-08/2)	(3.4E-08/2)	5.70E-03
Phenol*	(3.38E-08/2)	3.18E-03	4.36E-04	1.21E-03
Ethane**	ND	ND	ND	0.00E+00
Methane**	ND	ND	ND	0.00E+00
PROCESS RATES (TONS OF BRICK PRODUCED PER HOUR)				
OCT. 29-30	17.6	17.6	17.6	
NOV. 2	17.2	17.2	17.2	
NOV. 3	17.3	17.3	17.3	
NOV. 4	17.2	17.2	17.2	
NOV. 5	16.8	16.8	16.8	
NOV. 6-7	16.7	16.7	16.7	

*Data shown in parentheses represent non-detect runs.
VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

KILN EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.281	0.336	0.288	0.302
CO (Average of 9 runs)	2.93	3.45	3.31	3.23
NOx (Average of 9 Runs)	0.392	0.435	0.409	0.412
Filterable PM-10	0.198	0.210	0.218	0.209
Condensible PM	0.297	0.294	0.245	0.279
Condensible organic PM	0.0663	0.0674	0.108	0.0807
Condensible inorganic PM	0.231	0.226	0.137	0.198
Hydrogen fluoride	0.539	0.642	0.208	0.463
THC as propane	0.0527	0.0582	0.0595	0.0568
Antimony*	3.60E-06	3.69E-06	1.17E-05	6.34E-06
Arsenic	5.53E-05	5.41E-05	4.48E-05	5.14E-05
Beryllium	5.27E-07	5.52E-07	1.10E-06	7.25E-07
Cadmium	6.16E-06	1.73E-05	2.85E-05	1.73E-05
Chromium	3.30E-05	5.49E-05	7.08E-05	5.29E-05
Lead	3.29E-04	1.74E-04	4.79E-04	3.27E-04
Manganese	1.09E-03	1.02E-03	3.62E-02	0.0128
Mercury	9.59E-06	5.37E-06	1.46E-05	9.85E-06
Nickel	2.06E-05	3.63E-05	4.65E-05	3.45E-05
Phosphorus	1.12E-03	1.84E-03	1.29E-03	0.00141
Selenium	1.15E-04	2.20E-05	3.05E-05	5.57E-05
Total Fluorides	2.77E-03	1.72E-02	1.89E-01	0.0696
Acetone	2.36E-04	1.67E-04	7.72E-04	3.92E-04
Acrylonitrile*	2.65E-05	1.04E-05	8.98E-06	1.53E-05
Benzene	5.75E-04	5.69E-04	4.01E-04	5.15E-04
Bromomethane	3.37E-05	4.46E-05	7.13E-05	4.98E-05
2-butanone*	9.67E-06	1.51E-07	1.54E-07	3.33E-06
Carbon disulfide	1.59E-05	1.99E-05	1.29E-05	1.62E-05
Carbon tetrachloride*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Chloroform*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Chloromethane	8.98E-04	1.01E-03	1.38E-04	6.81E-04
Ethylbenzene	1.32E-05	6.41E-06	5.99E-06	8.52E-06
2-hexanone*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Iodomethane	1.59E-04	2.18E-04	2.32E-04	2.03E-04
Methylene chloride	1.03E-05	4.13E-06	7.96E-06	7.47E-06
M-/p-xylene	2.53E-05	1.11E-05	5.00E-05	2.88E-05
O-xylene*	4.16E-06	1.79E-06	5.39E-06	3.78E-06
Styrene*	1.48E-07	3.50E-07	1.54E-07	2.17E-07
Tetrachloroethane*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Toluene	1.23E-04	6.47E-05	1.28E-04	1.05E-04
1,1,1-trichloroethane*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Trichloroethane*	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Trichlorofluoromethane	7.01E-06	4.64E-06	5.69E-06	5.78E-06
Vinyl acetate	1.48E-07	1.51E-07	1.54E-07	1.51E-07
Bis(2-ethylhexy)phthalate	3.89E-05	2.80E-05	1.87E-05	2.85E-05
Dibenzofuran*	3.48E-05	1.04E-05	1.02E-09	1.51E-05
Dimethylphthalate*	1.01E-09	1.02E-09	3.05E-05	1.02E-05
Di-n-butylphthalate*	1.01E-09	1.82E-05	1.02E-09	6.07E-06
2-methylphenol*	1.01E-09	1.02E-09	1.02E-09	1.02E-09
Naphthalene*	1.02E-03	1.02E-09	1.02E-09	3.41E-04
Phenol*	1.01E-09	1.90E-04	2.61E-05	7.22E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	ND	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc.. Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLETS

SAWDUST DRYER OUTLET A EMISSION RATES (LB/HR)				
Filterable PM	2.21	2.19	3.07	
CO	25.98	26.38	26.35	
NOx	3.00	3.22	2.46	
PM-10	1.98	1.99	2.64	
Condensible PM	0.261	0.0556	1.48	
CO	19.09	28.91	26.67	
NOx	1.85	2.96	2.90	
Hydrogen fluoride	1.2	3.094	0.329	
THC as propane	0.359	2.40	2.76	
CO	25.09	27.07	27.34	
NOx	3.01	3.03	2.98	
Antimony*	(2.72E-05/2)	(2.76E-05/2)	(2.65E-05/2)	1.36E-05
Arsenic	1.97E-04	2.31E-04	2.60E-04	2.29E-04
Beryllium*	2.31E-06	(1.44E-06/2)	8.84E-06	3.96E-06
Cadmium	8.12E-05	1.52E-04	5.79E-05	9.70E-05
Chromium	2.72E-04	6.78E-04	1.52E-04	3.67E-04
Lead	2.41E-03	9.18E-04	1.11E-04	1.15E-03
Manganese	2.63E-03	3.78E-03	6.43E-03	4.28E-03
Mercury	1.34E-04	8.62E-05	6.10E-05	9.37E-05
Nickel	3.17E-04	4.51E-04	1.19E-04	2.96E-04
Phosphorus*	(0.00704/2)	4.71E-03	(0.00693/2)	ND
Selenium	4.60E-04	4.51E-04	4.29E-04	4.47E-04
Total Fluorides	VOID	0.173	0.524	0.349
Acetone	5.96E-03	6.15E-03	1.09E-02	7.67E-03
Acrylonitrile	(7.39E-05/2)	1.48E-04	2.18E-04	1.34E-04
Benzene	3.87E-03	4.24E-03	4.12E-03	4.08E-03
Bromomethane	3.27E-04	3.38E-04	4.70E-04	3.78E-04
2-butanone*	1.03E-03	(0.000653/2)	4.79E-03	2.05E-03
Carbon disulfide	1.07E-04	1.35E-04	1.50E-04	1.31E-04
Carbon tetrachloride*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Chloroform*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Chloromethane	8.41E-03	1.12E-02	1.16E-02	1.04E-02
Ethylbenzene	8.16E-05	6.73E-05	1.10E-04	8.63E-05
2-hexanone*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Iodomethane	1.55E-03	1.83E-03	2.07E-03	1.82E-03
Methylene chloride	2.59E-04	1.76E-03	4.41E-04	8.20E-04
M-/p-xylene	4.64E-04	1.68E-04	2.56E-04	2.96E-04
O-xylene	7.60E-05	4.77E-05	7.56E-05	6.64E-05
Styrene*	(3.3E-06/2)	(3.25E-06/2)	(9.28E-06/2)	2.64E-06
Tetrachloroethane*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Toluene	3.91E-03	4.00E-03	3.82E-03	3.91E-03
1,1,1-trichloroethane*	(1.89E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.41E-06
Trichloroethane*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Trichlorofluoromethane*	(0.000151/2)	(9.15E-05/2)	1.56E-04	ND
Vinyl acetate*	(3.3E-06/2)	(3.25E-06/2)	(3.33E-06/2)	1.65E-06
Bis(2-ethylhexy)phthalate*	3.44E-04	(1.91E-08/2)	3.21E-04	2.22E-04
Dibenzofuran*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Dimethylphthalate*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Di-n-butylphthalate/	3.63E-04	(1.91E-08/2)	1.28E-04	1.64E-04
2-methylphenol*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Naphthalene*	(1.94E-08/2)	(1.91E-08/2)	(1.92E-08/2)	9.62E-09
Phenol*	(1.94E-08/2)	1.33E-03	1.59E-03	9.73E-04
Ethane**	ND	ND	ND	ND
Methane**	ND	4.04E+02	ND	ND

*Data shown in parentheses represent non-detect runs.
VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLET A– EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	0.128	0.130	0.183	0.147
CO (Average of 9 runs)	1.37	1.61	1.57	1.52
NOx (Average of 9 Runs)	0.154	0.180	0.163	0.166
Filterable PM-10	0.114	0.116	0.154	0.128
Condensible PM	0.015	0.003	0.086	0.035
Hydrogen fluoride	0.070	0.180	0.019	0.090
THC as propane	0.0215	0.1438	0.1653	0.110
Antimony*	7.91E-07	8.21E-07	7.89E-07	8.00E-07
Arsenic	1.15E-05	1.38E-05	1.55E-05	1.36E-05
Beryllium*	1.34E-07	4.29E-08	5.26E-07	2.34E-07
Cadmium	4.72E-06	9.05E-06	3.45E-06	5.74E-06
Chromium	1.58E-05	4.04E-05	9.05E-06	2.17E-05
Lead	1.40E-04	5.46E-05	6.61E-06	6.71E-05
Manganese	1.53E-04	2.25E-04	3.83E-04	0.0003
Mercury	7.79E-06	5.13E-06	3.63E-06	5.52E-06
Nickel	1.84E-05	2.68E-05	7.08E-06	1.75E-05
Phosphorus*	2.05E-04	2.80E-04	2.06E-04	0.00023
Selenium	2.67E-05	2.68E-05	2.55E-05	2.64E-05
Total Fluorides	VOID	1.01E-02	3.05E-02	0.0135
Acetone	3.57E-04	3.68E-04	6.53E-04	4.59E-04
Acrylonitrile	2.21E-06	8.86E-06	1.31E-05	8.04E-06
Benzene	2.32E-04	2.54E-04	2.47E-04	2.44E-04
Bromomethane	1.96E-05	2.02E-05	2.81E-05	2.27E-05
2-butanone*	6.17E-05	1.96E-05	2.87E-04	1.23E-04
Carbon disulfide	6.41E-06	8.08E-06	8.98E-06	7.82E-06
Carbon tetrachloride*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Chloroform*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Chloromethane	5.04E-04	6.71E-04	6.95E-04	6.23E-04
Ethylbenzene	4.89E-06	4.03E-06	6.59E-06	5.17E-06
2-hexanone*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Iodomethane	9.28E-05	1.10E-04	1.24E-04	1.09E-04
Methylene chloride	1.55E-05	1.05E-04	2.64E-05	4.91E-05
M-/p-xylene	2.78E-05	1.01E-05	1.53E-05	1.77E-05
O-xylene	4.55E-06	2.86E-06	4.53E-06	3.98E-06
Styrene*	9.88E-08	9.73E-08	2.78E-07	1.58E-07
Tetrachloroethane*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Toluene	2.34E-04	2.40E-04	2.29E-04	2.34E-04
1,1,1-trichloroethane*	5.66E-08	9.73E-08	9.97E-08	8.45E-08
Trichloroethane*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Trichlorofluoromethane*	4.52E-06	2.74E-06	9.34E-06	5.53E-06
Vinyl acetate*	9.88E-08	9.73E-08	9.97E-08	9.86E-08
Bis(2-ethylhexy)phthalate*	2.06E-05	5.72E-10	1.92E-05	1.33E-05
Dibenzofuran*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Dimethylphthalate*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Di-n-butylphthalate/	2.17E-05	5.72E-10	7.66E-06	9.80E-06
2-methylphenol*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Naphthalene*	5.81E-10	5.72E-10	5.75E-10	5.76E-10
Phenol*	5.81E-10	7.96E-05	9.52E-05	5.83E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	2.42E+01	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc.. Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLET B EMISSION RATES (LB/HR)				
Filterable PM	19.39	20.15	20.78	
CO	24.89	24.63	22.84	
NOx	2.35	2.73	2.81	
PM-10	2.53	1.72	2.26	
Condensible PM	0.509	0.191	0.408	
CO	26.7	29.59	29.33	
NOx	2.46	2.63	3.01	
Hydrogen fluoride	0.014	2.384	2.197	
THC as propane	1.200	0.96	1.52	
CO	23.13	25.25	23.35	
NOx	3.01	2.65	2.33	
Antimony*	(7.1E-05/2)	(7.16E-05/2)	3.15E-05	3.43E-05
Arsenic	9.19E-05	1.85E-04	9.80E-05	1.25E-04
Beryllium*	2.33E-06	(1.47E-06/2)	(1.46E-06/2)	1.27E-06
Cadmium	2.71E-04	2.80E-04	2.63E-04	2.71E-04
Chromium	2.40E-04	6.81E-04	3.91E-04	4.37E-04
Lead	2.12E-03	7.04E-04	3.96E-05	9.55E-04
Manganese	3.57E-03	4.30E-03	3.37E-03	3.75E-03
Mercury	1.62E-04	3.96E-05	5.98E-05	8.71E-05
Nickel	2.03E-04	3.66E-04	2.67E-04	2.79E-04
Phosphorus*	9.05E-03	(0.00717/2)	(0.00714/2)	5.40E-03
Selenium	1.73E-04	4.67E-04	3.76E-04	3.39E-04
Total Fluorides	NA	NA	NA	NA
Acetone	9.61E-03	9.47E-03	9.83E-03	9.64E-03
Acrylonitrile*	2.21E-04	(0.000203/2)	2.13E-04	1.79E-04
Benzene	6.12E-03	4.99E-03	4.59E-03	5.23E-03
Bromomethane*	4.35E-04	(0.000373/2)	4.69E-04	3.64E-04
2-butanone*	1.44E-03	(0.00159/2)	2.60E-03	1.61E-03
Carbon disulfide	1.80E-04	1.63E-04	1.81E-04	1.75E-04
Carbon tetrachloride*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Chloroform*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Chloromethane	1.29E-02	1.02E-02	1.35E-02	1.22E-02
Ethylbenzene	1.19E-04	6.89E-05	6.00E-05	8.26E-05
2-hexanone*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Iodomethane	2.19E-03	2.17E-03	2.41E-03	2.26E-03
Methylene chloride	2.07E-04	3.45E-04	6.79E-05	2.07E-04
M-/p-xylene	2.26E-04	1.47E-04	1.66E-04	1.80E-04
O-xylene	7.16E-05	4.65E-05	4.56E-05	5.46E-05
Styrene*	(8.52E-05/2)	(0.000104/2)	(2.87E-06/2)	3.20E-05
Tetrachloroethane*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Toluene	3.52E-03	2.93E-03	3.44E-03	3.30E-03
1,1,1-trichloroethane*	(3.1E-06/2)	(1.19E-05/2)	(2.87E-06/2)	2.98E-06
Trichloroethane*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Trichlorofluoromethane*	1.05E-04	(5.84E-05/2)	8.71E-05	7.38E-05
Vinyl acetate*	(3.1E-06/2)	(3.09E-06/2)	(2.87E-06/2)	1.51E-06
Bis(2-ethylhexy)phthalate	8.94E-04	4.49E-03	9.08E-04	2.10E-03
Dibenzofuran*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Dimethylphthalate*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Di-n-butylphthalate	3.82E-05	8.63E-05	1.75E-04	9.98E-05
2-methylphenol*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Naphthalene*	(2E-08/2)	(1.95E-08/2)	(1.91E-08/2)	9.77E-09
Phenol	5.86E-04	9.24E-04	7.67E-04	7.59E-04
Ethane**	ND	ND	ND	ND
Methane**	ND	ND	ND	ND

*Data shown in parentheses represent non-detect runs.
VALUES IN PARENTHESES ARE EQUAL TO 1/2 OF THE DETECTION LIMIT
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

SAWDUST DRYER OUTLET B-- EMISSION FACTORS (LB/TON)				AVERAGE
Filterable PM	1.127	1.199	1.237	1.188
CO (Average of 9 runs)	1.46	1.55	1.48	1.50
NOx (Average of 9 Runs)	0.153	0.157	0.159	0.156
Filterable PM-10	0.146	0.100	0.132	0.126
Condensible PM	0.029	0.011	0.024	0.021
Hydrogen fluoride	0.001	0.139	0.127	0.089
THC as propane	0.0719	0.0575	0.0909	0.073
Antimony*	2.06E-06	2.13E-06	1.88E-06	2.02E-06
Arsenic	5.34E-06	1.10E-05	5.83E-06	7.40E-06
Beryllium*	1.35E-07	4.38E-08	4.35E-08	7.42E-08
Cadmium	1.58E-05	1.67E-05	1.57E-05	1.60E-05
Chromium	1.40E-05	4.05E-05	2.33E-05	2.59E-05
Lead	1.23E-04	4.19E-05	2.36E-06	5.58E-05
Manganese	2.08E-04	2.56E-04	2.01E-04	0.00022
Mercury	9.42E-06	2.36E-06	3.56E-06	5.11E-06
Nickel	1.18E-05	2.18E-05	1.59E-05	1.65E-05
Phosphorus*	5.26E-04	2.13E-04	2.13E-04	0.00032
Selenium	1.01E-05	2.78E-05	2.24E-05	2.01E-05
Total Fluorides	NA	NA	NA	NA
Acetone	5.75E-04	5.67E-04	5.89E-04	5.77E-04
Acrylonitrile*	1.32E-05	6.08E-06	1.28E-05	1.07E-05
Benzene	3.66E-04	2.99E-04	2.75E-04	3.13E-04
Bromomethane*	2.60E-05	1.12E-05	2.81E-05	2.18E-05
2-butanone*	8.62E-05	4.76E-05	1.56E-04	9.65E-05
Carbon disulfide	1.08E-05	9.76E-06	1.08E-05	1.05E-05
Carbon tetrachloride*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Chloroform*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Chloromethane	7.72E-04	6.11E-04	8.08E-04	7.31E-04
Ethylbenzene	7.13E-06	4.13E-06	3.59E-06	4.95E-06
2-hexanone*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Iodomethane	1.31E-04	1.30E-04	1.44E-04	1.35E-04
Methylene chloride	1.24E-05	2.07E-05	4.07E-06	1.24E-05
M-/p-xylene	1.35E-05	8.80E-06	9.94E-06	1.08E-05
O-xylene	4.29E-06	2.78E-06	2.73E-06	3.27E-06
Styrene*	2.55E-06	3.11E-06	8.59E-08	1.92E-06
Tetrachloroethane*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Toluene	2.11E-04	1.75E-04	2.06E-04	1.97E-04
1,1,1-trichloroethane*	9.28E-08	3.56E-07	8.59E-08	1.78E-07
Trichloroethane*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Trichlorofluoromethane*	6.29E-06	1.75E-06	5.22E-06	4.42E-06
Vinyl acetate*	9.28E-08	9.25E-08	8.59E-08	9.04E-08
Bis(2-ethylhexy)phthalate	5.35E-05	2.69E-04	5.44E-05	1.26E-04
Dibenzofuran*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Dimethylphthalate*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Di-n-butylphthalate	2.29E-06	5.17E-06	1.05E-05	5.98E-06
2-methylphenol*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Naphthalene*	5.99E-10	5.84E-10	5.72E-10	5.85E-10
Phenol	3.51E-05	5.53E-05	4.59E-05	4.54E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	ND	ND	ND

*Totals include data from non-detect runs.
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.

TOTAL SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B - KILN)				
Filterable PM	0.975	0.994	1.13	1.03
CO (Average of 9 runs)	-0.100	-0.290	-0.260	-0.217
NOx (Average of 9 Runs)	-0.0850	-0.0980	-0.0870	-0.0900
Filterable PM-10	0.0629	0.0055	0.0670	0.0451
Condensible PM	-0.252	-0.279	-0.136	-0.222
Hydrogen fluoride	-0.469	-0.323	-0.062	-0.284
THC as propane	0.0406	0.143	0.197	0.127
Antimony*	-7.50E-07	-7.38E-07	-9.06E-06	-3.52E-06
Arsenic	-3.86E-05	-2.93E-05	-2.35E-05	-3.05E-05
Beryllium*	-2.57E-07	-4.66E-07	-5.26E-07	-4.16E-07
Cadmium	1.43E-05	8.39E-06	-9.41E-06	4.43E-06
Chromium	-3.26E-06	2.60E-05	-3.85E-05	-5.27E-06
Lead	-6.57E-05	-7.73E-05	-4.70E-04	-2.04E-04
Manganese	-7.33E-04	-5.43E-04	-3.56E-02	-1.23E-02
Mercury	7.62E-06	2.12E-06	-7.39E-06	7.81E-07
Nickel	9.59E-06	1.23E-05	-2.35E-05	-5.32E-07
Phosphorus*	-3.85E-04	-1.35E-03	-8.67E-04	-8.66E-04
Selenium	-7.77E-05	3.26E-05	1.74E-05	-9.22E-06
Total Fluorides	-2.77E-03	-7.09E-03	-1.58E-01	-5.61E-02
Acetone	6.96E-04	7.68E-04	4.69E-04	6.45E-04
Acrylonitrile*	-1.11E-05	4.58E-06	1.68E-05	3.44E-06
Benzene	2.34E-05	-1.62E-05	1.20E-04	4.25E-05
Bromomethane*	1.20E-05	-1.31E-05	-1.50E-05	-5.40E-06
2-butanone*	1.38E-04	6.70E-05	4.42E-04	2.16E-04
Carbon disulfide	1.26E-06	-2.04E-06	6.95E-06	2.06E-06
Carbon tetrachloride*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Chloroform*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Chloromethane	3.78E-04	2.75E-04	1.37E-03	6.73E-04
Ethylbenzene	-1.16E-06	1.75E-06	4.19E-06	1.59E-06
2-hexanone*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Iodomethane	6.47E-05	2.16E-05	3.59E-05	4.07E-05
Methylene chloride	1.76E-05	1.22E-04	2.25E-05	5.40E-05
M-/p-xylene	1.60E-05	7.78E-06	-2.47E-05	-3.19E-07
O-xylene	4.68E-06	3.85E-06	1.87E-06	3.47E-06
Styrene*	2.50E-06	2.86E-06	2.10E-07	1.86E-06
Tetrachloroethane*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Toluene	3.22E-04	3.50E-04	3.07E-04	3.26E-04
1,1,1-trichloroethane*	1.50E-09	3.02E-07	3.20E-08	1.12E-07
Trichloroethane*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Trichlorofluoromethane*	3.80E-06	-1.53E-07	8.87E-06	4.17E-06
Vinyl acetate*	4.37E-08	3.86E-08	3.20E-08	3.81E-08
Bis(2-ethylhexy)phthalate	3.53E-05	2.41E-04	5.49E-05	1.10E-04
Dibenzofuran*	-3.48E-05	-1.04E-05	1.29E-10	-1.50E-05
Dimethylphthalate*	1.68E-10	1.32E-10	-3.05E-05	-1.02E-05
Di-n-butylphthalate	2.40E-05	-1.30E-05	1.81E-05	9.71E-06
2-methylphenol*	1.68E-10	1.32E-10	1.29E-10	1.43E-10
Naphthalene*	-1.02E-03	1.32E-10	1.29E-10	-3.41E-04
Phenol	3.51E-05	-5.54E-05	1.15E-04	3.16E-05
Ethane**	ND	ND	ND	ND
Methane**	ND	2.42E+01	ND	ND

*Totals include data from non-detect runs.
**The detection limits for methane and ethane were greater than the measured THC conc..
Therefore, emissions for these pollutants cannot be estimated.
NEGATIVE VALUES INDICATE POLLUTANT REMOVAL FROM EXHAUST STREAM

TOTAL KILN AND SAWDUST DRYER EMISSION FACTORS (OUTLETS A + B)				
Filterable PM	1.26	1.33	1.42	1.34
CO (Average of 9 runs)	2.83	3.16	3.05	3.01
NOx (Average of 9 Runs)	0.307	0.337	0.322	0.322
Filterable PM-10	0.261	0.216	0.285	0.254
Condensible PM	0.0445	0.0143	0.110	0.0561
Condensible organic PM	0.0316	0.0107	0.0878	0.0434
Condensible inorganic PM	0.0129	0.00365	0.0217	0.0128
Hydrogen fluoride	0.0706	0.318	0.146	0.178
THC as propane	0.0934	0.201	0.256	0.184
Antimony*	2.85E-06	2.95E-06	2.66E-06	ND
Arsenic	1.68E-05	2.48E-05	2.13E-05	2.10E-05
Beryllium*	2.70E-07	8.66E-08	5.70E-07	3.09E-07
Cadmium	2.05E-05	2.57E-05	1.91E-05	2.18E-05
Chromium	2.98E-05	8.09E-05	3.23E-05	4.77E-05
Lead	2.63E-04	9.65E-05	8.96E-06	1.23E-04
Manganese	3.60E-04	4.81E-04	5.83E-04	4.75E-04
Mercury	1.72E-05	7.49E-06	7.19E-06	1.06E-05
Nickel	3.02E-05	4.86E-05	2.30E-05	3.39E-05
Phosphorus*	7.31E-04	4.94E-04	4.19E-04	5.48E-04
Selenium	3.68E-05	5.46E-05	4.79E-05	4.65E-05
Total Fluorides	VOID	0.0101	0.0305	0.0203
Acetone	9.32E-04	9.35E-04	0.00124	0.00104
Acrylonitrile*	1.54E-05	1.49E-05	2.58E-05	1.87E-05
Benzene	5.98E-04	5.53E-04	5.22E-04	5.57E-04
Bromomethane*	4.56E-05	3.14E-05	5.62E-05	4.44E-05
2-butanone*	1.48E-04	6.72E-05	4.43E-04	2.19E-04
Carbon disulfide	1.72E-05	1.78E-05	1.98E-05	1.83E-05
Carbon tetrachloride*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Chloroform*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Chloromethane	0.00128	0.00128	0.00150	0.00135
Ethylbenzene	1.20E-05	8.16E-06	1.02E-05	1.01E-05
2-hexanone*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Iodomethane	2.24E-04	2.40E-04	2.68E-04	2.44E-04
Methylene chloride	2.79E-05	1.26E-04	3.05E-05	6.15E-05
M-/p-xylene	4.13E-05	1.89E-05	2.53E-05	2.85E-05
O-xylene	8.84E-06	5.64E-06	7.26E-06	7.25E-06
Styrene*	2.65E-06	3.21E-06	3.64E-07	2.07E-06
Tetrachloroethane*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Toluene	4.45E-04	4.15E-04	4.35E-04	4.32E-04
1,1,1-trichloroethane*	1.49E-07	4.54E-07	1.86E-07	2.63E-07
Trichloroethane*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Trichlorofluoromethane*	1.08E-05	4.49E-06	1.46E-05	9.95E-06
Vinyl acetate*	1.92E-07	1.90E-07	1.86E-07	1.89E-07
Bis(2-ethylhexy)phthalate	7.41E-05	2.69E-04	7.36E-05	1.39E-04
Dibenzofuran*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Dimethylphthalate*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Di-n-butylphthalate	2.40E-05	5.17E-06	1.81E-05	1.58E-05
2-methylphenol*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Naphthalene*	1.18E-09	1.16E-09	1.15E-09	1.16E-09
Phenol	3.51E-05	1.35E-04	1.41E-04	1.04E-04
Ethane**	ND	ND	ND	ND
Methane**	ND	24.2	ND	ND

*Totals include data from non-detect runs.

**The detection limits for methane and ethane were greater than the measured THC conc.. Therefore, emissions for these pollutants cannot be estimated.

CO_2 EMISSION FACTORS--FROM PM/METALS, PM10/COND PM, SEMI-VOST TESTS

Kiln Outlet

Concentration (%)	Flow rate (dscfm)	Emission rate (lb/hr)	Process rate (ton/hr)	Emission factor (lb/ton)
PM/METALS TEST				
4.9	28005	9402	17.2	547
4.8	32033	10535	16.8	627
4.6	28862	9097	16.8	541
PM-10/COND. PM TEST				
4.8	24714	8128	17.3	470
4.9	29814	10010	17.2	582
5.1	28690	10025	17.2	583
SEMI-VOST TEST				
4.5	26998	8324	16.7	498
4.3	27968	8240	16.7	493
4.4	28623	8629	16.7	517
AVERAGE EMISSION FACTOR				540

Sawdust dryer outlets

Concentration (%)	Flow rate (dscfm)	Emission rate (lb/hr)	Process rate (ton/hr)	Emission factor (lb/ton)
PM/METALS TEST				
3.30	17170+16507	7615	17.2	443
3.35	16756+16044	7529	16.8	448
3.25	17273+15595	7319	16.8	436
PM-10/COND. PM TEST				
3.01	16845+18067	7188	17.3	416
3.43	17177+18081	8286	17.2	482
3.30	18099+18311	8233	17.2	479
SEMI-VOST TEST				
3.40	17689+16895	8057	16.7	482
3.30	17558+16954	7803	16.7	467
3.30	17918+15821	7629	16.7	457
AVERAGE EMISSION FACTOR				457

Filename: BRICK4A.WQ1
Date: 09-Jul-96
Facility: PINE HALL BRICK
Location: MADISON, NC
Source: SAWDUST-FIRED BRICK KILN
Test date: NOVEMBER 1992

PARTICLE SIZE DATA SUMMARY

KILN OUTLET		SAWDUST DRYER OUTLET		SAWDUST DRYER OUTLET		AVERAGE OF OUTLETS A & B
AERODYN. DIAMETER	% LESS THAN STATED SIZE	AERODYN. DIAMETER	% LESS THAN STATED SIZE	AERODYN. DIAMETER	% LESS THAN STATED SIZE	% LESS THAN STATED SIZE
PM-10	72.58%	PM-10	99.59%	PM-10	72.18%	85.88%
PM-2.5	60.48%	PM-2.5	91.43%	PM-2.5	68.88%	80.16%
PM-1	57.33%	PM-1	49.67%	PM-1	62.30%	55.99%

KILN OUTLET

RUN 2		RUN 3		RUN 4	
PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE
10.493	66.47%	10.452	79.36%	15.112	79.35%
10	65.41%	10	79.02%	10	73.32%
6.993	58.96%	6.969	76.76%	9.41	72.62%
3.912	54.88%	3.903	66.19%	3.501	67.72%
2.5	51.53%	2.5	63.68%	2.5	66.23%
1.746	49.74%	1.747	62.33%	1.556	64.83%
1.048	45.85%	1.053	62.33%	1.556	64.83%
1	45.27%	1	61.89%	1	64.83%
0.546	39.83%	0.554	58.22%	0.929	64.83%

SAWDUST DRYER OUTLET A

RUN 2		RUN 3		RUN 4	
PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE
10.977	99.37%	10.618	99.67%	13.288	99.83%
10	99.35%	10	99.64%	10	99.77%
7.363	99.31%	7.121	99.50%	8.313	99.74%
4.183	98.90%	4.045	88.61%	3.158	99.58%
2.5	98.28%	2.5	76.46%	2.5	99.55%
1.944	98.07%	1.879	71.58%	1.458	99.51%
1.222	45.97%	1.181	46.51%	1.458	99.51%
1	27.32%	1	39.84%	1	81.86%
0.704	2.45%	0.68	28.04%	0.518	63.29%

SAWDUST DRYER OUTLET B

RUN 2		RUN 3		RUN 4	
PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE
10.839	31.60%	11.04	94.37%	13.504	92.94%
10	29.85%	10	94.35%	10	92.32%
7.272	24.18%	7.407	94.31%	8.449	92.05%
4.133	21.73%	4.21	94.28%	3.211	91.94%
2.5	20.81%	2.5	94.09%	2.5	91.75%
1.923	20.49%	1.959	94.03%	1.484	91.48%
1.21	19.60%	1.233	93.96%	1.484	91.48%
1	18.76%	1	76.92%	1	91.22%
0.70	17.56%	0.713	55.94%	0.928	91.18%

Filename: BRICK5.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 12
BACKGROUND REPORT REFERENCE 5
BELDEN BRICK--SUGARCREEK
NATURAL GAS-FIRED KILN #1, PLANT 3

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	402	429	397	
	Moisture	%	5.51	5.45	5.69	
	Oxygen	%	16.4	16.5	16.9	
	Volumetric flow, actual	acfm	29445	29266	27610	
	Volumetric flow, standard	dscfm	16638	16045	15661	
	Isokinetic variation	%	99	103.64	103.63	
Circle: Production or feed rate Capacity:		TPH	7.83	7.83	7.83	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0198	0.0153	0.0190	
	CO2	%	3.2%	3.1%	3.0%	
	SO2	ppmv	16.9	18.0	15.9	
	NOx	lb/dscf	2.47E-06	2.51E-06	2.1E-06	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	2.82	2.10	2.55	
	CO2	lb/hr	3648	3408	3219	
	SO2	lb/hr	2.80	2.88	2.48	
	NOx	lb/hr	2.47	2.42	1.97	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.361	0.269	0.326	0.318
	CO2	lb/ton	466	435	411	437
	SO2	lb/ton	0.357	0.367	0.317	0.347
	NOx	lb/ton	0.315	0.309	0.252	0.292
METRIC	Filterable PM	kg/Mg	0.180	0.134	0.163	0.159
	CO2	kg/Mg	233	218	206	219
	SO2	kg/Mg	0.179	0.184	0.158	0.174
	NOx	kg/Mg	0.157	0.154	0.126	0.146

Filename: BRICK6.WQ1 DATE: 09-Jul-96

AP-42 SECTION 11.3, REFERENCE 13

BACKGROUND REPORT, REFERENCE 6

GENERAL SHALE--MARION, VA

COAL(W/SUPPLEMENTAL NATURAL GAS)-FIRED KILN 6B

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	417	409	406		
	Pressure	in. HG	29.48	29.48	29.48		
	Moisture	%	5.8	5.37	6.98		
	Oxygen	%	16	16	16.5		
	Volumetric flow, actual	acfm	5205	5058	5058		
	Volumetric flow, standard*	dscfm	2909	2865	2826	0	
	Isokinetic variation	%	104.11	105.06	106.36		
Circle: Production or feed rate Capacity:		TPH	2.35	2.35	2.35		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.192	0.216	0.183		
	CO2	%	4.75	5.00	5.50		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	4.79	5.31	4.43		
	CO2	lb/hr	947	982	1065		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	2.04	2.26	1.89		2.06
	CO2	lb/ton	403	418	453		425
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	1.018	1.129	0.943		1.030
	CO2	kg/Mg	201	209	227		212

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK6A.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 13
BACKGROUND REPORT, REFERENCE 6
GENERAL SHALE--MARION, VA
COAL(W/SUPPLEMENTAL NATURAL GAS)-FIRED KILN 28

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	364	351	353		
	Pressure	in. HG	29.54	29.62	29.62		
	Moisture	%	3.76	3.88	4.13		
	Oxygen	%	18	16	16		
	Volumetric flow, actual	acfm	11585	10862	10145	10864	
	Volumetric flow, standard*	dscfm	7054	6729	6253	0	
	Isokinetic variation	%	105.51	104.67	105.61		
Circle: Production or feed rate Capacity:		TPH	9.36	9.36	9.36		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.137	0.134	0.101	0.124	
	CO2	%	2.50	4.00	4.00		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	8.28	7.73	5.41	7.14	
	CO2	lb/hr	1209	1845	1714		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.885	0.826	0.578		0.763
	CO2	lb/ton	129	197	183		170
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.442	0.413	0.289		0.382
	CO2	kg/Mg	64.6	98.5	91.6		84.9

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK7.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 14
BACKGROUND REPORT, REFERENCE 7
GENERAL SHALE--GLASCOW, VA
COAL-FIRED KILN #21

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	451	457	452	
	Moisture	%	10.77	10.84	10.43	
	Oxygen	%	11.5	14	15.25	
	Volumetric flow, actual	acfm	5546	5180	4997	
	Volumetric flow, standard	dscfm	2829	2623	2556	
	Isokinetic variation	%	104.41	98.03	98.8	
Circle: Production or feed rate Capacity:		TPH	6.25	6.25	6.25	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.2320	0.2200	0.1430	
	CO2	%	8.5%	7.0%	5.0%	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	5.63	4.95	3.13	
	CO2	lb/hr	1648	1258	876	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.901	0.792	0.502	0.731
	CO2	lb/ton	264	201	140	202
METRIC	Filterable PM	kg/Mg	0.450	0.396	0.251	0.366
	CO2	kg/Mg	132	101	70	101

Filename: BRICK8.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 15
BACKGROUND REPORT, REFERENCE 8
BELDEN BRICK--SUGARCREEK
NATURAL GAS-FIRED KILN #1, PLANT 3

D. Emission Data/Mass Flux Rates/Emission Factors

			Values reported			
Test ID	Parameter	Units	KILN	DRYER	Run 3	Run 4
1	Stack temperature	Deg F	462	463	471	
	Moisture	%	9.68	9.13	8.09	
	Oxygen	%	18.2	17.5	18.8	
	Volumetric flow, actual	acfm	30011	30767	30444	
	Volumetric flow, standard	dscfm	15275.067	15738.2	15615.85	
	Isokinetic variation	%	100.3	103.2	106.5	
Circle: Production or feed rate Capacity:		TPH	10.77	10.77	10.77	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0202	0.0203	0.0275	
	CO2	%	2.2%	2.5%	1.8%	
	SO2	ppmv	24.77	25.59	21.74	
	NOx	lb/dscf	2.86E-06	3.45E-06	3.14E-06	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	2.64	2.74	3.68	
	CO2	lb/hr	2303	2696	1926	
	SO2	lb/hr	3.77	4.01	3.38	
	NOx	lb/hr	2.62	3.26	2.94	
	Emission factors:					AVERAGE
ENGLISH	Filterable PM	lb/ton	0.246	0.254	0.342	0.281
	CO2	lb/ton	214	250	179	214
	SO2	lb/ton	0.350	0.373	0.314	0.346
	NOx	lb/ton	0.243	0.303	0.273	0.273
METRIC	Filterable PM	kg/Mg	0.123	0.127	0.171	0.140
	CO2	kg/Mg	107	125	89	107
	SO2	kg/Mg	0.175	0.186	0.157	0.173
	NOx	kg/Mg	0.122	0.151	0.137	0.137

Filename: BRICK9.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 16
BACKGROUND REPORT, REFERENCE 9
GENERAL SHALE--MOORESVILLE, IN
COAL-FIRED KILN #20

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	159	157	155		
	Pressure	in. HG	29.85	29.85	29.85		
	Moisture	%	7.55	8.66	10.74		
	Oxygen	%	17	17	17		
	Volumetric flow, actual	acfm	5402	4886	5245		
	Volumetric flow, standard*	dscfm	4250	3810	4010		
	Isokinetic variation	%	NA	NA	NA		
Circle: Production or feed rate Capacity:		TPH	13.3	13.3	13.3		
	Pollutant concentrations:						
	SO2	ppmv	407.6	361.2	350.8		
	CO2	%	3.00	3.00	3.00		
	Pollutant mass flux rates:						
	SO2	lb/hr	17.5	13.9	14.2		
	CO2	lb/hr	874	783	824		
	Emission factors (ENGLISH UNITS):						AVERAGE
	SO2	lb/ton	1.32	1.047	1.070		1.145
	CO2	lb/ton	65.7	58.9	62.0		62.2
	Emission factors (METRIC UNITS):						AVERAGE
	SO2	kg/Mg	0.659	0.524	0.535		0.573
	CO2	kg/Mg	32.8	29.4	31.0		31.1

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK9A.WQ1 DATE: 09-Jul-96
GENERAL SHALE--MOORESVILLE, IN
COAL-FIRED BRICK DRYER #20

D. Emission Data/Mass Flux Rates/Emission Factors

			Values reported				
Test ID	Parameter	Units	Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	124	126	128		
	Pressure	in. HG	29.85	29.85	29.85		
	Moisture	%	10.44	10.52	9.22		
	Oxygen	%	17	17	17		
	Volumetric flow, actual	acfm	30118	30252	30404		
	Volumetric flow, standard*	dscfm	24256	24258	24651		
	Isokinetic variation	%	NA	NA	NA		
Circle: Production or feed rate Capacity:		TPH	13.3	13.3	13.3		
	Pollutant concentrations:						
	SO2	ppmv	130.4	158.6	142.2		
	CO2	%	3.00	3.00	3.00		
	Pollutant mass flux rates:						
	SO2	lb/hr	32.0	39.0	35.5		
	CO2	lb/hr	4987	4987	5068		
	Emission factors (ENGLISH UNITS):						AVERAGE
	SO2	lb/ton	2.41	2.928	2.666		2.667
	CO2	lb/ton	375	375	381		377
	Emission factors (METRIC UNITS):						AVERAGE
	SO2	kg/Mg	1.203	1.464	1.333		1.333
	CO2	kg/Mg	187	187	190		188

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK10.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 17
BACKGROUND REPORT, REFERENCE 10
GENERAL SHALE--KNOXVILLE, TN
COAL-FIRED KILN #7B

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	174	175	164		
	Pressure	in. HG	29.96	29.96	29.96		
	Moisture	%	5.29	6.3	6.97		
	Oxygen	%	18	18	18		
	Volumetric flow, actual	acfm	28329	28407	28715		
	Volumetric flow, standard*	dscfm	22374	22162	22634	0	
	Isokinetic variation	%	101.54	103.46	103.64		
Circle: Production or feed rate Capacity:		TPH	12.32	12.32	12.32		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.051	0.058	0.057		
	CO2	%	2	2	2		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	9.78	11.0	11.1		
	CO2	lb/hr	3067	3038	3102		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.794	0.894	0.898		0.862
	CO2	lb/ton	249	247	252		249
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.397	0.447	0.449		0.431
	CO2	kg/Mg	124	123	126		125

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK12.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 18
BACKGROUND REPORT, REFERENCE 12
GENERAL SHALE--KINGSPORT, TN
COAL-FIRED (W/ SUPPLEMENTAL NATURAL GAS) KILN #15

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	381	381	382	379	
	Moisture	%	5.82	6.95	6.83	6.91	
	Oxygen	%	17	17.3	16.5	17	
	Volumetric flow, actual	acfm	13419	13299	13307	13231	
	Volumetric flow, standard	dscfm	8016	7847	7852	7829	
	Isokinetic variation	%	100.09	100.91	100.93	100.6	
Circle: Production or feed rate Capacity:		TPH	5.36	5.36	5.36	5.36	
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.0688	0.0704	0.0801	0.065	
	CO2	%	5.0%	4.5%	5.3%	4.0%	
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	4.73	4.74	5.39	4.36	
	CO2	lb/hr	2746	2419	2851	2146	
	Emission factors:						AVERAGE
ENGLISH	Filterable PM	lb/ton	0.88	0.88	1.01	0.81	0.90
	CO2	lb/ton	513	452	532	400	474
METRIC	Filterable PM	kg/Mg	0.44	0.44	0.50	0.41	0.45
	CO2	kg/Mg	256	226	266	200	237

Filename: BRICK13.WQ1 DATE: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 19
BACKGROUND REPORT, REFERENCE 13
GENERAL SHALE--KINGSPORT, TN
COAL-FIRED KILN #29--CONTROLLED WITH PREHEATER BAGHOUSE

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	310	308	313	
	Moisture	%	6.47	5.66	4.78	
	Oxygen	%	16	17	17	
	Volumetric flow, actual	acfm	28137	28106	27869	
	Volumetric flow, standard	dscfm	18216	18402	18299	
	Isokinetic variation	%	102.23	104.75	104.05	
Circle: Production or feed rate Capacity:		TPH	9.16	9.16	9.16	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.003	0.0022	0.0024	
	CO2	%	4.5	4.0	3.5	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.468	0.347	0.376	
	CO2	lb/hr	5617	5043	4388	
	Emission factors:					AVERAGE
	Filterable PM	lb/ton	0.0511	0.0379	0.0411	0.0434
	CO2	lb/ton	613	550	479	547

Filename: BRICK14.WQ1
Date: 09-Jul-96
AP-42 SECTION 11.3, REFERENCE 20
BACKGROUND REPORT, REFERENCE 14
Facility: CHATHAM BRICK AND TILE COMPANY
Location: GULF, NORTH CAROLINA
Source: SAWDUST-FIRED BRICK KILN
Test date: AUGUST 19, 1980

CO_2 DATA CANNOT BE USED FOR EMISSION FACTOR DEVELOPMENT BECAUSE VOLUMETRIC FLOW RATES WERE NOT DETERMINED DURING EACH TEST RUN

PARTICLE SIZE DATA SUMMARY

PARTICLE DIAMETER	% LESS THAN STATED SIZE
PM-10	84%
PM-2.5	36%
PM-1	30%

Filename: BRICK15.WQ1 Date: 09-Jul-96

AP-42 SECTION 11.3, REFERENCE 21

BACKGROUND REPORT, REFERENCE 15

Facility: LEE BRICK AND TILE COMPANY

Location: SANFORD, NORTH CAROLINA

Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER

Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	520	520.1	489.1	
NORTH	Pressure	in. HG	29.84	30.42	29.8	
STACK	Moisture	%	5.95	5.69	6.59	
	Oxygen	%	16.1	16.4	16.3	
	Volumetric flow, actual	acfm	13500	13200	13300	
	Volumetric flow, standard*	dscfm	6822	6819	6884	0
	Isokinetic variation	%	103.9	102.3	98.2	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.133	0.146	0.151	
	Condensible inorganic PM	gr/dscf	0.011	0.015	0.01	
	CO2	% vol	3.3	3.4	3.2	
	SO2	ppmdv	36.5	ND	ND	
	NOx	ppmdv	134	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	7.778	8.533	8.909	
	Condensible inorganic PM	lb/hr	0.643	0.877	0.590	
	CO2	lb/hr	1543	1589	1510	
	SO2	lb/hr	2.48	ND	ND	
	NOx	lb/hr	6.55	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	1.1	1.2	1.2	1.2
	Condensible inorganic PM	lb/ton	0.09	0.12	0.08	0.10
	CO2	lb/ton	213	219	208	213
	SO2	lb/ton	0.34	ND	ND	0.34
	NOx	lb/ton	0.90	ND	ND	0.90
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.54	0.59	0.61	0.58
	Condensible inorganic PM	kg/Mg	0.044	0.060	0.041	0.048
	CO2	kg/Mg	106	109	104	107
	SO2	kg/Mg	0.17	ND	ND	0.17
	NOx	kg/Mg	0.45	ND	ND	0.45

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15A.WQ1
Date: 09-Jul-96
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	184.5	192.8	197.4	
SOUTH	Pressure	in. HG	29.84	30.42	29.8	
STACK	Moisture	%	2.45	2.57	3.27	
	Oxygen	%	19.5	19	18.7	
	Volumetric flow, actual	acfm	13300	13100	13000	
	Volumetric flow, standard*	dscfm	10601	10496	10059	0
	Isokinetic variation	%	101.9	102	102	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.035	0.036	0.035	
	Condensible inorganic PM	gr/dscf	0.002	0.001	0.002	
	CO2	% vol	0.7	1	1.1	
	SO2	ppmdv	7.52	ND	ND	
	NOx	ppmdv	40.2	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	3.180	3.239	3.018	
	Condensible inorganic PM	lb/hr	0.182	0.090	0.172	
	CO2	lb/hr	509	719	758	
	SO2	lb/hr	0.80	ND	ND	
	NOx	lb/hr	3.05	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.44	0.45	0.42	0.43
	Condensible inorganic PM	lb/ton	0.025	0.012	0.024	0.020
	CO2	lb/ton	70	99	104	91
	SO2	lb/ton	0.11	ND	ND	0.11
	NOx	lb/ton	0.42	ND	ND	0.42
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.22	0.22	0.21	0.22
	Condensible inorganic PM	kg/Mg	0.013	0.006	0.012	0.010
	CO2	kg/Mg	35	50	52	46
	SO2	kg/Mg	0.055	ND	ND	0.055
	NOx	kg/Mg	0.21	ND	ND	0.21

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15B.WQ1
Date: 09-Jul-96
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
3	Stack temperature	Deg F	136.8	130.9	144.4	
BOTTOM	Pressure	in. HG	29.84	30.42	29.8	
STACK	Moisture	%	0.747	0.654	1.476	
	Oxygen	%	20.2	20.2	20.2	
	Volumetric flow, actual	acfm	4790	4680	4640	
	Volumetric flow, standard*	dscfm	4195	4224	3978	0
	Isokinetic variation	%	101	102.6	102.6	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.004	0.004	0.003	
	Condensible inorganic PM	gr/dscf	0.003	0.002	0.002	
	CO2	% vol	<0.1	<0.1	<0.1	
	SO2	ppmdv	<3.65	ND	ND	
	NOx	ppmdv	71.7	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.144	0.145	0.102	
	Condensible inorganic PM	lb/hr	0.108	0.072	0.068	
	CO2	lb/hr	ND	ND	ND	
	SO2	lb/hr	ND	ND	ND	
	NOx	lb/hr	2.15	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.020	0.020	0.014	0.018
	Condensible inorganic PM	lb/ton	0.015	0.010	0.009	0.011
	CO2	lb/ton	ND	ND	ND	ND
	SO2	lb/ton	ND	ND	ND	ND
	NOx	lb/ton	0.30	ND	ND	0.30
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.0099	0.010	0.0070	0.0090
	Condensible inorganic PM	kg/Mg	0.0074	0.0050	0.0047	0.0057
	CO2	kg/Mg	ND	ND	ND	ND
	SO2	kg/Mg	ND	ND	ND	ND
	NOx	kg/Mg	0.15	ND	ND	0.15

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15C.WQ1
Date: 09-Jul-96
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
4	Stack temperature	Deg F	84.1	82.1	81.9	
DRYER	Pressure	in. HG	29.84	30.42	29.8	
STACK	Moisture	%	2.94	2.79	3.49	
	Oxygen	%	20.4	20.4	20.4	
	Volumetric flow, actual	acfm	48700	48800	48900	
	Volumetric flow, standard*	dscfm	45747	46977	45798	0
	Isokinetic variation	%	98.8	103.3	104.6	
Circle: Production or feed rate Capacity:		TPH	7.2576	7.2576	7.2576	
	Pollutant concentrations:					
	Filterable PM	gr/dscf	0.001	0.002	0.001	
	Condensible inorganic PM	gr/dscf	0.003	0.001	0.002	
	CO2	% vol	<0.1	<0.1	<0.1	
	SO2	ppmdv	13.2	ND	ND	
	NOx	ppmdv	14.5	ND	ND	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.392	0.805	0.393	
	Condensible inorganic PM	lb/hr	1.176	0.403	0.785	
	CO2	lb/hr	ND	ND	ND	
	SO2	lb/hr	6.02	ND	ND	
	NOx	lb/hr	4.75	ND	ND	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.054	0.11	0.054	0.073
	Condensible inorganic PM	lb/ton	0.16	0.055	0.11	0.11
	CO2	lb/ton	ND	ND	ND	ND
	SO2	lb/ton	0.83	ND	ND	0.83
	NOx	lb/ton	0.65	ND	ND	0.65
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.027	0.055	0.027	0.037
	Condensible inorganic PM	kg/Mg	0.081	0.028	0.054	0.054
	CO2	kg/Mg	ND	ND	ND	ND
	SO2	kg/Mg	0.41	ND	ND	0.41
	NOx	kg/Mg	0.33	ND	ND	0.33

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK15D.WQ1
Date: 09-Jul-96
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: COAL-FIRED BRICK KILN AND WASTE HEAT FIRED DRYER
Test date: JANUARY 1980

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	EMISSION FACTORS	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
SUM OF NORTH, SOUTH, & BOTTOM KILN STACKS	(ENGLISH UNITS):					
	Filterable PM	lb/ton	1.6	1.7	1.6	1.6
	Condensible inorganic PM	lb/ton	0.13	0.14	0.11	0.13
	CO_2	lb/ton	283	318	312	304
	SO_2	lb/ton	0.45	ND	ND	0.45
	NO_x	lb/ton	1.6	ND	ND	1.6
	METRIC UNITS:					AVERAGE
	Filterable PM	kg/Mg	0.78	0.84	0.82	0.81
	Condensible inorganic PM	kg/Mg	0.065	0.071	0.057	0.064
	CO_2	kg/Mg	142	159	156	152
	SO_2	kg/Mg	0.23	ND	ND	0.23
	NO_x	kg/Mg	0.81	ND	ND	0.81

Filename: BRICK15E.WQ1
Date: 09-Jul-96
Facility: LEE BRICK AND TILE COMPANY
Location: SANFORD, NORTH CAROLINA
Source: LOW-ASH COAL-FIRED KILN
Test date: JANUARY 1980

PARTICLE SIZE DATA SUMMARY

KILN OUTLET STACKS

AERODYN. DIAMETER	% LESS THAN STATED SIZE
PM-10	57.53%
PM-2.5	23.37%
PM-1	9.77%

KILN OUTLET STACKS

NORTH KILN STACK		SOUTH KILN STACK	
PARTICLE DIAMETER	% LESS THAN STATED SIZE	PARTICLE DIAMETER	% LESS THAN STATED SIZE
10	56.80%	10	58.27%
8.6	52.60%	7.5	52.40%
5.4	43.00%	4.9	46.30%
3.6	30.20%	3.3	35.30%
2.5	19.60%	2.5	27.14%
2.5	19.60%	2.3	25.10%
1.5	10.00%	1.4	18.70%
1	5.07%	1	14.46%
0.81	3.20%	0.73	11.60%

Filename: BRICK17.WQ1
AP-42 SECTION 11.3, REFERENCE 22
BACKGROUND REPORT, REFERENCE 17
Date: 17-Jul-96
Facility: Acme Brick
Location: Sealy, TX
Source: Natural gas-fired tunnel kiln with dry packed bed scrubber (limestone media)
Test date: 06/18/91

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	281.2	282.5	281.3	
	Pressure	in. HG	29.9	29.9	29.9	
	Moisture	%	8.142	7.705	7.77	
	Oxygen	%	18	18	18.5	
	Volumetric flow, actual	acfm	48005	47607	48024	
	Volumetric flow, standard*	dscfm	31391	31225	31527	0
	Isokinetic variation	%	97.33	97.68	97.72	
Circle: Production or feed rate Capacity:		TPH	19.2	19.2	19.2	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0153	0.0158	0.0181	
	Hydrogen fluoride	ppmdv	0.6934	0.7869	0.865	
	SO2	ppmdv	38.94	40.49	39.81	
	CO2	% dv	3	4	3	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	4.107	4.241	4.903	
	Hydrogen fluoride	lb/hr	0.0678	0.0765	0.0849	
	SO2	lb/hr	12.2	12.6	12.5	
	CO2	lb/hr	6454	8560	6482	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.21	0.22	0.26	0.23
	Hydrogen fluoride	lb/ton	0.0035	0.0040	0.0044	0.0040
	SO2	lb/ton	0.64	0.66	0.65	0.65
	SO2 (from dryer)	lb/ton	0.022	0.023	0.027	0.024
	Total SO2 (kiln + dryer)	lb/ton	0.66	0.68	0.68	0.67
	CO2	lb/ton	336	446	338	373
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.11	0.11	0.13	0.12
	Hydrogen fluoride	kg/Mg	0.0018	0.0020	0.0022	0.0020
	SO2	kg/Mg	0.32	0.33	0.33	0.32
	SO2 (from dryer)	kg/Mg	0.011	0.012	0.013	0.012
	Total SO2 (kiln + dryer)	kg/Mg	0.33	0.34	0.34	0.34
	CO2	kg/Mg	168	223	169	187

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK17A.WQ1
AP-42 SECTION 11.3, REFERENCE 22
BACKGROUND REPORT, REFERENCE 17
Date: 10-Jul-96
Facility: Acme Brick
Location: Sealy, TX
Source: Brick dryer
Test date: 06/18/91

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	105.8	108.5	108.5	
	Pressure	in. HG	29.81	29.83	29.83	
	Moisture	%	5.292	4.544	6.748	
	Oxygen	%	21	21	21	
	Volumetric flow, actual	acfm	67975	66414	67078	
	Volumetric flow, standard*	dscfm	59859	58696	57914	0
	Isokinetic variation	%	NA	NA	NA	
Circle: Production or feed rate Capacity:		TPH	19.2	19.2	19.2	
	Pollutant concentrations:					
	Hydrogen fluoride	ppmdv	ND	ND	ND	
	SO2	ppmdv	0.7167	0.7625	0.8938	
	CO2	% dv	0	0	0	
	Pollutant mass flux rates:					
	Hydrogen fluoride	lb/hr	ND	ND	ND	
	SO2	lb/hr	0.4	0.4	0.5	
	CO2	lb/hr	0	0	0	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Hydrogen fluoride	lb/ton	ND	ND	ND	ND
	SO2	lb/ton	0.022	0.023	0.027	0.024
	CO2	lb/ton	0	0	0	0
	Emission factors (METRIC UNITS):					AVERAGE
	Hydrogen fluoride	kg/Mg	ND	ND	ND	ND
	SO2	kg/Mg	0.011	0.012	0.013	0.012
	CO2	kg/Mg	0	0	0	0

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK18.WQ1
AP-42 SECTION 11.3, BACKGROUND REPORT REFERENCE 18
Date: 10-Jul-96
Facility: Lee Brick and Tile Company
Location: Sanford, NC
Source: Coal-fired tunnel kiln
Test date: 01/24/78
Comments: Only one test run performed one each stack. Test is not valid.

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	478			
Waste heat stack	Pressure	in. HG	29.4			
	Moisture	%	6.6			
	Oxygen	%	16			
	Volumetric flow, actual	acfm	7816			
	Volumetric flow, standard*	dscfm	4210			0
	Isokinetic variation	%	103.28			
Brick production rate		TPH	10.37			
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.3309			
	CO2	% dv	5			
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	11.94			
	CO2	lb/hr	1443			
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	1.2			1.2
	CO2	lb/ton	139			139
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.58			0.58
	CO2	kg/Mg	70			70

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

TOTAL EMISSION FACTORS FOR BOTH STACKS

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	3.8			3.84
	CO2	lb/ton	369			369
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.9			1.92
	CO2	kg/Mg	185			185

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	239			
Dryer stack	Pressure	in. HG	29.36			
	Moisture	%	0.61			
	Oxygen	%	19.5			
	Volumetric flow, actual	acfm	31486			
	Volumetric flow, standard*	dscfm	23197			0
	Isokinetic variation	%	101.36			
Brick production rate		TPH	10.37			
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1400			
	CO2	% dv	1.5			
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	27.84			
	CO2	lb/hr	2385			
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	2.7			2.7
	CO2	lb/ton	230			230
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.3			1.3
	CO2	kg/Mg	115			115

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK19.WQ1
AP-42 SECTION 11.3, BACKGROUND REPORT, REFERENCE 19
Date: 10-Jul-96
Facility: Lee Brick and Tile Company
Location: Sanford, NC
Source: Coal-fired tunnel kiln
Test date: 02/09/78

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	306	303	308	
South stack	Pressure	in. HG	29.9	29.9	29.9	
	Moisture	%	3.84	4.35	4.17	
	Oxygen	%	19	19	19	
	Volumetric flow, actual	acfm	31560	32827	31912	
	Volumetric flow, standard*	dscfm	20905	21714	21012	0
	Isokinetic variation	%	96.8	96.1	99.5	
Brick production rate		TPH	8.3	8.3	8.3	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1337	0.1206	0.1076	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	23.96	22.45	19.38	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	2.9	2.7	2.3	2.6
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.4	1.4	1.2	1.3

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	336	336	335	
North stack	Pressure	in. HG	29.9	29.9	29.9	
	Moisture	%	3.35	3.6	3.5	
	Oxygen	%	19	19	19	
	Volumetric flow, actual	acfm	2376	2226	2281	
	Volumetric flow, standard*	dscfm	1522	1422	1461	0
	Isokinetic variation	%	98.7	97.6	95.4	
Brick production rate		TPH	8.3	8.3	8.3	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.1541	0.1554	0.1367	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	2.01	1.89	1.71	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.24	0.23	0.21	0.23
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.12	0.11	0.10	0.11

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT. % MOISTURE AND STACK PRESSURE BACKCALCULATED FROM dscfm PROVIDED IN REPORT.

TOTAL EMISSION FACTORS FOR BOTH STACKS

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	3.1	2.9	2.5	2.9
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	1.6	1.5	1.3	1.4

Filename: BRICK21.WQ1
AP-42 SECTION 11.3, REFERENCE 23
BACKGROUND REPORT, REFERENCE 21
Date: 10-Jul-96
Facility: Chatham Brick and Tile Company
Location: Sanford, NC
Source: Sawdust fired tunnel kiln
Test date: 07/18/79

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	341	344	323	
Waste heat stack	Pressure	in. HG	29.76	29.76	29.99	
	Moisture	%	6.6	7	6.5	
	Oxygen	%	18.7	18.7	18.7	
	Volumetric flow, actual	acfm	19677	19577	19522	
	Volumetric flow, standard*	dscfm	12050	11893	12337	0
	Isokinetic variation	%	102.3	101.3	102.6	
Brick production rate		TPH	5.2	5.2	5.2	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0131	0.0110	0.0170	
	CO2	% dv	1.8	1.8	1.8	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	1.35	1.12	1.80	
	CO2	lb/hr	1486	1467	1522	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.26	0.22	0.35	0.27
	CO2	lb/ton	286	282	293	287
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.13	0.11	0.17	0.14
	CO2	kg/Mg	143	141	146	143

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

TOTAL EMISSION FACTORS FOR BOTH STACKS

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.42	0.29	0.44	0.38
	CO2	lb/ton	672	635	654	654
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.21	0.14	0.22	0.19
	CO2	kg/Mg	336	318	327	327

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	124	124	116	
Dryer	Pressure	in. HG	29.78	29.78	30.01	
stack	Moisture	%	4.4	6	5.4	
	Oxygen	%	18.7	18.7	18.7	
	Volumetric flow, actual	acfm	18917	17596	17527	
	Volumetric flow, standard*	dscfm	16274	14884	15245	0
	Isokinetic variation	%	93.8	99.4	96.5	
Brick production rate		TPH	5.2	5.2	5.2	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.0058	0.0030	0.0038	
	CO2	% dv	1.8	1.8	1.8	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	0.81	0.38	0.50	
	CO2	lb/hr	2008	1836	1881	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.16	0.074	0.10	0.11
	CO2	lb/ton	386	353	362	367
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.078	0.037	0.048	0.054
	CO2	kg/Mg	193	177	181	183

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK22.WQ1 DATE: 18-Mar-97
AP-42 SECTION 11.3, REFERENCE 25
BACKGROUND REPORT, REFERENCE 22
TRAINGLE BRICK--MERRY OAKS, NC
BRICK KILN NO. 2 STACK

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	510	517	508		
	Pressure	in. HG	30.47	30.47	30.47		
	Moisture	%	7.1	7.2	7.1		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	29680	29114	28491		
	Volumetric flow, standard*	dscfm	15285	14870	14703	0	
	Isokinetic variation	%	102.7	102.1	99.6		
Circle: Capacity:	Production or feed rate	TPH	10.56	10.56	10.56		
	Pollutant concentrations:						
	CO	ppmdv	92.8	91.8	95.6		
	CO2	%	2.4	2.4	2.4		
	NOx	ppmdv	12	12.6	12.7		
	SO2	ppmdv	5.1	4.2	4		
	TOC as propane	ppmdv	6.83	7.20	7.47		
	Methane as propane (all runs non-detect)**	ppmdv	0.660	0.637	0.640		
	Antimony	G/dscf	0	2.67E-07	1.58E-05		
	Arsenic	G/dscf	6.13E-07	9.42E-07	4.16E-06		
	Beryllium (all runs non-detect)**	G/dscf	3.35E-08	3.46E-08	3.75E-08		
	Cadmium	G/dscf	2.65E-07	5.85E-07	5.82E-07		
	Chromium	G/dscf	1.39E-06	1.88E-06	1.91E-06		
	Cobalt (all runs non-detect)**	G/dscf	3.35E-07	3.46E-07	3.75E-07		
	Lead	G/dscf	1.08E-06	1.01E-06	1.96E-05		
	Manganese	G/dscf	8.01E-06	6.47E-06	6.42E-06		
	Mercury (all runs non-detect)**	G/dscf	7.87E-07	8.13E-07	8.82E-07		
	Nickel	G/dscf	1.2E-06	1.6E-06	3.68E-07		
	Selenium	G/dscf	3.68E-06	3.51E-06	3.39E-06		
	Pollutant mass flux rates:						
	CO	lb/hr	6.19	5.95	6.13		
	CO2	lb/hr	2514	2446	2418		
	NOx	lb/hr	1.31	1.34	1.34		
	SO2	lb/hr	0.778	0.623	0.587		
	TOC as propane	lb/hr	0.716	0.734	0.752		
	Methane as propane (all runs non-detect)**	lb/hr	0.0346	0.0324	0.0322		
	Antimony	lb/hr	0.00E+00	3.40E-05	1.99E-03		
	Arsenic	lb/hr	8.03E-05	1.20E-04	5.24E-04		
	Beryllium (all runs non-detect)**	lb/hr	2.19E-06	2.20E-06	2.36E-06		
	Cadmium	lb/hr	3.47E-05	7.46E-05	7.33E-05		
	Chromium	lb/hr	1.82E-04	2.40E-04	2.41E-04		
	Cobalt (all runs non-detect)**	lb/hr	2.19E-05	2.20E-05	2.36E-05		
	Lead	lb/hr	1.41E-04	1.29E-04	2.47E-03		
	Manganese	lb/hr	1.05E-03	8.25E-04	8.09E-04		
	Mercury (all runs non-detect)**	lb/hr	5.16E-05	5.18E-05	5.56E-05		
	Nickel	lb/hr	1.57E-04	2.04E-04	4.64E-05		
	Selenium	lb/hr	4.82E-04	4.47E-04	4.27E-04		
	Emission factors (ENGLISH UNITS):						AVERAGE
	CO	lb/ton	0.59	0.56	0.58		0.58
	CO2	lb/ton	238	232	229		233
	NOx	lb/ton	0.12	0.13	0.13		0.13
	SO2	lb/ton	0.074	0.059	0.056		0.063
	TOC as propane	lb/ton	0.068	0.069	0.071		0.069
	Methane as propane (all runs non-detect)**	lb/ton	0.0033	0.0031	0.0031		0.0031
	Antimony	lb/ton	0.0E+00	3.2E-06	1.9E-04		6.4E-05
	Arsenic	lb/ton	7.6E-06	1.1E-05	5.0E-05		2.3E-05
	Beryllium (all runs non-detect)**	lb/ton	2.1E-07	2.1E-07	2.2E-07		2.1E-07
	Cadmium	lb/ton	3.3E-06	7.1E-06	6.9E-06		5.8E-06
	Chromium	lb/ton	1.7E-05	2.3E-05	2.3E-05		2.1E-05
	Cobalt (all runs non-detect)**	lb/ton	2.1E-06	2.1E-06	2.2E-06		2.1E-06
	Lead	lb/ton	1.3E-05	1.2E-05	2.3E-04		8.6E-05
	Manganese	lb/ton	9.9E-05	7.8E-05	7.7E-05		8.5E-05
	Mercury (all runs non-detect)**	lb/ton	4.9E-06	4.9E-06	5.3E-06		5.0E-06
	Nickel	lb/ton	1.5E-05	1.9E-05	4.4E-06		1.3E-05
	Selenium	lb/ton	4.6E-05	4.2E-05	4.0E-05		4.3E-05

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
**CONCENTRATIONS SHOWN REPRESENT THE POLLUTANT DETECTION LIMIT FOR EACH TEST RUN.
EMISSION RATES AND FACTORS CALCULATED USING ONE-HALF OF THE DETECTION LIMIT.

Filename: BRICK22A.WQ1 DATE: 10-Jul-96
TRAINGLE BRICK--MERRY OAKS, NC
BRICK KILN NO. 2 STACK

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
2	Stack temperature	Deg F	518	516	519		
	Pressure	in. HG	30.5	30.47	30.5		
	Moisture	%	6.8	6.5	7		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	28515	30363	29047		
	Volumetric flow, standard*	dscfm	14626	15641	14852	0	
	Isokinetic variation	%	99.4	98.6	98.9		
Circle: Production or feed rate Capacity:		TPH	10.56	10.56	10.56		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.00293	0.00246	0.00325		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	0.367	0.330	0.414		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.035	0.031	0.039		0.0351
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.017	0.016	0.020		0.018

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK22B.WQ1 DATE: 10-Jul-96
TRAINGLE BRICK--MERRY OAKS, NC
BRICK KILN NO. 2 STACK

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	Run 4	
3	Stack temperature	Deg F	505	510.4	510.4		
	Pressure	in. HG	30.5	30.5	30.51		
	Moisture	%	6.2	6.2	6.2		
	Oxygen	%	16.6	16.6	16.6		
	Volumetric flow, actual	acfm	28012	28091	28091		
	Volumetric flow, standard*	dscfm	14655	14615	14620	0	
	Isokinetic variation	%	100.4	100.1	99.8		
Circle: Production or feed rate Capacity:		TPH	10.56	10.56	10.56		
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.00602	0.00510	0.00553		
	Filterable PM-10	G/dscf	0.00447	0.00380	0.00422		
	Total condensible PM	G/dscf	0.0122	0.0165	0.0168		
	Condensible inorganic PM	G/dscf	0.0109	0.0165	0.0149		
	Condensible organic PM	G/dscf	0.0013	0	0.0019		
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	0.756	0.639	0.693		
	Filterable PM-10	lb/hr	0.562	0.476	0.529		
	Total condensible PM	lb/hr	1.53	2.07	2.11		
	Condensible inorganic PM	lb/hr	1.37	2.07	1.87		
	Condensible organic PM	lb/hr	0.159	0.00	0.236		
	Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.072	0.061	0.066		0.066
	Filterable PM-10	lb/ton	0.053	0.045	0.050		0.0494
	Condensible inorganic PM	lb/ton	0.130	0.20	0.18		0.17
	Condensible organic PM	lb/ton	0.015	0.000	0.022		0.0125
	Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.036	0.030	0.033		0.033
	Filterable PM-10	kg/Mg	0.027	0.023	0.025		0.025
	Condensible inorganic PM	kg/Mg	0.065	0.098	0.088		0.084
	Condensible organic PM	kg/Mg	0.0075	0.0000	0.0112		0.0062

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK23.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE 26
BACKGROUND REPORT, REFERENCE 23
SUMMARY DATA FROM TESTING PERFORMED BY CLEMSON UNIVERSITY

ENDICOTT CLAY PRODUCTS, UNSPECIFIED FUEL
TEST METHOD: 13B, TOTAL FLUORIDES (TF)

	RUN 1	RUN 2	AVERAGE
LB/HR, TF	1.34	1.44	
PRODUCTION RATE, T	5.92	5.92	
EMISSION FACTORS			
TOTAL FLUORIDES, LB/	0.23	0.24	0.23

COMMENTS: C-RATED DATA, LITTLE DETAIL PROVIDED ABOUT TESTING

BORAL BRICKS, INC., SALISBURY, NC
SAWDUST-FIRED KILN (TWO KILN STACKS AND ONE SAWDUST DRYER STACK)
TEST METHODS: 26A, HF & HCl; 5, PM; 8, SO2 & SO3

	RUN 1	RUN 2	RUN 3	AVERAGE
HF, LB/HR	5.705	6.773	6.838	
HCl, LB/HR	0.985	1.3585	1.563	
SO2, LB/HR	12.76	11.82	12.47	
SO3, LB/HR	0.910	1.15	1.43	
PM, LB/HR	24.23	26.56	21.4	
PRODUCTION RATE, T	22.8	22.8	22.8	
EMISSION FACTORS				
HF, LB/TON	0.25	0.30	0.30	0.28
HCl, LB/TON	0.043	0.060	0.069	0.057
SO2, LB/TON	0.56	0.52	0.55	0.54
SO3, LB/TON	0.040	0.050	0.063	0.051
PM, LB/TON	1.06	1.16	0.94	1.06

COMMENTS: B-RATED DATA, MRI AND EPA VISITED THIS PLANT IN 1992.
PM DATA MAY NOT BE USEFUL DUE TO CONFIGURATION OF KILN/SAWDUST DRY

BORAL BRICKS, INC., PHENIX CITY, AL
NATURAL GAS-FIRED KILN
TEST METHODS: 26, HF & HCl; 8, SO2 & SO3; 13B, TF

	RUN 1	RUN 2	RUN 3	AVERAGE
HF, LB/HR	3.13	3.32	1.86	
HCl, LB/HR	1.42	1.57	0.748	
SO2, LB/HR	3.13	2.85	2.81	
SO3, LB/HR	0.631	0.64	0.58	
TF, LB/HR	4.98	4.8	4.55	
PRODUCTION RATE, T	12.848	12.848	12.848	
EMISSION FACTORS				
HF, LB/TON	0.24	0.26	0.14	0.22
HCl, LB/TON	0.111	0.122	0.058	0.097
SO2, LB/TON	0.24	0.22	0.22	0.23
SO3, LB/TON	0.049	0.050	0.045	0.048
TF, LB/TON	0.39	0.37	0.35	0.37

COMMENTS: C-RATED DATA.

REDLANDS BRICK, EAST WINDSOR, CT
NATURAL GAS-FIRED KILN
TEST METHODS: 26, HF & HCl; 8, SO2 & SO3

	RUN 1	RUN 2	RUN 3	AVERAGE
HF, LB/HR	7.6	6.19	6.85	
HCl, LB/HR	3.22	2.5	2.84	
SO2, LB/HR	7.16	7.5	6.6	
SO3, LB/HR	0.273	0.61	0.36	
PRODUCTION RATE, T	10.94	10.94	10.94	
EMISSION FACTORS				
HF, LB/TON	0.69	0.57	0.63	0.63
HCl, LB/TON	0.294	0.229	0.260	0.261
SO2, LB/TON	0.65	0.69	0.60	0.65
SO3, LB/TON	0.025	0.056	0.033	0.038

COMMENTS: C-RATED DATA.

RICHTEX CORP., PLANT 4, COLUMBIA, SC
NATURAL GAS-FIRED KILN
TEST METHODS: 13B, TF

	RUN 1	RUN 2	RUN 3	AVERAGE
TOTAL FLUORIDES, LB/	4.76	5.46	4.62	
PRODUCTION RATE, T	11.27	11.27	11.27	
EMISSION FACTORS				
TOTAL FLUORIDES, LB/	0.42	0.48	0.41	0.44

COMMENTS: ALL RUNS BETWEEN 114% AND 116% ISOKINETIC
RESULTS ARE PROBABLY BIASED LOW, BUT ARE > AVG. TF. C-RATED DATA.

BORAL BRICKS, INC., PLANT 5, AUGUSTA, GA
NATURAL GAS-FIRED KILN, SAWDUST IN BODY OF BRICKS
TEST METHODS: 26A, HF & HCl; 5, PM; 8, SO2 & SO3

	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	AVERAGE
HF, LB/HR				17.69	15.89	16.62	
HCl, LB/HR				8.64	7.79	7.99	
SO2, LB/HR	19.65	19.46	19.49				
SO3, LB/HR	6.64	4.77	5.19				
PM, LB/HR	3.75	3.58	2.8	2.87	3.81	3.48	
PRODUCTION RATE, T	19.71	19.71	19.71	19.71	19.71	19.71	
EMISSION FACTORS							
HF, LB/TON				0.90	0.81	0.84	0.85
HCl, LB/TON				0.44	0.40	0.41	0.41
SO2, LB/TON	1.00	0.99	0.99				0.99
SO3, LB/TON	0.34	0.24	0.26				0.28
PM, LB/TON	0.19	0.18	0.14	0.15	0.19	0.18	0.17

COMMENTS: B-RATED DATA. SUFFICIENT DETAIL ABOUT TESTING PROVIDED.

Source category: Brick & structural clay products
Plant name : Stark Ceramics, Inc.
Process : glazed structural clay tile mfg.

Filename: BRICK24.WQ1
Location: East Canton, OH
Test date: Sept. 16, 1993

Date: 07/10/96
Ref. No.: 24/ – AP-42 Ref 27
Process rate basis: production

Source	Type of control	Pollutant	Run No.	Test Method	Isokinetic, %	Gas volume, DSCF	Volum. flow rate, DSCFM	Mass, g	Concen., gr/DSCF	Emission rate, lb/hr	Process rate, ton/hr	Emission factor kg/Mg	Emission factor lb/ton	Emission factor Rat.
Kiln No. 3	none	filterable PM	1	EPA 5	91.4	31.68	9,226	0.152	0.074	5.84	2.92	1.0	2.0	
		filterable PM	2		92.2	32.13	9,276	0.108	0.052	4.13	2.92	0.71	1.4	
		filterable PM	3		96.8	34.39	9,464	0.141	0.063	5.13	2.92	0.88	1.8	
									gr/DSCF		Average	0.86	1.7	B
		fluoride	1	EPA13B	92.0	48.26	8,957	0.076	0.024	1.88	2.92	0.32	0.64	
		fluoride	2		97.4	48.60	8,786	0.076	0.024	1.81	2.92	0.31	0.62	
		fluoride	3		97.0	49.35	9,048	0.078	0.024	1.89	2.92	0.32	0.65	
									ppm		Average	0.32	0.64	B
		SO2	1	EPA 6	NA	NA	9,226	NA	231.64	20.8	2.92	3.6	7.1	
		SO2	2		NA	NA	9,276	NA	220.89	23.8	2.92	4.1	8.2	
		SO2	3		NA	NA	9,464	NA	284.96	23.3	2.92	4.0	8.0	
									%		Average	3.9	7.7	B
		CO2	1	Orsat	NA	NA	9,226	NA	3.4	2,153	2.92	370	740	
		CO2	2		NA	NA	9,276	NA	3.1	1,974	2.92	340	680	
		CO2	3		NA	NA	9,464	NA	3.2	2,079	2.92	360	710	
											Average	360	710	B

Basis for rating: - Process rates are average for kiln car processed.
Problems noted:
Other notes:

Source category: Brick & structural clay products
Plant name : Crescent Brick Company
Process : structural clay tile mfg.
No. 2 tunnel kiln

Filename: BRICK25.WQ1
Location: East Canton, OH
Test date: Feb. 29, 1988

Date: 07/26/96
Ref. No.: 25/28
Process rate basis: production

Source	Type of control	Pollutant	Run No.	Test Method	Isokinetic, %	Gas volume, DSCF	Volum. flow rate, DSCFM	Mass, g	Concen., gr/DSCF	Emission rate, lb/hr	Process rate, ton/hr	Emission factor kg/Mg	Emission factor lb/ton	Rat.
Kiln No. 3	none	filterable PM	1	EPA 5	103.8	29.54	6,188	0.064	0.0336	1.78	4.52	0.20	0.39	
		filterable PM	2		108.2	31.83	6,396	0.063	0.0307	1.69	4.52	0.19	0.37	
		filterable PM	3		105.1	31.55	6,581	0.065	0.0317	1.79	4.52	0.20	0.40	
									ppmdv		Average	0.19	0.39	B
		SO2	1	EPA 6	NA	NA	6,188	NA	177	10.9	4.52	1.2	2.4	
		SO2	2		NA	NA	6,396	NA	228	14.5	4.52	1.6	3.2	
		SO2	3		NA	NA	6,581	NA	202	13.6	4.52	1.5	3.0	
									%		Average	1.4	2.9	B
		CO2	1	Orsat	NA	NA	6,188	NA	3.1	1,317	4.52	150	290	
		CO2	2		NA	NA	6,396	NA	3.0	1,317	4.52	150	290	
		CO2	3		NA	NA	6,581	NA	2.4	1,084	4.52	120	240	
											Average	140	270	B

Basis for rating: - Lack of detail about the process provided in the test report.
Problems noted:
Other notes:

Filename BRICK29.WQ1 DATE: 06-Mar-97

AP-42 SECTION 11.3, REFERENCE

BACKGROUND REPORT, REFERENCE 29

INTERSTATE BRICK--WEST JORDAN, UTAH

PRIMARY CRUSHER BAGHOUSE

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	45.08	49.83	51.33	
	Pressure	in. HG	25.12	25.12	25.12	
	Moisture	%	4	4	3	
	Oxygen	%	20.8	20.8	20.8	
	Stack area	ft2	0.7854	0.7854	0.7854	
	Gas velocity	ft/sec	52.24	52.27	52.58	
	Volumetric flow, actual	acfm	2462	2463	2478	
	Volumetric flow, standard*	dscfm	2074	2056	2084	
	Isokinetic variation	%	150.18	148.7	147.72	
PROCESS RATE		TPH	100	100	100	
	Pollutant concentrations:					
	PM-10	G/dscf	0.0033	0.0032	0.0035	
	Pollutant mass flux rates:					
	PM-10	lb/hr	0.0587	0.0564	0.0625	
	Emission factors (ENGLISH UNITS):					AVERAG
	PM-10	lb/ton	5.9E-04	5.6E-04	6.3E-04	5.9E-04

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename BRICK29A.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 29
INTERSTATE BRICK--WEST JORDAN, UTAH
EXTRUSION LINE 3 BAGHOUSE

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	59.83	55.42	50.25	
	Pressure	in. HG	24.66	24.64	24.6	
	Moisture	%	2	1	1	
	Oxygen	%	20.5	20.5	20.5	
	Stack area	ft2	1.917	1.917	1.917	
	Gas velocity	ft/sec	33.92	34.41	32.78	
	Volumetric flow, actual	acfm	3901	3958	3770	
	Volumetric flow, standard*	dscfm	3201	3306	3176	
	Isokinetic variation	%	123.18	118.69	127.71	
PROCESS RATE		TPH	21.9	21.9	21.9	
	Pollutant concentrations:					
	PM-10	G/dscf	0.0039	0.0026	0.002	
	Pollutant mass flux rates:					
	PM-10	lb/hr	0.1070	0.0737	0.0544	
	Emission factors (ENGLISH UNITS):					AVERAG
	PM-10	lb/ton	0.0049	0.0034	0.0025	0.0036

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
BAGHOUSE ON EXTRUSION LINE; INCLUDES 325 MESH ADDITIVES

Filename BRICK29B.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 29
INTERSTATE BRICK--WEST JORDAN, UTAH
EXTRUSION LINE 4 BAGHOUSE

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	43.5	42.5	41.92	
	Pressure	in. HG	25.31	25.31	25.31	
	Moisture	%	6	3	5	
	Oxygen	%	20.8	20.8	20.8	
	Stack area	ft2	1.917	1.917	1.917	
	Gas velocity	ft/sec	17.31	15.73	16.09	
	Volumetric flow, actual	acfm	1991	1809	1851	
	Volumetric flow, standard*	dscfm	1660	1560	1565	
	Isokinetic variation	%	177.17	184.91	185.32	
PROCESS RATE		TPH	21.9	21.9	21.9	
	Pollutant concentrations:					
	PM-10	G/dscf	0.006	0.0029	0.0041	
	Pollutant mass flux rates:					
	PM-10	lb/hr	0.0854	0.0388	0.0550	
	Emission factors (ENGLISH UNITS):					AVERAG
	PM-10	lb/ton	0.0039	0.0018	0.0025	0.0027

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename BRICK29C.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 29
INTERSTATE BRICK--WEST JORDAN, UTAH
TUNNEL KILN #3 SCRUBBER INLET

THIS TEST IS VOID. LETTER FROM PLANT STATES THAT FLOW RATES ARE WRONG.

D. Emission Data/Mass Flux Rates/Emission Factors

			Values reported			
Test ID	Parameter	Units	Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	421.5	422.5	424.5	
	Pressure	in. HG	25.41	25.41	25.41	
	Moisture	%	9.1	9.1	9.1	
	Oxygen	%	14.8	14.8	14.8	
	Stack area	ft2	15.999	15.999	15.999	
	Gas velocity	ft/sec	145.382	147.093	149.4789	
	Volumetric flow, actual	acfm	139558	141200	143491	
	Volumetric flow, standard*	dscfm	64532	65217	66125	
	Isokinetic variation	%	na	na	na	
PROCESS RATE: KILN FEED RATE		TPH	13.625	13.625	13.625	
	Pollutant concentrations:					
	SO2	ppmdv	599.53	592.09	546.41	
	NOx	ppmdv	31.9	32.87	40.26	
	CO2	%	3.4	3.4	3.4	
	Pollutant mass flux rates:					
	SO2	lb/hr	385.9	385.2	360.4	
	NOx	lb/hr	14.7	15.4	19.1	
	CO2	lb/hr	15037	15196	15408	
	Emission factors (ENGLISH UNITS):					AVERAG
	SO2	lb/ton	28	28	26	28
	NOx	lb/ton	1.1	1.1	1.4	1
	CO2	lb/ton	1104	1115	1131	1117

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename BRICK29D.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 29
INTERSTATE BRICK--WEST JORDAN, UTAH
TUNNEL KILN #4 SCRUBBER INLET

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	125.16	123.92	121.2	
	Pressure	in. HG	25.3	25.2	25.22	
	Moisture	%	14.21	12.87	12.41	
	Oxygen	%	16.9	16.8	16.7	
	Stack area	ft2	100.42	100.42	100.42	
	Gas velocity	ft/sec	9.4985	9.8765	10.0498	
	Volumetric flow, actual	acfm	57230	59508	60552	
	Volumetric flow, standard*	dscfm	37461	39488	40614	
	Isokinetic variation	%	95.5	97.9	97.4	
PROCESS RATE: KILN FEED RATE		TPH	12.04	12.04	12.04	
	Pollutant concentrations:					
	SO2	ppmdv	209.31	137.82	182.29	
	NOx	ppmdv	12.36	10.08	8.59	
	CO2	%	2.23	2.47	2.47	
	Pollutant mass flux rates:					
	SO2	lb/hr	78.2	54.3	73.9	
	NOx	lb/hr	3.32	2.85	2.50	
	CO2	lb/hr	5725	6684	6875	
	Emission factors (ENGLISH UNITS):					AVERAG
	SO2	lb/ton	6.5	4.5	6.1	5.7
	NOx	lb/ton	0.28	0.24	0.21	0.24
	CO2	lb/ton	475	555	571	534

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BRICK29E.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 29
INTERSTATE BRICK--WEST JORDAN, UTAH
TUNNEL KILN #4 SCRUBBER OUTLET

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	125.16	123.92	121.2	
	Pressure	in. HG	25.3	25.2	25.22	
	Moisture	%	14.21	12.87	12.41	
	Oxygen	%	16.9	16.8	16.7	
	Stack area	ft2	100.42	100.42	100.42	
	Gas velocity	ft/sec	9.4985	9.8765	10.0498	
	Volumetric flow, actual	acfm	57230	59508	60552	
	Volumetric flow, standard*	dscfm	37461	39488	40614	
	Isokinetic variation	%	95.5	97.9	97.4	
PROCESS RATE: KILN FEED RATE		TPH	12.04	12.04	12.04	
	Pollutant concentrations:					
	SO2	ppmdv	35.26	26.16	29.71	
	NOx	ppmdv	11.43	10.4	8.25	
	CO2	%	2.23	2.47	2.47	
	Total PM	mg	44.4	66	86.2	
	Filterable PM	mg	42.3	63.6	83.4	
	Condensible organic PM	mg	0.9	1.1	1.4	
	Condensible inorganic PM	mg	1.2	1.3	1.4	
	Total PM	G/dscf	0.0188	0.0258	0.033	
	Filterable PM	G/dscf	0.0179	0.0249	0.0319	
	Condensible organic PM	G/dscf	0.00038	0.00043	0.00054	
	Condensible inorganic PM	G/dscf	0.00051	0.00051	0.00054	
	Total fluorides	G/dscf	0.0077	0.0056	0.0058	
	Pollutant mass flux rates:					
	SO2	lb/hr	13.2	10.3	12.0	
	NOx	lb/hr	3.07	2.94	2.40	
	CO2	lb/hr	5725	6684	6875	
	Filterable PM	lb/hr	5.75	8.41	11.11	
	Condensible organic PM	lb/hr	0.12	0.15	0.19	
	Condensible inorganic PM	lb/hr	0.16	0.17	0.19	
	Total fluorides	lb/hr	2.47	1.90	2.02	
	Emission factors (ENGLISH UNITS):					AVERAG
	SO2	lb/ton	1.1	0.86	1.00	0.98
	NOx	lb/ton	0.25	0.24	0.20	0.23
	CO2	lb/ton	475	555	571	534
	Filterable PM	lb/ton	0.48	0.70	0.92	0.70
	Condensible organic PM	lb/ton	0.010	0.012	0.015	0.013
	Condensible inorganic PM	lb/ton	0.014	0.014	0.015	0.014
	Total fluorides	lb/ton	0.21	0.16	0.17	0.18

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename BRICK30.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 30
INTERSTATE BRICK--WEST JORDAN, UTAH
TUNNEL KILN #3 SCRUBBER INLET
OCTOBER 31, 1995

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	546.15	533.45	544.65	
	Pressure	in. HG	25.4	25.33	25.29	
	Moisture	%	6.79	6.96	7.42	
	Oxygen	%	14.6	14.3	14.9	
	Stack area	ft2	15.999	15.999	15.999	
	Gas velocity	ft/sec	47.3805	45.6738	45.8357	
	Volumetric flow, actual	acfm	45482	43844	44000	
	Volumetric flow, standard*	dscfm	18886	18354	18096	
	Isokinetic variation	%	107.4	104.5	103.5	
PROCESS RATE: fired bricks produce		TPH	13.23	13.23	13.23	
	Pollutant concentrations:					
	SO2	ppmdv	125.63	147.92	148.33	
	NOx	ppmdv	79.07	77.52	82.06	
	CO	ppmdv	455.62	445.38	444.65	
	CO2	%	3.5	3.7	3.4	
	Total PM	mg	25.4	24.5	22.8	
	Filterable PM	mg	23.6	23.2	21.1	
	Condensible organic PM	mg	1.4	0.7	1	
	Condensible inorganic PM	mg	0.4	0.6	0.7	
	Total PM	G/dscf	0.0097	0.0099	0.0094	
	Filterable PM	G/dscf	0.0090	0.0094	0.0087	
	Condensible organic PM	G/dscf	0.00053	0.00028	0.00041	
	Condensible inorganic PM	G/dscf	0.00015	0.00024	0.00029	
	Total fluorides	mg/dscf	7.999	11.414	14.422	
	Pollutant mass flux rates:					
	SO2	lb/hr	23.7	27.1	26.8	25.8
	NOx	lb/hr	10.70	10.19	10.64	10.5
	CO	lb/hr	37.53	35.66	35.10	36.1
	CO2	lb/hr	4530	4654	4216	4467
	Filterable PM	lb/hr	1.46	1.47	1.35	1.43
	Condensible organic PM	lb/hr	0.087	0.045	0.064	0.0650
	Condensible inorganic PM	lb/hr	0.025	0.038	0.045	0.0359
	Total fluorides	lb/hr	19.98	27.71	34.52	27.4
	Emission factors (ENGLISH UNITS):					AVERAG
	SO2	lb/ton	1.8	2.0	2.0	2.0
	NOx	lb/ton	0.81	0.77	0.80	0.79
	CO	lb/ton	2.8	2.7	2.7	2.7
	CO2	lb/ton	342	352	319	338
	Filterable PM	lb/ton	0.11	0.11	0.10	0.11
	Condensible organic PM	lb/ton	0.0065	0.0034	0.0048	0.0049
	Condensible inorganic PM	lb/ton	0.0019	0.0029	0.0034	0.0027
	Total fluorides	lb/ton	1.5	2.1	2.6	2.1

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename BRICK30A.WQ1 DATE: 06-Mar-97
AP-42 SECTION 11.3, REFERENCE
BACKGROUND REPORT, REFERENCE 30
INTERSTATE BRICK--WEST JORDAN, UTAH
TUNNEL KILN #3 SCRUBBER OUTLET
OCTOBER 31, 1995

D. Emission Data/Mass Flux Rates/Emission Factors

			Values reported			
Test ID	Parameter	Units	Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	137.96	135.25	135.42	
	Pressure	in. HG	25.38	25.31	25.28	
	Moisture	%	13.87	17.35	16.97	
	Oxygen	%	14.9	14.5	14.9	
	Stack area	ft2	19.635	19.635	19.635	
	Gas velocity	ft/sec	23.5423	22.8724	22.8384	
	Volumetric flow, actual	acfm	27735	26946	26906	
	Volumetric flow, standard*	dscfm	17893	16711	16738	
	Isokinetic variation	%	101.7	99.96	99.3	
PROCESS RATE: fired bricks produce		TPH	13.23	13.23	13.23	
	Pollutant concentrations:					
	SO2	ppmdv	0.45	0.34	0.34	
	NOx	ppmdv	23.4	19.54	24.58	
	CO	ppmdv	461.14	409.35	420.32	
	CO2	%	5.1	5.1	4.9	
	Total PM	mg	32.9	36.5	29.8	
	Filterable PM	mg	32.3	35.8	29.5	
	Condensible organic PM	mg	0.3	0.2	0.2	
	Condensible inorganic PM	mg	0.3	0.5	0.1	
	Total PM	G/dscf	0.0103	0.0125	0.0102	
	Filterable PM	G/dscf	0.0101	0.0123	0.0101	
	Condensible organic PM	G/dscf	0.000094	0.000068	0.000068	
	Condensible inorganic PM	G/dscf	0.000094	0.000171	0.000034	
	Total fluorides	mg/dscf	0.00834	0.0072	0.00673	
	Pollutant mass flux rates:					
	SO2	lb/hr	0.0803	0.0567	0.0568	0.065
	NOx	lb/hr	3.00	2.34	2.95	2.76
	CO	lb/hr	35.99	29.84	30.69	32.2
	CO2	lb/hr	6254	5841	5621	5905
	Filterable PM	lb/hr	1.55	1.76	1.45	1.59
	Condensible organic PM	lb/hr	0.014	0.010	0.010	0.0113
	Condensible inorganic PM	lb/hr	0.014	0.025	0.005	0.0146
	Total fluorides	lb/hr	0.0197	0.0159	0.0149	0.0169
	Emission factors (ENGLISH UNITS):					AVERAG
	SO2	lb/ton	0.0061	0.0043	0.0043	0.0049
	NOx	lb/ton	0.23	0.18	0.22	0.21
	CO	lb/ton	2.7	2.3	2.3	2.4
	CO2	lb/ton	473	441	425	446
	Filterable PM	lb/ton	0.12	0.13	0.11	0.12
	Condensible organic PM	lb/ton	0.0011	0.00074	0.00074	0.00086
	Condensible inorganic PM	lb/ton	0.0011	0.0019	0.0004	0.0011
	Total fluorides	lb/ton	0.0015	0.0012	0.0011	0.0013

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: exhibitb.xls
Ref. No.:
Date: 04-Mar-97
Reviewer: BLS

Facility: Boral Brick, Isenhour Divisio
Location: Salisbury, NC
Source: Kiln #6 and sawdust dryer
Test date: 06-Oct-95

Summation of emission rates and emission factors for three exhaust points

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
1+2+3	Pollutant mass flux rates:					
Kiln	CO2	lb/hr	1.26E+04	1.28E+04	1.24E+04	1.26E+04
exhaust	CO	lb/hr	3.31E+01	2.89E+01	2.88E+01	3.02E+01
No. 1 & 2	Emission factors (ENGLISH UNITS):					
and sawdus	CO2	lb/unit	5.03E+02	5.15E+02	4.98E+02	5.05E+02
dryer	CO	lb/unit	1.33E+00	1.16E+00	1.15E+00	1.21E+00
exhaust						

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibitb.xls
Ref. No.:
Date: 04-Mar-97
Reviewer: BLS

Facility: Boral Brick, Isenhour Divisio
Location: Salisbury, NC
Source: Kiln #6 and sawdust dryer
Test date: 06-Oct-95

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
1	Stack temperature	Deg F	334.6	341.4	325.3	333.8
Kiln exhaust No. 1	Pressure	in. Hg	28.955	29.071	29.206	29.1
	Moisture	%	5.0	5.0	6.0	5.3
	Oxygen	%	15.6	15.6	15.7	15.6
	Vol. flow, actual	acfm	17,131	17,127	16,314	16,857
	Vol. flow, standard*	dscfm	10,465	10,416	10,065	10,315
	Isokinetic variation	%	na	na	na	na
	Process rate (specify u	tph	24.96	24.96	24.96	24.96
Indicate basis for process rate: brick production						
	Pollutant concentrations:					AVERAGE
	CO2	% vol.	4.6	4.6	4.7	4.63E+00
	CO	ppmdv	271.9	248.0	238.3	2.53E+02
	Pollutant mass flux rates:					AVERAGE
	CO2	lb/hr	3.30E+03	3.28E+03	3.24E+03	3.27E+03
	CO	lb/hr	1.24E+01	1.13E+01	1.05E+01	1.14E+01
	Emission factors (ENGLISH UNITS):					AVERAGE
	CO2	lb/unit	1.32E+02	1.32E+02	1.30E+02	1.31E+02
	CO	lb/unit	4.97E-01	4.51E-01	4.19E-01	4.56E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: exhibitb.xls
Ref. No.:
Date: 04-Mar-97
Reviewer: BLS

Facility: Boral Brick, Isenhour Divisio
Location: Salisbury, NC
Source: Kiln #6 and sawdust dryer
Test date: 06-Oct-95

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
2	Stack temperature	Deg F	204.8	212.8	215.3	211.0
Kiln exhaust No. 2	Pressure	in. Hg	28.874	28.994	29.124	29.0
	Moisture	%	2.0	2.1	2.2	2.1
	Oxygen	%	18.8	18.8	18.9	18.8
	Vol. flow, actual	acfm	30,797	31,567	32,016	31,460
	Vol. flow, standard*	dscfm	23,133	23,502	23,830	23,488
	Isokinetic variation	%	na	na	na	na
	Process rate (specify u	tph	24.96	24.96	24.96	24.96
Indicate basis for process rate: brick production						
	Pollutant concentrations:					AVERAGE
	CO2	% vol.	1.9	1.9	1.9	1.90E+00
	CO	ppmdv	125.1	107.9	107.9	1.14E+02
	Pollutant mass flux rates:					AVERAGE
	CO2	lb/hr	3.01E+03	3.06E+03	3.10E+03	3.06E+03
	CO	lb/hr	1.26E+01	1.11E+01	1.12E+01	1.16E+01
	Emission factors (ENGLISH UNITS):					AVERAGE
	CO2	lb/unit	1.21E+02	1.23E+02	1.24E+02	1.23E+02
	CO	lb/unit	5.06E-01	4.43E-01	4.49E-01	4.66E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: exhibitb.xls
Ref. No.:
Date: 04-Mar-97
Reviewer: BLS

Facility: Boral Brick, Isenhour Divisio
Location: Salisbury, NC
Source: Kiln #6 and sawdust dryer
Test date: 06-Oct-95

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
3	Stack temperature	Deg F	159.1	160.4	156.3	158.6
Sawdust dryer	Pressure	in. Hg	28.838	28.95	29.088	29.0
	Moisture	%	15.0	16.0	16.0	15.7
	Oxygen	%	15.5	15.6	15.5	15.5
	Vol. flow, actual	acfm	27,739	28,587	27,055	27,794
	Vol. flow, standard*	dscfm	19,381	19,774	18,929	19,361
	Isokinetic variation	%	na	na	na	na
	Process rate (specify u	tph	24.96	24.96	24.96	24.96
Indicate basis for process rate: brick production						
	Pollutant concentrations:					AVERAGE
	CO2	% vol.	4.7	4.8	4.7	4.73E+00
	CO	ppmdv	95.3	76.2	85.8	8.58E+01
	Pollutant mass flux rates:					AVERAGE
	CO2	lb/hr	6.24E+03	6.50E+03	6.10E+03	6.28E+03
	CO	lb/hr	8.05E+00	6.57E+00	7.08E+00	7.23E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	CO2	lb/unit	2.50E+02	2.61E+02	2.44E+02	2.52E+02
	CO	lb/unit	3.23E-01	2.63E-01	2.84E-01	2.90E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

(33)

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibitc.xls
Ref. No.: 33
Date: 25-Mar-97
Reviewer: BLS

Facility: Boral Bricks — Smyrna
Location: ~~Atlanta~~, GA
Source: Kiln #2 (nat. gas-fired)
Test date: 27-Aug-96

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
1	Stack temperature	Deg F	532.88	539.63	515.13	529.2
	Pressure	in. Hg	29.33	29.33	29.33	29.3
	Moisture	%	10.4	11.1	11.7	11.1
	Oxygen	%	14.6	14.4	14.2	14.4
	Gas volume sampled	dscf	32.81	33.79	35.55	34.05
	Vol. flow, actual	acfm	32,861	32,551	32,926	32,779
	Vol. flow, standard*	dscfm	15,349	14,977	15,425	15,250
	Isokinetic variation	%	91.3	96.4	96.9	94.8
	Process rate (specify u	tph	12.49	12.49	12.49	12.49
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	0.0846	0.0853	0.1648	1.12E-01
	Total fluorides	grams	0.0044	0.0087	0.0104	7.83E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	3.98E-02	3.90E-02	7.15E-02	5.01E-02
	Total fluorides	gr/dscf	2.07E-03	3.97E-03	4.51E-03	3.52E-03
	TOC as carbon	ppmdv	1.09E+01	6.19E+00	5.10E+00	7.39E+00
	TOC as propane	ppmdv	3.63E+00	2.06E+00	1.70E+00	2.46E+00
	SO2	ppmdv	140.6	126.2	140.3	1.36E+02
	CO2	% vol.	3.66	3.82	3.88	3.79E+00
	NOx	ppmdv	23.0	24.2	25.3	2.41E+01
	CO	ppmdv	133.4	163.0	148.1	1.48E+02
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	5.23E+00	5.00E+00	9.46E+00	6.56E+00
	Total fluorides	lb/hr	2.72E-01	5.10E-01	5.97E-01	4.60E-01
	TOC as propane	lb/hr	3.81E-01	2.12E-01	1.80E-01	2.58E-01
	SO2	lb/hr	2.15E+01	1.88E+01	2.16E+01	2.06E+01
	CO2	lb/hr	3.85E+03	3.92E+03	4.10E+03	3.96E+03
	NOx	lb/hr	2.53E+00	2.59E+00	2.79E+00	2.64E+00
	CO	lb/hr	8.93E+00	1.06E+01	9.96E+00	9.84E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	4.19E-01	4.00E-01	7.57E-01	5.26E-01
	Total fluorides	lb/unit	2.18E-02	4.08E-02	4.78E-02	3.68E-02
	TOC as propane**	lb/unit	3.05E-02	1.70E-02	1.44E-02	2.06E-02
	SO2	lb/unit	1.72E+00	1.51E+00	1.73E+00	1.65E+00
	CO2	lb/unit	3.08E+02	3.14E+02	3.28E+02	3.17E+02
	NOx	lb/unit	2.02E-01	2.08E-01	2.23E-01	2.11E-01
	CO	lb/unit	7.15E-01	8.52E-01	7.97E-01	7.88E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
**Also represents total non-methane organic compounds (see note 2)
(1) Several mistakes were found with the M25A data. The concentrations were not corrected to a dry basis before calculating the emission rate. Also, the first reading for run 1 was 7 ppm on the data recorder, but was documented as 0 ppm.
(2) EPA Method 18 did not detect methane during any test run.

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: exhibitc.xls
Ref. No.: 33
Date: 25-Mar-97
Reviewer: BLS

Facility: Boral Bricks
Location: ~~Atlanta~~ Smyrna, GA
Source: Kiln #1 (nat. gas-fired)
Test date: 28-Aug-96

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
2	Stack temperature	Deg F	517.71	511.63	509.75	513.0
	Pressure	in. Hg	29.34	29.34	29.34	29.3
	Moisture	%	11.5	13.2	12.7	12.5
	Oxygen	%	14.4	14.1	14.6	14.3
	Gas volume sampled	dscf	43.08	42.20	40.55	41.94
	Vol. flow, actual	acfm	30,358	30,350	31,401	30,703
	Vol. flow, standard*	dscfm	14,226	14,033	14,641	14,300
	Isokinetic variation	%	97.9	99.7	96.1	97.9
	Process rate (specify u	tph	12.49	12.49	12.49	12.49
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	0.1168	0.0922	0.1573	1.22E-01
	Total fluorides	grams	0.0144	0.0179	0.0151	1.58E-02
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	4.18E-02	3.37E-02	5.99E-02	4.51E-02
	Total fluorides	gr/dscf	5.16E-03	6.54E-03	5.75E-03	5.82E-03
	TOC as carbon	ppmdv	2.83E-01	3.80E-01	8.59E-01	5.07E-01
	TOC as propane	ppmdv	9.42E-02	1.27E-01	2.86E-01	1.69E-01
	SO2	ppmdv	107.8	130.0	108.7	1.16E+02
	CO2	% vol.	3.78	4.00	3.74	3.84E+00
	NOx	ppmdv	26.3	27.5	25.8	2.66E+01
	CO	ppmdv	163.8	157.6	167.6	1.63E+02
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	5.10E+00	4.06E+00	7.51E+00	5.56E+00
	Total fluorides	lb/hr	6.29E-01	7.87E-01	7.21E-01	7.12E-01
	TOC as propane	lb/hr	9.18E-03	1.22E-02	2.87E-02	1.67E-02
	SO2	lb/hr	1.53E+01	1.82E+01	1.59E+01	1.64E+01
	CO2	lb/hr	3.68E+03	3.85E+03	3.75E+03	3.76E+03
	NOx	lb/hr	2.68E+00	2.76E+00	2.71E+00	2.72E+00
	CO	lb/hr	1.02E+01	9.64E+00	1.07E+01	1.02E+01
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	4.08E-01	3.25E-01	6.01E-01	4.45E-01
	Total fluorides	lb/unit	5.04E-02	6.30E-02	5.77E-02	5.70E-02
	TOC as propane**	lb/unit	7.35E-04	9.76E-04	2.30E-03	1.34E-03
	SO2	lb/unit	1.22E+00	1.46E+00	1.27E+00	1.32E+00
	CO2	lb/unit	2.95E+02	3.08E+02	3.00E+02	3.01E+02
	NOx	lb/unit	2.15E-01	2.21E-01	2.17E-01	2.18E-01
	CO	lb/unit	8.13E-01	7.72E-01	8.57E-01	8.14E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
**Also represents total non-methane organic compounds (see note 2)
(1) Several mistakes were found with the M25A data. The concentrations were not corrected to a dry basis before calculating the emission rate.
(2) EPA Method 18 did not detect methane during any test run.

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EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibite.xls
Ref. No.:
Date: 05-Mar-97
Reviewer: BLS

Facility: Boral Brick
Location: Henderson, TX
Source: Kiln #1 and #2
Test date: June 29-30, 1995

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
Part./Fl	Stack temperature	Deg F	472	472	459	467.7
Dry	Pressure	in. Hg	29.66	29.62	29.68	29.7
scrubber	Moisture	%	7.45	7.71	7.57	7.58
stack	Oxygen	%	17.3	17.0	17.2	17.2
	Gas volume sampled	dscf	71.68	71.17	70.74	71.20
	Vol. flow, actual	acfm	84,480	83,852	82,471	83,601
	Vol. flow, standard*	dscfm	44,078	43,563	43,601	43,747
	Isokinetic variation	%	100.9	101.4	100.7	101.0
	Process rate (specify u	tph	20.79	20.79	20.79	20.79
Indicate basis for process rate:	brick production					
	Pollutant mass:					
	Filterable PM	grams	0.0604	0.1005	0.081	8.06E-02
	Condensable inorg. PM	grams	0.039	0.0483	0.0043	3.05E-02
	Total fluorides	grams	0.014484	0.013813	0.014707	1.43E-02
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	1.30E-02	2.18E-02	1.77E-02	1.75E-02
	Condensable inorg. PM	gr/dscf	8.40E-03	1.05E-02	9.38E-04	6.60E-03
	Total fluorides	gr/dscf	3.12E-03	2.99E-03	3.21E-03	3.11E-03
	CO2	% vol.	2.1	2.2	2.0	########
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	4.91E+00	8.14E+00	6.60E+00	6.55E+00
	Condensable inorg. PM	lb/hr	3.17E+00	3.91E+00	3.51E-01	2.48E+00
	Total fluorides	lb/hr	1.18E+00	1.12E+00	1.20E+00	1.17E+00
	CO2	lb/hr	6.34E+03	6.57E+03	5.97E+03	6.29E+03
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	2.36E-01	3.91E-01	3.18E-01	3.15E-01
	Condensable inorg. PM	lb/unit	1.53E-01	1.88E-01	1.69E-02	1.19E-01
	Total fluorides	lb/unit	5.67E-02	5.38E-02	5.77E-02	5.60E-02
	CO2	lb/unit	3.05E+02	3.16E+02	2.87E+02	3.03E+02

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibite.xls
Ref. No.:
Date: 05-Mar-97
Reviewer: BLS

Facility: Boral Brick
Location: Henderson, TX
Source: Kiln #1 and #2
Test date: June 29-30, 1995

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
SO2/NOx	Stack temperature	Deg F	463	470	452	461.7
Dry scrubber stack	Pressure	in. Hg	29.66	29.62	29.68	29.7
	Moisture	%	7.94	8.12	8.02	8.03
	Oxygen	%	17.0	17.2	17.2	17.1
	Gas volume sampled	dscf				#DIV/0!
	Vol. flow, actual	acfm	84,544	87,277	85,329	85,717
	Vol. flow, standard*	dscfm	44,301	45,234	45,239	44,925
	Isokinetic variation	%				#DIV/0!
	Process rate (specify u	tph	20.79	20.79	20.79	20.79
Indicate basis for process rate:		brick production				
	SO2	ppmdv	48.2	46.5	45.2	4.66E+01
	SO3	ppmdv	1.2	1.2	1.7	1.37E+00
	CO2	% vol.	2.2	2.2	2.2	2.20E+00
	NOx	ppmdv	16.0	17.0	17.0	1.67E+01
	Pollutant mass flux rates:					AVERAGE
	SO2	lb/hr	2.13E+01	2.10E+01	2.04E+01	2.09E+01
	SO3	lb/hr	6.62E-01	6.76E-01	9.58E-01	7.66E-01
	CO2	lb/hr	6.68E+03	6.82E+03	6.82E+03	6.77E+03
	NOx	lb/hr	5.08E+00	5.51E+00	5.51E+00	5.36E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	SO2	lb/unit	1.02E+00	1.01E+00	9.80E-01	1.00E+00
	SO3	lb/unit	3.19E-02	3.25E-02	4.61E-02	3.68E-02
	CO2	lb/unit	3.21E+02	3.28E+02	3.28E+02	3.26E+02
	NOx	lb/unit	2.44E-01	2.65E-01	2.65E-01	2.58E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibitf.xls
Ref. No.:
Date: 05-Mar-97
Reviewer: BLS

Facility: Boral Brick
Location: Henderson, TX
Source: Kiln #1 and #2
Test date: 15-Feb-96

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
1	Stack temperature	Deg F	436	440	441	439.0
Dry scrubber	Pressure	in. Hg	29.47	29.49	29.47	29.5
	Moisture	%	7.1	6.2	5.9	6.4
	Oxygen	%	16.4	16.6	16.5	16.5
	Gas volume sampled	dscf	39.12	40.16	39.34	39.54
	Vol. flow, actual	acfm	74,664	78,770	76,460	76,631
	Vol. flow, standard*	dscfm	40,273	42,733	41,520	41,509
	Isokinetic variation	%	101.7	98.4	99.2	99.8
	Process rate (specify u	tph	21.06	21.06	21.06	21.06
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	6.41E-02	5.67E-02	6.64E-02	6.24E-02
	Condensable inorg. PM	grams	1.53E-02	1.32E-02	4.30E-03	1.09E-02
	Total fluorides	grams	6.98E-03	6.52E-03	6.94E-03	6.82E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	2.53E-02	2.18E-02	2.60E-02	2.44E-02
	Condensable inorg. PM	gr/dscf	6.03E-03	5.07E-03	1.69E-03	4.26E-03
	Total fluorides	gr/dscf	2.75E-03	2.51E-03	2.72E-03	2.66E-03
	CO2	% vol.	2.20E+00	2.30E+00	2.30E+00	2.27E+00
	NOx	ppmdv	2.36E+01	2.42E+01	2.48E+01	2.42E+01
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	8.73E+00	7.98E+00	9.27E+00	8.66E+00
	Condensable inorg. PM	lb/hr	2.08E+00	1.86E+00	6.00E-01	1.51E+00
	Total fluorides	lb/hr	9.50E-01	9.18E-01	9.69E-01	9.46E-01
	CO2	lb/hr	6.07E+03	6.73E+03	6.54E+03	6.45E+03
	NOx	lb/hr	6.81E+00	7.41E+00	7.38E+00	7.20E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	4.14E-01	3.79E-01	4.40E-01	4.11E-01
	Condensable inorg. PM	lb/unit	9.89E-02	8.82E-02	2.85E-02	7.19E-02
	Total fluorides	lb/unit	4.51E-02	4.36E-02	4.60E-02	4.49E-02
	CO2	lb/unit	2.88E+02	3.20E+02	3.11E+02	3.06E+02
	NOx	lb/unit	3.23E-01	3.52E-01	3.50E-01	3.42E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: exhibitf.xls
Ref. No.:
Date: 05-Mar-97
Reviewer: BLS

Facility: Boral Brick
Location: Henderson, TX
Source: Kiln #1 and #2
Test date: 15-Feb-96

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
2	Stack temperature	Deg F	436	440	441	439.0
Uncontroll	Pressure	in. Hg	29.47	29.49	29.47	29.5
	Moisture	%	7.1	6.2	5.9	6.4
	Oxygen	%	16.4	16.6	16.5	16.5
	Gas volume sampled	dscf	27.92	28.04	28.14	28.04
	Vol. flow, actual	acfm	74,664	78,770	76,460	76,631
	Vol. flow, standard*	dscfm	40,273	42,733	41,520	41,509
	Isokinetic variation	%	101.7	98.4	99.2	99.8
	Process rate (specify u	tph	21.06	21.06	21.06	21.06
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Total fluorides	grams	8.20E-02	7.05E-02	6.90E-02	7.38E-02
	Pollutant concentrations:					AVERAGE
	Total fluorides	gr/dscf	4.53E-02	3.88E-02	3.78E-02	4.07E-02
	Pollutant mass flux rates:					AVERAGE
	Total fluorides	lb/hr	1.57E+01	1.42E+01	1.35E+01	1.44E+01
	Emission factors (ENGLISH UNITS):					AVERAGE
	Total fluorides	lb/unit	7.43E-01	6.75E-01	6.39E-01	6.86E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibith.xls
Ref. No.:
Date: 05-Mar-97
Reviewer: BLS

Facility: Statesville Brick Co.
Location: Statesville, NC
Source: Sawdust-fired kiln
Test date: 29-Nov-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
1	Stack temperature	Deg F	512	524	531	522.3
Uncontroll	Pressure	in. Hg	29.598	29.468	29.498	29.5
	Moisture	%	23.0	17.0	23.0	21.0
	Oxygen	%	17.5	17.5	17.0	17.3
	Vol. flow, actual	acfm	11,863	11,102	13,538	12,168
	Vol. flow, standard*	dscfm	4,909	4,870	5,476	5,085
	Isokinetic variation	%	na	na	na	0.0
	Process rate (specify u	tph	9.7375	9.7375	9.7375	9.7375
Indicate basis for process rate: fired brick produced						
	Pollutant concentrations:					AVERAGE
	CO2	% vol.	4.0	4.0	4.0	4.00E+00
	CO	ppmdv	80.3	87.2	96.5	8.80E+01
	Pollutant mass flux rates:					AVERAGE
	CO2	lb/hr	1.35E+03	1.33E+03	1.50E+03	1.39E+03
	CO	lb/hr	1.72E+00	1.85E+00	2.30E+00	1.96E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	CO2	lb/unit	1.38E+02	1.37E+02	1.54E+02	1.43E+02
	CO	lb/unit	1.76E-01	1.90E-01	2.37E-01	2.01E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: exhibith.xls
Ref. No.:
Date: 05-Mar-97
Reviewer: BLS

Facility: Statesville Brick Co.
Location: Statesville, NC
Source: Sawdust dryer exhaust**
Test date: 29-Nov-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
2	Stack temperature	Deg F	198	183	190	190.3
Uncontroll	Pressure	in. Hg	29.656	29.526	29.556	29.6
	Moisture	%	9.0	10.0	10.0	9.7
	Oxygen	%	17.5	17.0	18.0	17.5
	Vol. flow, actual	acfm	18,467	18,149	18,320	18,312
	Vol. flow, standard*	dscfm	13,366	13,236	13,230	13,277
	Isokinetic variation	%	na	na	na	0.0
	Process rate (specify u	tph	9.7375	9.7375	9.7375	9.7375
Indicate basis for process rate:		fired brick produced				
	Pollutant concentrations:					AVERAGE
	CO2	% vol.	3.5	3.5	3.5	3.50E+00
	CO	ppmdv	59.3	64.8	71.4	6.52E+01
	Pollutant mass flux rates:					AVERAGE
	CO2	lb/hr	3.21E+03	3.17E+03	3.17E+03	3.18E+03
	CO	lb/hr	3.46E+00	3.74E+00	4.12E+00	3.77E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	CO2	lb/unit	3.29E+02	3.26E+02	3.26E+02	3.27E+02
	CO	lb/unit	3.55E-01	3.84E-01	4.23E-01	3.87E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT
**Sawdust dryer heated with a portion of the exhaust from a sawdust-fired kiln.

TOTAL EMISSION FACTORS FOR BOTH STACKS (KILN AND SAWDUST DRYER EXHAUST)

CO2	lb/unit	4.67E+02	4.63E+02	4.80E+02	4.70E+02
CO	lb/unit	5.31E-01	5.74E-01	6.60E-01	5.88E-01

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: brick38.xls
Ref. No.: 38
Date: 23-Jun-97
Reviewer: BLS

Facility: Marseilles Brick
Location: Marseilles, IL
Source: Dryer No. 1
Test date: 29-Aug-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
1	Stack temperature	Deg F	113.417	103.5	102.25	106.4
	Pressure	in. Hg	30.11	30.11	30.11	30.1
	Moisture	%	6.45	7.72	7.62	7.26
	Oxygen	%	20.30	20.42	20.45	20.39
	Gas volume sampled	dscf	49.13	50.05	50.06	49.75
	Vol. flow, actual	acfm	22,268	21,619	22,593	22,160
	Vol. flow, standard*	dscfm	19,304	18,812	19,724	19,280
	Isokinetic variation	%	95.5	99.8	95.2	96.9
	Process rate (specify units)	tph	5.985	5.985	5.985	5.985
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	1.24E-02	3.30E-03	8.60E-03	8.10E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	3.89E-03	1.02E-03	2.65E-03	2.52E-03
	TOC as propane	ppmdv	1.55E+00	0.00E+00	0.00E+00	5.17E-01
	SO2	ppmdv	ND	ND	ND	ND
	CO2	% vol.	0.32	0.22	0.40	3.13E-01
	CO	ppmdv	5.5	14.6	5.4	8.50E+00
	SO3	gr/dscf	1.00E-04	1.00E-04	3.30E-03	0.0012
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	6.44E-01	1.64E-01	4.48E-01	4.19E-01
	TOC as propane	lb/hr	2.05E-01	0.00E+00	0.00E+00	6.83E-02
	SO2	lb/hr	ND	ND	ND	ND
	CO2	lb/hr	4.23E+02	2.84E+02	5.41E+02	4.16E+02
	CO	lb/hr	4.63E-01	1.20E+00	4.64E-01	7.08E-01
	SO3	lb/hr	1.65E-02	1.61E-02	5.58E-01	1.97E-01
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	1.08E-01	2.74E-02	7.49E-02	7.00E-02
	TOC as propane	lb/unit	3.43E-02	0.00E+00	0.00E+00	1.14E-02
	SO2	lb/unit	ND	ND	ND	ND
	CO2	lb/unit	7.07E+01	4.74E+01	9.03E+01	6.95E+01
	CO	lb/unit	7.73E-02	2.00E-01	7.76E-02	1.18E-01
	SO3	lb/unit	2.76E-03	2.69E-03	9.32E-02	3.29E-02

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: brick38.xls
Ref. No.: 38
Date: 23-Jun-97
Reviewer: BLS

Facility: Marseilles Brick
Location: Marseilles, IL
Source: Dryer No. 2
Test date: 29-Aug-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
2	Stack temperature	Deg F	103.583	102.667	104.5	103.6
	Pressure	in. Hg	30.04	30.04	30.04	30.0
	Moisture	%	8.83	8.26	8.24	8.44
	Oxygen	%	20.38	20.43	20.30	20.37
	Gas volume sampled	dscf	46.91	46.92	46.21	46.68
	Vol. flow, actual	acfm	20,769	20,433	20,155	20,453
	Vol. flow, standard*	dscfm	17,811	17,661	17,368	17,613
	Isokinetic variation	%	98.8	99.7	99.8	99.4
	Process rate (specify units)	tph	5.985	5.985	5.985	5.985
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	5.30E-03	5.30E-03	3.80E-03	4.80E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	1.74E-03	1.74E-03	1.27E-03	1.59E-03
	TOC as propane	ppmdv	ND	ND	ND	ND
	SO2	gr/dscf	ND	ND	5.34E-04	1.78E-04
	CO2	% vol.	0.30	0.40	0.30	3.33E-01
	CO	ppmdv	4.7	3.0	5.0	4.23E+00
	SO3	gr/dscf	2.06E-03	1.09E-03	7.80E-04	0.0013
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	2.66E-01	2.64E-01	1.89E-01	2.40E-01
	TOC as propane	lb/hr	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	SO2	lb/hr	ND	ND	7.95E-02	2.65E-02
	CO2	lb/hr	3.66E+02	4.84E+02	3.57E+02	4.02E+02
	CO	lb/hr	3.65E-01	2.31E-01	3.79E-01	3.25E-01
	SO3	lb/hr	3.14E-01	1.65E-01	1.16E-01	1.99E-01
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	4.45E-02	4.41E-02	3.16E-02	4.00E-02
	TOC as propane	lb/unit	ND	ND	ND	ND
	SO2	lb/unit	ND	ND	1.33E-02	4.43E-03
	CO2	lb/unit	6.12E+01	8.09E+01	5.96E+01	6.72E+01
	CO	lb/unit	6.10E-02	3.86E-02	6.33E-02	5.43E-02
	SO3	lb/unit	5.25E-02	2.76E-02	1.94E-02	3.32E-02

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: brick38.xls
Ref. No.: 38
Date: 07-Jul-97
Reviewer: BLS

Facility: Marseilles Brick
Location: Marseilles, IL
Source: Nat. Gas-Fired Tunnel Kiln
Test date: 29-Aug-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
3	Stack temperature	Deg F	437.429	436.286	434.762	436.2
	Pressure	in. Hg	30.23	30.23	30.23	30.2
	Moisture	%	5.78	5.55	4.25	5.19
	Oxygen	%	16.73	18.30	19.39	18.14
	Gas volume sampled	dscf	62.21	63.52	63.80	63.18
	Vol. flow, actual	acfm	30,774	30,481	31,250	30,835
	Vol. flow, standard*	dscfm	17,236	17,136	17,840	17,404
	Isokinetic variation	%	94.1	96.7	93.3	94.7
	Process rate (specify units)	tph	11.97	11.97	11.97	11.97
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	5.89E-01	3.18E-01	3.87E-01	4.31E-01
	SO2	grams	3.35E+00	3.41E+00	3.56E+00	3.44E+00
	SO3	grams	3.43E-03	4.41E-03	7.97E-03	5.27E-03
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	1.46E-01	7.73E-02	9.37E-02	1.06E-01
	TOC as propane	ppmdv	7.80E+00	6.10E+00	6.20E+00	ND
	SO2	gr/dscf	8.30E-01	8.29E-01	8.60E-01	8.39E-01
	CO2	% vol.	2.22	2.23	2.27	2.24E+00
	CO	ppmdv	130.1	126.0	136.8	1.31E+02
	SO3	gr/dscf	8.51E-04	1.07E-03	1.93E-03	0.0013
	NOx	ppmdv	16.4	15.6	7.3	1.31E+01
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	2.16E+01	1.14E+01	1.43E+01	1.58E+01
	TOC as propane	lb/hr	9.21E-01	7.16E-01	7.58E-01	7.98E-01
	SO2	lb/hr	1.23E+02	1.22E+02	1.31E+02	1.25E+02
	CO2	lb/hr	2.62E+03	2.62E+03	2.77E+03	2.67E+03
	CO	lb/hr	9.78E+00	9.41E+00	1.06E+01	9.94E+00
	SO3	lb/hr	1.26E-01	1.57E-01	2.95E-01	1.93E-01
	SO3--dryer 1	lb/hr	1.65E-02	1.61E-02	5.58E-01	1.97E-01
	SO3--dryer 2	lb/hr	3.14E-01	1.65E-01	1.16E-01	1.99E-01
	SO3--total	lb/hr	4.57E-01	3.39E-01	9.69E-01	5.88E-01
	NOx	lb/hr	2.02E+00	1.92E+00	9.26E-01	1.62E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	1.80E+00	9.48E-01	1.20E+00	1.32E+00
	TOC as propane	lb/ton	7.70E-02	5.98E-02	6.33E-02	6.67E-02
	SO2	lb/ton	1.02E+01	1.02E+01	1.10E+01	1.05E+01
	CO2	lb/ton	2.19E+02	2.19E+02	2.32E+02	2.23E+02
	CO	lb/ton	8.17E-01	7.86E-01	8.89E-01	8.31E-01
	SO3--kiln + dryers	lb/ton	3.82E-02	2.83E-02	8.09E-02	4.91E-02
	NOx	lb/ton	1.69E-01	1.60E-01	7.74E-02	1.36E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: brick39.xls
Ref. No.: 39
Date: 23-Jun-97
Reviewer: BLS

Facility: Marseilles Brick
Location: Marseilles, IL
Source: Dryer No. 1
Test date: 10-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	AVERAGE
1	Stack temperature	Deg F	92.333	94.292	94.125	93.6
	Pressure	in. Hg	30.24	30.24	30.24	30.2
	Moisture	%	9.67	7.80	7.91	8.46
	Oxygen	%	20.40	20.40	20.40	20.40
	Gas volume sampled	dscf	39.74	46.91	46.66	44.44
	Vol. flow, actual	acfm	17,410	21,041	20,034	19,495
	Vol. flow, standard*	dscfm	15,194	18,677	17,768	17,213
	Isokinetic variation	%	98.1	94.2	98.5	97.0
	Process rate (specify units)	tph	4.788	4.788	4.788	4.788
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	1.93E-02	7.10E-03	1.27E-02	1.30E-02
	SO3	grams	1.25E-03	4.10E-04	1.24E-03	9.67E-04
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	7.49E-03	2.34E-03	4.20E-03	4.68E-03
	TOC as propane	ppmdv	3.75E+00	6.12E+00	7.26E+00	5.71E+00
	SO2	ppmdv	ND	ND	ND	ND
	CO2	% vol.	0.30	0.30	0.30	3.00E-01
	CO	ppmdv	8.0	18.7	24.0	1.69E+01
	SO3	gr/dscf	4.85E-04	1.35E-04	4.10E-04	3.43E-04
	NOx	ppmdv	11.9	3.5	2.0	5.81E+00
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	9.76E-01	3.74E-01	6.40E-01	6.63E-01
	TOC as propane	lb/hr	3.90E-01	7.83E-01	8.84E-01	6.86E-01
	SO2	lb/hr	ND	ND	ND	ND
	CO2	lb/hr	3.12E+02	3.84E+02	3.65E+02	3.54E+02
	CO	lb/hr	5.30E-01	1.52E+00	1.86E+00	1.30E+00
	SO3	lb/hr	6.32E-02	2.16E-02	6.24E-02	4.91E-02
	NOx	lb/hr	1.29E+00	4.70E-01	2.58E-01	6.74E-01
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	2.04E-01	7.81E-02	1.34E-01	1.39E-01
	TOC as propane	lb/unit	8.14E-02	1.64E-01	1.85E-01	1.43E-01
	SO2	lb/unit	ND	ND	ND	ND
	CO2	lb/unit	6.52E+01	8.02E+01	7.63E+01	7.39E+01
	CO	lb/unit	1.11E-01	3.18E-01	3.88E-01	2.72E-01
	SO3	lb/unit	1.32E-02	4.51E-03	1.30E-02	1.03E-02
	NOx	lb/unit	2.70E-01	9.82E-02	5.40E-02	1.41E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY

Source Category: BRICK

Filename: brick39.xls
Ref. No.: 39
Date: 23-Jun-97
Reviewer: BLS

Facility: Marseilles Brick
Location: Marseilles, IL
Source: Dryer No. 2
Test date: 10-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
2	Stack temperature	Deg F	94.375	94.75	98.208	95.8
	Pressure	in. Hg	30.07	30.07	30.07	30.1
	Moisture	%	8.53	6.84	7.30	7.56
	Oxygen	%	20.40	20.40	20.40	20.40
	Gas volume sampled	dscf	41.82	45.76	41.52	43.03
	Vol. flow, actual	acfm	18,329	20,229	18,670	19,076
	Vol. flow, standard*	dscfm	16,048	18,027	16,452	16,842
	Isokinetic variation	%	97.8	95.2	94.7	95.9
	Process rate (specify units)	tph	4.788	4.788	4.788	4.788
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	1.53E-02	2.30E-03	2.30E-03	6.63E-03
	SO3	grams	ND	ND	1.01E-03	3.37E-04
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	5.65E-03	7.76E-04	8.55E-04	2.43E-03
	TOC as propane	ppmdv	3.00E+00	2.55E+00	4.85E+00	3.47E+00
	SO2	ppmdv	ND	ND	ND	ND
	CO2	% vol.	0.30	0.30	0.30	3.00E-01
	CO	ppmdv	14.9	19.0	20.0	1.80E+01
	SO3	gr/dscf	ND	ND	3.75E-04	1.25E-04
	NOx	ppmdv	1.5	2.2	3.0	2.23E+00
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	7.77E-01	1.20E-01	1.21E-01	3.39E-01
	TOC as propane	lb/hr	3.30E-01	3.15E-01	5.47E-01	3.97E-01
	SO2	lb/hr	ND	ND	ND	ND
	CO2	lb/hr	3.30E+02	3.71E+02	3.38E+02	3.46E+02
	CO	lb/hr	1.04E+00	1.50E+00	1.43E+00	1.32E+00
	SO3	lb/hr	0.00E+00	0.00E+00	5.29E-02	1.76E-02
	NOx	lb/hr	1.67E-01	2.87E-01	3.54E-01	2.69E-01
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/unit	1.62E-01	2.50E-02	2.52E-02	7.08E-02
	TOC as propane	lb/unit	6.89E-02	6.58E-02	1.14E-01	8.30E-02
	SO2	lb/unit	ND	ND	ND	ND
	CO2	lb/unit	6.89E+01	7.74E+01	7.06E+01	7.23E+01
	CO	lb/unit	2.17E-01	3.12E-01	3.00E-01	2.76E-01
	SO3	lb/unit	0.00E+00	0.00E+00	1.11E-02	3.68E-03
	NOx	lb/unit	3.48E-02	6.00E-02	7.38E-02	5.62E-02

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

EMISSION TEST REPORT REVIEW SUMMARY
Source Category: BRICK

Filename: brick39.xls
Ref. No.: 39
Date: 07-Jul-97
Reviewer: BLS

Facility: Marseilles Brick
Location: Marseilles, IL
Source: Nat. Gas-Fired Tunnel Kiln
Test date: 11-May-94

Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported Run 1	Run 2	Run 3	AVERAGE
3	Stack temperature	Deg F	481.571	480.143	473.524	478.4
	Pressure	in. Hg	29.84	29.84	29.84	29.8
	Moisture	%	6.58	6.61	6.49	6.56
	Oxygen	%	17.80	17.80	17.80	17.80
	Gas volume sampled	dscf	49.82	48.93	43.10	47.28
	Vol. flow, actual	acfm	24,362	25,838	23,601	24,600
	Vol. flow, standard*	dscfm	12,728	13,516	12,449	12,898
	Isokinetic variation	%	102.1	94.4	90.3	95.6
	Process rate (specify units)	tph	9.576	9.576	9.576	9.576
Indicate basis for process rate: brick production						
	Pollutant mass:					
	Filterable PM	grams	1.26E-01	1.27E-01	1.02E-01	1.18E-01
	SO2	grams	1.27E+00	1.16E+00	1.01E+00	1.15E+00
	SO3	grams	8.31E-02	6.54E-02	4.77E-02	6.54E-02
	Pollutant concentrations:					AVERAGE
	Filterable PM	gr/dscf	3.89E-02	3.99E-02	3.63E-02	3.84E-02
	TOC as propane	ppmdv	9.20E+00	8.80E+00	7.80E+00	ND
	SO2	gr/dscf	3.93E-01	3.66E-01	3.62E-01	3.74E-01
	CO2	% vol.	1.80	1.80	1.80	1.80E+00
	CO	ppmdv	125.8	122.8	125.5	1.25E+02
	SO3	gr/dscf	2.57E-02	2.06E-02	1.71E-02	0.0211
	NOx	ppmdv	25.9	27.6	28.0	2.72E+01
	Pollutant mass flux rates:					AVERAGE
	Filterable PM	lb/hr	4.24E+00	4.62E+00	3.88E+00	4.25E+00
	TOC as propane	lb/hr	8.02E-01	8.15E-01	6.65E-01	7.61E-01
	SO2	lb/hr	4.29E+01	4.24E+01	3.86E+01	4.13E+01
	CO2	lb/hr	1.57E+03	1.67E+03	1.54E+03	1.59E+03
	CO	lb/hr	6.98E+00	7.24E+00	6.81E+00	7.01E+00
	SO3	lb/hr	2.81E+00	2.39E+00	1.82E+00	2.34E+00
	SO3--dryer 1	lb/hr	6.32E-02	2.16E-02	6.24E-02	4.91E-02
	SO3--dryer 2	lb/hr	0.00E+00	0.00E+00	5.29E-02	1.76E-02
	SO3--total	lb/hr	2.87E+00	2.41E+00	1.94E+00	2.41E+00
	NOx	lb/hr	2.36E+00	2.67E+00	2.50E+00	2.51E+00
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	4.43E-01	4.83E-01	4.05E-01	4.43E-01
	TOC as propane	lb/ton	8.38E-02	8.51E-02	6.95E-02	7.95E-02
	SO2	lb/ton	4.48E+00	4.43E+00	4.03E+00	4.31E+00
	CO2	lb/ton	1.64E+02	1.74E+02	1.60E+02	1.66E+02
	CO	lb/ton	7.29E-01	7.56E-01	7.11E-01	7.32E-01
	SO3--kiln + dryers	lb/ton	3.00E-01	2.52E-01	2.02E-01	2.51E-01
	NOx	lb/ton	2.47E-01	2.79E-01	2.61E-01	2.62E-01

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Guardian Systems

2610 Nineteenth Street, South
Birmingham, Alabama 35209
205/879-1850

November 30, 1983

Mr. Dave NcNees
General Shale Products Corporation
P.O. Box 3547 C.R.S.
Johnson City, Tennessee 37601

Dear Dave:

I have reviewed the test report of the compliance tests conducted on Kiln #15 in Kingsport, Tennessee on October 11, 1983, and found that I had made an error on the computer input sheet (page 4). I apparently calculated the stack area using a 36" diameter stack instead of the actual stack diameter of 32". This resulted in stack area of 7.07 sq. ft. instead of 5.59 sq. ft and an average stack emission of 6.11 pounds per hour which should be 4.83 pounds per hour.

I have corrected the stack area on the computer input sheet and have enclosed six (6) copies of the corrected sheets (pages 2-6) and this letter of explanation for your distribution. I apologize for this error and hope that these corrected results will help to offset any inconvience that I might have caused you. It was a pleasure to be of service to you on this project and if we can be of any help now or in the future, please call us.

Sincerely,

Have a good day!

Tom Lotz
Director Field Services

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
2610 19TH. STREET, SOUTH
BIRMINGHAM, AL 35209
205-879-1850

SUMMARIZED AIR TEST RESULTS FOR GENERAL SHALE PRODUCTS CO
JOB NUMBER 41332

RUN NUMBER	1	2	3	4
DATE OF TEST	10/11/83	10/11/83	10/11/83	10/11/83
TIME OF TEST	0830-0937	1115-1221	1328-1433	1520-1625
LOCATION OF TEST	TK #15	TK #15	TK #15	TK #15
STACK GAS TEMPERATURE DEGREES F	381	381	382	379
MOISTURE CONTENT, % V/V	5.82	6.95	6.83	6.91
OXYGEN CONTENT, % V/V	17.00	17:30	16.50	17.00
CARBON DIOXIDE CONTENT, % V/V	5.00	4.50	5.30	4.00
STACK GAS VELOCITY FEET PER SECOND	40.01	39.65	39.67	39.45
VOLUMETRIC FLOW ACTUAL CUBIC FEET PER MINUTE	13,419	13,299	13,307	13,231
VOLUMETRIC FLOW DRY STANDARD CUBIC FEET PER MINUTE	8,016	7,847	7,852	7,829
CONCENTRATION GRAINS PER DRY STANCARD CUBIC FOOT	0.069	0.070	0.080	0.065
CONCENTRATION GRAINS PER ACTUAL CUBIC FOOT	0.041	0.042	0.047	0.038
PARTICULATE MASS RATE (#/HR.)	4.73	4.73	5.39	4.36
% ISOKINETIC	100.09	100.91	100.93	100.60

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
2610 19TH. STREET, SOUTH
BIRMINGHAM, AL 35209
205-879-1850

COMPUTER INPUT PARAMETERS FOR GENERAL SHALE PRODUCTS CO
JOB NUMBER 41332

RUN NUMBER	1	2	3	4
DATE	10/11/83	10/11/83	10/11/83	10/11/83
LOCATION	TK #15	TK #15	TK #15	TK #15
TIME	0830-0937	1115-1221	1328-1433	1520-1625
BAROMETRIC PRESSURE (IN. HG)	30.24	30.24	30.24	30.24
STATIC PRESSURE (IN. H2O)	- 0.200	- 0.270	- 0.270	- 0.250
RUN TIME (MINUTES)	64	64	64	64
METER VOLUME (CORRECTED)	49.572	49.388	49.250	49.390
STACK TEMPERATURE (•F)	381	381	382	379
METER TEMPERATURE (•F)	78	83	81	86
METER PRESSURE (IN.H2O)	1.83	1.80	1.80	1.80
SQR VELOCITY PRESSURE	0.567	0.560	0.561	0.557
MASS OF PARTICULATE (MG.)	220.8	222.7	253.8	204.7
ML. OF WATER COLLECTED	64.8	77.4	76.0	76.5
% OXYGEN	17.0	17.3	16.5	17.0
% CARBON DIOXIDE	5.0	4.5	5.3	4.0
% CARBON MONOXIDE	0.0	0.0	0.0	0.0
STACK AREA (SQ. FT.)	5.59	5.59	5.59	5.59
PITOT CORRECTION FACTOR	0.84	0.84	0.84	0.84
NOZZLE DIAMETER (IN.)	0.314	0.314	0.314	0.314

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
2610 19TH. STREET, SOUTH
BIRMINGHAM, AL 35209
205-879-1850

COMPUTED AIR TEST RESULTS FOR GENERAL SHALE PRODUCTS CO
JOB NUMBER 41332

RUN NUMBER	1	2	3	4
DATE OF TEST	10/11/83	10/11/83	10/11/83	10/11/83
LOCATION OF TEST	TK #15	TK #15	TK #15	TK #15
1. STACK PRESSURE				
INCHES HG	30.23	30.22	30.22	30.22
MILLIMETERS HG	767.72	767.59	767.59	767.63
2. METER PRESSURE				
INCHES HG	30.37	30.37	30.37	30.37
MILLIMETERS HG	771.51	771.46	771.46	771.46
3. METER VOLUME				
DRY STANDARD CUBIC FEET	49.390	48.750	48.793	48.484
DRY STANDARD CUBIC METERS	1.399	1.380	1.382	1.373
4. WATER VOLUME				
STANDARD CUBIC FEET	3.050	3.643	3.577	3.601
STANDARD CUBIC METERS	0.086	0.103	0.101	0.102
5. MOISTURE CONTENT (%)	5.82	6.95	6.83	6.91
6. MOLECULAR WEIGHT DRY	29.48	29.41	29.51	29.32
7. MOLECULAR WEIGHT WET	28.81	28.62	28.72	28.54
8. STACK VELOCITY				
FEET PER SECOND	40.01	39.65	39.67	39.45
METERS PER SECOND	12.19	12.09	12.09	12.02
9. VOLUMETRIC FLOW				
ACTUAL CUBIC FEET PER MINUTE	13,419	13,299	13,307	13,231
ACTUAL CUBIC METERS PER SECOND	6.33	6.28	6.28	6.24
10. VOLUMETRIC FLOW				
DRY STANDARD CUBIC FEET PER MINUTE	8,016	7,847	7,852	7,829
DRY STANDARD CUBIC METER PER SECOND	3.78	3.70	3.71	3.69

G U A R D I A N ** S Y S T E M S ** I N C O R P O R A T E D
2610 19TH. STREET, SOUTH
BIRMINGHAM, AL 35209
205-879-1850

COMPUTED AIR TEST RESULTS FOR GENERAL SHALE PRODUCTS CO
JOB NUMBER 41332

RUN NUMBER	1	2	3	4
DATE OF TEST	10/11/83	10/11/83	10/11/83	10/11/83
LOCATION OF TEST	TK #15	TK #15	TK #15	TK #15
11. CONCENTRATION				
GRAINS PER DRY STANDARD CUBIC FOOT	0.0688	0.0704	0.0801	0.0650
GRAMS PER DRY STANDARD CUBIC METER	0.1575	0.1610	0.1833	0.1488
15. PARTICULATE MASS RATE (#/HR.)	4.73	4.73	5.39	4.36
16. VOLUME AT NOZZLE				
ACTUAL CUBIC FEET	82.688	82.629	82.691	81.943
ACTUAL CUBIC METERS	2.341	2.340	2.342	2.320
17. CONCENTRATION				
GRAINS PER ACTUAL CUBIC FOOT	0.0411	0.0415	0.0473	0.0385
GRAMS PER ACTUAL CUBIC METER	0.0941	0.0950	0.1081	0.0880
18. % ISOKINETIC	100.09	100.91	100.93	100.60

PROCESS INFORMATION

PLANT: Kingsport -- TK-15 DATE: October 11, 1983

Brick Rate:

Car Schedule	=	80	Minutes	= .75	Cars/Hour
Car Count	=	3,968	Q/S Brick/Car		
Hourly Rate	=	2,976	Q/S Brick/Hour		
Brick Weight	=	4.3	Lbs.		
Brick Rate	=	12,797	Lbs./Hour		

Fuel Rate:

Total	=	30.8	Therms/M Brick		
Coal	=	6.69	Tons/Day		
		557.5	Lbs./Hour	= 79	% of Btu's
Natural Gas	=	48.9	MCF/Day		
		2037.5	Cu. Ft./Hour	= 21	% of Btu's

Total Process Weight:

	12,797	Lbs. Brick/Hour
+	557	Lbs. Coal/Hour
	13,354	Total Lbs./Hour
	6.68	Tons/Hour

Coal Analysis:

14,551	Btu/Lb.
0.79%	Sulfur
3.22%	Ash

Allowable Emissions:

9.3 lbs./hr.

I. INTRODUCTION AND PROCESS DESCRIPTION

On October 11, 1983, Guardian Systems, Inc. performed a series of particulate emissions tests on General Shale Products Brick Plant Kiln No. 15 located in Kingsport, Tennessee. These tests were conducted in accordance to the rules and regulations expressed in the Code of Federal Regulations, Title 40, Section 60, Reference Methods 1-5 as amended.

Individual bricks are formed and stacked onto kiln cars measuring approximately 7'-5" x 9'-6". Cars are inserted on a regular basis into a long, continuous-fired tunnel kiln. As one car is discharged another is inserted. This provides a constant moving mass inside the kiln. Cars are pushed through the 424-6" long kiln at a slow, methodical pace requiring almost 59.6 hours for the complete travel. By means of a coal firing process, heat is increased in each chamber until the total firing is complete. As the car continues through the kiln from the main firing zone the temperatures are reduced to provide necessary cooling.

On October 11, 1983 at approximately 8:00 AM, an informal pre-test meeting was held at the sampling location. The purpose of the meeting was to discuss the test procedures to be used for sampling Kiln 15 that day. Mr. Thomas Isaacs and Mr. Ron Drigger represented the Division of Air Pollution Control First Tennessee Regional Health Office; Mr. Greg Forte representated the Division of Air Pollution Control Nashville Office; Mr. Dave McNees, Corporate Representative, and Mr. Buddy Archer, Plant Superintendent represented General Shale Products Corporation and Mr. Tom Lotz and Mr. Ashley Riley represented Guardian Systems, Inc.

The following personnel were present during the actual field sampling and performed the duties indicated:

Mr. Dave McNees	Provided production data
Mr. Buddy Archer	Stable operation of plant
Mr. Thomas Isaacs	Observed field sampling
Mr. Ron Digger	Opacity measurements
Mr. Greg Forte	Observed plant operations
Mr. Tom Lotz	Field sampling
Mr. Ashley Riley	Field sampling and coal sampling

The FAX from the
National Authority on Brick

DATE: 11/24/92

TO: RICK MARINSHAW
MID WEST

FAX NO: (919) 677-0065

FROM: NELSON COONEY, PRESIDENT

Brick Institute of America
11490 Commerce Park Drive
Reston, VA 22091-1525
FAX No. (703) 620-3928 Phone No. (703) 620-0010

Number of Pages Including this Page 1

If there is a problem with this transmission, please call us.

Message:

Dear Rick:

For a gas-fired plant, I'd recommend:

The Belden Brick Company
700 Tuscarawas Street W.
Canton, Ohio 4 701-0910

contact:
John Jensen
(216) 456-0031

For a coal-fired plant, I'd recommend:

General Shale Products Corporation
Bx 16421, CRS.
Johnson City, Tennessee 37602

contact:
Walt Banyas
(615) 282-4661

Belden has 7 plants in Ohio; General Shale has 18 plants in AL, GA, IN, KY, TN and VA.

College of Engineering

THE GILBERT C. ROBINSON DEPARTMENT OF
CERAMIC ENGINEERING

CLEMSON UNIVERSITY

April 24, 1995

Mr. Ron Myers
Emissions Inventory Branch
Technical Support Division (MD-14)
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Re: Summary of Test Data For Brick Manufacturing For AP-42 Revisions

Dear Ron:

I have been supplied a copy of your FAX to Mr. John Jensen of Belden Brick dated March 31, 1995, which contains a Table 4-1, "Summary of test Data For Brick Manufacturing." I have previously checked acid gas emissions and found the numbers to correlate with data I have from the tests at Pine Hall, Belden, and General Shale. I had a chance today to examine the "Grinding Room" PM and PM-10 data today for the first time. You will recall that this draft has values of Filterable PM for grinding rooms in plants without a dust collector system of 8.5 and 17 lb/ton and PM-10 of 0.53 lb/ton.

I don't understand these values at all. I checked the Pine Hall data in the Final Test Report of August, 1993, where the average values of PM and PM-10 were 2.300 and 0.172 lb/hr respectively. The grinding room was processing 220 tons/hr during these tests. This yields emission factors for PM and PM-10 of 0.0104 and 0.00078 lb/ton respectively.

I ask you to check these values, and please let us know if our calculations are in error. These values are extremely important with respect to state regulatory actions, and I am sure you are as concerned with good numbers as we are.

With regards,

Denis A. Brosnan

Denis A. Brosnan

c: Mr. Rick Marinshaw, MRI
Mr. Walt Banyas, General Shale
Mr. Nelson Cooney, BIA

OLIN HALL • BOX 340907 • CLEMSON, SOUTH CAROLINA 29634-0907 • TELEPHONE 803/656-3093

FAX MESSAGE/COVER SHEET

Denis A. Brosnan, PhD, PE
Clemson University, Olin Hall
P. O. Box 340907
Clemson, SC 29634-0907 USA

TEL: 803-656-0603 FAX: 803-656-0604
Internet: Denis.Brosnan@eng.clemson.edu

PLEASE NOTE THE NEW FAX NUMBER!

Date: 4/24/95

Pages: 2

To: Rick Marenshaw

FAX: 919-677-0065

Subject: AP-42 Data

Message

Brick and Tile - Smarter Than You Think!

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

June 29, 1995

Mr. Ronald E Myers
Emission Factor and Inventory Group
Emissions, Monitoring and Analysis Division
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

Re: Your letter of May 23, 1995, concerning update of AP-42, 11.3 BRICK AND STRUCTURAL CLAY PRODUCT MANUFACTURING (DRAFT)

Dear Mr. Myers:

We do not disagree with the emission factors in the referenced draft section but have a few comments as follows:

1. Our experience with brick plants indicates a slightly different flow process than portrayed in the referenced draft figure 11.3-1 which shows mining to primary crusher to grinding/screening to raw materials storage to forming/cutting (brick making). In our area the process flow is mining to raw material stockpile to primary crusher to crushed material storage shed to grinding/screening to screened material storage bin to brick making.

2. We feel that it would be helpful if the different types of particulate matter (PM) listed in Tables 11.3-1 and 11.3-2 were better identified. This includes filterable, condensible and total PM, and their breakdown into PM, PM10, inorganic and organic. A written definition of each term, or a listed test method for determination of each term, would be helpful. This could be done in either the writeup or as a footnote to the table.

We appreciate the opportunity to comment on these updates to AP-42. We look forward to working with you in the future.

Sincerely,

Jeffrey A. Saitas
Deputy Director
Office of Air Quality

cc: Ms. Jole Luehrs, Chief, New Source Review Section (6T-AN), Environmental Protection Agency, Region 6, Dallas

Version 6/95

P.O. Box 13087 • Austin, Texas 78711-3087 • 512/239-1000

Ohio EPA

State of Ohio Environmental Protection Agency

STREET ADDRESS:
1800 WaterMark Drive
Columbus, OH 43215-1099

TELE: (614) 644-3020 FAX: (614) 644-2329

MAILING ADDRESS:
P.O. Box 1049
Columbus, OH 43216-1049

July 09, 1996

Brian Shrager
Midwest Research Institute
Suite 350
401 Harrison Oaks Blvd.
Cary, NC 27513-2412

Re: Emissions Test Reports for Counselor Material Processing, Inc. (formerly Ohio Briquetting), Crescent Brick Co. Inc. and New Castle Refractory.

Dear Mr. Shrager:

Per your request and as we discussed, please find enclosed the Emissions Test Reports for Crescent Brick Co. Inc. and New Castle Refractory. The Emission Test Report for Counselor Material Processing, Inc. (formerly Ohio Briquetting) will be forwarded to you by Jim Pellegrino from the Regional Air Pollution Control Agency (RAPCA) in Dayton, Ohio. Jim Pellegrino can be reached at telephone number (513) 225-5923 if you need to contact him.

Sincerely,

David Bola, Environmental Specialist
Ohio E.P.A., DAPC
Central Office
Columbus, Ohio

cc: Bill Juris, Environmental Supervisor, Ohio E.P.A., DAPC, Central Office, Columbus, Ohio

Jim Pellegrino, Regional Air Pollution Control Agency (RAPCA), Dayton, Ohio

BIA

THE FAX FROM THE NATIONAL AUTHORITY ON BRICK

Date: July 24, 1995

To: Ron Myers

Company: EPA

FAX No: (919) 541-0684

From: Nelson Cooney

Brick Institute of America
11490 Commerce Park Drive
Reston, VA 22091-1525
FAX No. (703) 620-3928 Phone No. (703) 620-0010

Number of Pages Including this Page: 6

If there is a problem with this transmission, please call us.

MESSAGE:

Dear Ron -

Faxed herewith are our comments. I will bring the original and copies with me to give you on Wednesday.

Sincerely,

Nelson

Brick Institute of America THE NATIONAL AUTHORITY ON BRICK CONSTRUCTION

July 24, 1995

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Factor and Inventory Group
Research Triangle Park, NC 27711

Attention: Mr. Ron Meyers
Emission Factor and Inventory Group

Re: Brick Industry Response to Proposed AP-42 Emission Factors

Dear Mr. Meyers:

The members of the Brick Institute of American (BIA) and the Center for Engineering Ceramic Manufacturing have completed their review of the proposed document entitled "Brick and Structural Clay Product Manufacturing." This letter presents our comments on the information contained in this document. It was generally agreed that this document provides a more comprehensive and accurate representation of air emissions from brick manufacturing facilities in comparison to the previous AP-42 version. We understand the inherent difficulties in establishing universal emission factors for an entire industry and feel that USEPA's recognition of mass balance techniques provides individual facilities with an option to the listed emission factors. However, after careful review the following technical and editorial comments are provided:

TECHNICAL COMMENTS

1. Emission factors were developed for criteria and hazardous air pollutants based on the weight of bricks produced in the kilns resulting in an emission factor with the units of pounds of pollutant per ton of brick produced. It is our feeling that this approach incorrectly designates the source of all emissions as originating from the clay body. This approach becomes particularly troublesome when dealing with

11490 Commerce Park Drive, Reston, Virginia 22091-1525 Phone: 703-620-0010 Fax: 703-620-3928

local state air toxic regulations such as in North Carolina where toxic emissions resulting solely from fuel combustion are exempt. It would seem more appropriate to develop so called "process emission factors" by testing regional facilities which are fired by natural gas. This is based on the fact that emissions of hazardous air pollutants and most criteria pollutants are negligible from the combustion of this fuel and therefore emissions could generally be attributed to the clay body.

2. Combining the metals emission factors for natural gas- and coal-fired plants into a single emission factor for all plants, regardless of fuel type, does not appear to be appropriate. It is well documented that considerable quantities of metals are emitted from coal combustion while combustion of natural gas will not result in emissions of these pollutants. In addition, the metals emission factors for natural gas-fired facilities are probably inordinately high due to the nature of raw material used at the Belden Brick facility. This facility obtains its clay in association with coal mining activities which, in all likelihood, have higher than normal metals content. As an example, the cadmium emission factor for natural gas-fired kilns is an order of magnitude higher than the factor for coal-fired facilities.

3. The emission factor for sulfur oxides from natural gas-fired kilns also appears to be inaccurate. In view of this inaccuracy, additional data should be developed before an SO_2 emission factor for natural gas-fired kilns is published.

4. Testing for SO_2 from brick dryers without supplemental heaters is questionable. Only one test was completed on a natural gas-fired facility. Typically, a well-operated natural gas-fired facility should not show any increase in CO or SO_2 above ambient levels. Obviously, dryer emissions will be highly dependent on operating procedure and raw material and we feel inclusion of this emission factor would be misleading.

5. The grinding and screening emission factor for particulate matter (PM & PM-10) from operations processing dry material is based on measuring the inlet concentration to a bag filter at the Belden Brick facility. Based on comments provided by Belden Brick personnel, this bag filter was designed with excessive pickup and carrying velocities. The end result is that this device actually collects particulate matter that would otherwise settle out in the building interior. Therefore, this emission factor is not representative of uncontrolled grinding and screening operations.

This data could be utilized by applying a removal efficiency factor to account for control resulting from the building enclosure. Based on experience of several brick manufacturers and previous permit submittals to state agencies, this efficiency factor is estimated to be in excess of 95% and in all likelihood greater than 99%. Additional testing of operations processing dry materials should be performed to more accurately quantify these emissions. In the absence of such data, facilities should be allowed to apply an efficiency factor to account for particulate settling within the building enclosure.

Based on the above information, it is recommended that EPA, at a minimum, provide a footnote to Tables 11.3-1 and 11.3-2 indicating that these emissions factors represent total airborne particulate matter within the screening and grinding enclosure and that an efficiency factor should be applied to estimate actual emissions to the outside atmosphere.

6. It is stated on page 11.3-5 that fluoride emissions can be reduced by maintaining kiln temperatures below 2000°F. This statement is not necessarily true and there are a number of facilities and raw materials which will show no higher fluoride emissions at 2100°F than at 2000 °F. We feel this statement should be removed from the final document.

7. It is stated on page 11.3-5 that the typical range of fluorine present in brick raw material is 0.01 to 0.2 percent. The actual range is more closely represented by a fluorine content of 0.01 or 0.06 percent.

EDITORIAL COMMENTS

1. Page 11.3-1 - The last sentence of the third paragraph should read "The material is then either conveyed to the mill room for brick forming or conveyed to a storage area."

2. Page 11.3-3 - At the bottom of the third paragraph the words "produce smoke" should be eliminated. The flashing process is actually a result of excess fuel which creates a reducing atmosphere, not smoke.

3. Page 11.3-2 - Flow Diagram. Since loading and packaging is an integral part of brick-making, there should be a box with "loading and packaging" included before the "storage and shipping" box. Also, the box "Preheater (optional)" would be better if it were "Predryer (optional)."

4. Page 11.3-2 - Flow Diagram. The dashed arrow in the box at lower left shows "exhaust steam." The should read "exhaust stream."

5. Page 11.3-5 - First paragraph. It is stated that barium carbonate is utilized as a surface treatment. Barium carbonate is mixed with the clay prior to extrusion and therefore should not be considered a surface treatment.

6. Page 11.3-3 - First paragraph. Alter the sentence with the additives to read "If specified, various surface treatments such as texturing or color coatings can be applied to the column at this point." Drop the unneeded next sentence, which reads: "These treatments are used to add color or texture to the product."

7. Page 11.3-3 - Paragraph 3. The first part of this paragraph is slightly out of order with kiln information before the dryer. This should read: "Following forming and setting, the brick-laden cars enter a predryer or holding area and are then loaded into the dryer. Dryers typically are heated to about 204°C (400°F) using waste heat from the cooling zone of the kiln. However, some plants heat dryers with gas or other fuels. Dryers may be in-line or totally separate from the kiln. From the dryer, the bricks enter the kiln, although some facilities operate down draft periodic kilns or other types of kilns. A typical tunnel kiln ranges from about 104 meters (340 feet) to 152 meters (500 feet) in length and includes a preheat zone, a furnace zone, and a cooling zone. The furnace or firing zone typically maintains a maximum temperature of about 1090°C (2000°F). During firing -- etc. --".

8. Page 11.3-3 - Last paragraph. Drop the sentence reading: "Although lower heat recovery makes this type of kiln less efficient than the tunnel kiln, the uniform temperature distribution leads to a good quality product." This is an editorial comment that has no place in this draft.

9. Page 11.3-5 - At the bottom of the fourth paragraph the statement "Control efficiencies of 95 percent or higher have been reported for this type of scrubber" should be removed. This statement is based on a control device at one plant and actual removal efficiencies will be highly dependent on exhaust stream characteristic and design parameters.

10. Table 11.2-1 and 11.3-2 - A footnote should be added to these tables explaining how total PM and PM-10 values are calculated from the filterable and condensible data.

11. Table 11.3-5 and 11.3-6 - A footnote should be added to these tables stating that regulated VOC emission factors can be calculated by subtracting the methane emission factor from the TOC emission factor. Alternately, an additional column entitled "Volatile Organic Compounds" could be added.

RECOMMENDATIONS

Based on our review of the proposed document the BIA is planning an additional source test of a kiln stack at Triangle Brick Company's facility in Merry Oaks, North Carolina. This facility is approximately four years old and is fired primarily by natural gas. It is anticipated that this test would be completed for metals, sulfur oxides, oxides of nitrogen, carbon monoxide, PM-10, and VOCs. It is our belief that the results of this testing, along with current fuel combustion emission factors, could be utilized for estimating emissions from a majority of brick manufacturing facilities.

In closing we wish to extend our appreciation to USEPA for its continued efforts to accurately quantify air emissions from our industry. As stated earlier, we feel the proposed document, while having some limitations, is an excellent step in this direction. We look forward to meeting with you and discussing this matter in more detail in the near future.

Very truly yours,

Nelson J. Cooney
President
Brick Institute of America

NJC:cb

copy to: David C. Evans, Esq.
BIA Legal Counsel

RECD. FROM BIA 7/26/95

Filename:
P6GRD.AIR

THE BELDEN BRICK COMPANY
PLANT 6 GRINDING PLANT
EPA AMBIENT AIR SAMPLES

EXHIBIT A

INTRODUCTION:

The USEPA draft of the proposed AP-42 revision Section 11.3 for the Brick and Structural Clay Product Manufacturing incorrectly assumes that the dust measured on the inlet side of a grinding plant baghouse would, in fact, be 100% released to the atmosphere.

Ambient air tests run 11/9/93 and 11/11/93 during the Belden USEPA tests indicate that only 4.33% of the dust inside the grinding plant leaves the grinding plant and thus affects the ambient air.

CALCULATIONS: (From page 3-18 of Draft Report dated July 27, 1994)

	1 g/DSCF	2 g/DSCF	3 g/DSCF	Average g/DSCF
Inside grinding plant.....	14.0460	19.6450		16.8455
Downwind outside West.....	1.3171	1.1533		1.2352
Background outside East...	0.3800	0.7090	0.4300	0.5063
Difference...Downwind minus Background........................				0.7289
Difference/Inside = Percent of dust that reaches ambient air..				4.33%

IF YOU ASSUME:

1 - That the inlet of the baghouse = Inside the grinding plant

2 - That the calculations for the percent of dust that reaches ambient air is correct

THEN:

The PM emission from the grinding plant is 4.33% of the emission factor of 8.5 #/ton

or 8.5 X 0.0433 = 0.368 #/ton

THEREFORE: THE CORRECT EMISSION FACTOR IS............0.368 #/ton

Prepared by:

John C. Jensen
Environmental Engineer
THE BELDEN BRICK COMPANY

Date Prepared:
6/7/95

FAX MESSAGE/COVER SHEET

Denis A. Brosnan, Ph.D, PE
Center For Engineering Ceramic Manufacturing
100 Clemson Research Blvd.
Anderson, SC 29625 USA

TEL: 864-656-0603 FAX: 864-656-1095
Internet: Denis.Brosnan@eng.clemson.edu

Date: 8/21/96

Pages: 2

To: BRIAN SHRAGER

FAX: 919-677-0065

Subject:

Please Note Our New Area Code of "864"

Brick, Tile, Toilets, And Refractories:
High Technology In Traditional Ceramic Products

Contact Personnel For Brick Plants
In The BIA Stack Testing Program
As Furnished To EPA

Plant	Contact	Telephone
Boral Bricks; Augusta Phenix City, Salisbury	Robert Maner	334-291-0930
Endicott Clay Products	Gary Davis	402-729-3315
Richtex Corporation	Mitch Wells	803-786-1260

D. A. Brosnan
8/21/96

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

COVER SHEET FOR TELEFAX DOCUMENTS

DATE: March 24, 1997

TIME: 3:00 p.m.

TO: Ron Myers

FAX #: 919/541-0684

FROM: Dennis Lawler, Manager, Division of Air Pollution Control
Illinois Environmental Protection Agency

NUMBER OF PAGES,
INCLUDING COVER PAGE: 33

If any difficulty is experienced with this transmission, please stop and call Kay at (217) 524-7636.

Special Instructions:

If this fax transmission is not clear, call Kay at 217/524-7636 and she will send a hard copy to you through the mail.

For future reference, our Telecopy Number is (217) 782-2465.

f:\kkwin\misc\faxform.kk

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

(217) 782-7326

March 24, 1997

Mr. Ron Myers (MD-14)
Emission Factor and Inventory Group
Office of Air Quality Planning and Standards
United States Environmental Protection Agency
Research Triangle Park, NC 27711

Re: Comments on Draft Section 11.3 "Brick and Structural Clay Product Manufacturing" of AP-42, 5th Ed. MRI Project No. 4604-02, December 1996, EPA Contract 68-D2-0159, Work Assignment No. IV-02

Dear Mr. Myers:

Per your request for comments regarding the experiences of the Illinois Environmental Protection Agency (Illinois EPA) with innovative control programs for brick and clay product manufacturers, our response to the draft document includes:

Re: Section 2.4, Paragraph 5:

1. The major source of SO_2 emissions in this industry is not the combustion products of the fuel but the various ferrous sulfide compounds used (generally as pyrite and/or mixed ferro aluminum sulfur siliceous clay compounds) in the clays. A secondary, smaller source is the wood and paper industry by-products that are used as brick additives to: 1) improve green strength, 2) minimize scumming, 3) reduce leaching or 4) improve coating adherence in the finished product. One common name for the liquid wood by-product is lignin sulfate. The other dry versions have several different names and/or numbers. All these sulfur points should be emphasized for their affects on the raw materials. All stack test information should include an analysis for sulfur in the clays and, as required, for the fuels and the additives. Draft table 11.3-2 does include a footnote to that effect, but more emphasis is needed on that point as well as the available control methods. Sulfur reduction control opportunities include adding lime to the clay, blending different clays, blending clays from different areas of the same mine, additive

materials selection, mechanical scrubbers, and selecting low sulfur fuel.

Regarding Section 2.4:

2 Fireclays and fireclay shale blends used to produce white, buff, dark buff, and pink colored brick are clays typically associated with sink holes or sedimentary deposits. At one Midwest facility, the amount of each type clay blended varies from 0 to 90%. Color consistency determines the amount of each blend. White brick would typically be 100% fireclay. The available sulfur in these clays generally range from 0.2% to 1.5% which are considered high; whereas, typical red brick shales have sulfur levels less than 0.25% but may have pockets and seams which have a higher sulfur content. Trials conducted at this brick facility found granular lime additions (CaO) could reduce air sulfur emissions and/or increase brick sulfur retention up to 100%. Lime additions up to 6% by weight of the batch have been made successfully in the higher fireclay blends. The higher shale blend clay mixtures require only 2% and 4% lime additions. The lime is added in granular form at the mixer. A 2% sand addition to open the brick's green structure and balance shrinkage is usually added with the lime. Lime additions to the brick mixture when compared to scrubbers are an effective low cost method (about a $1.25 per thousand brick) for controlling sulfur compound emissions. During firing, the lime disassociates allowing the calcium ion to form calcium sulfate compounds which are retained within the finished brick.

Regarding Section 2.3, Paragraph 7:

3. Fluorine and chlorine are inherent in the raw shales and clays and are emitted during the firing process. Secondary emissions of fluorine and chlorine compounds come from the kiln when wood byproducts are added to the clay batch. The batch additives, which are wastes from the paper bleaching process, breakdown during brick firing, and become emissions. These secondary emissions can be reduced or controlled by substituting dextrose products (beet, corn and cane sugar byproducts) in the batch to replace the chlorine containing additives and also by adding small amounts of barium compounds, frequently carbonates and sulfides, which chemically react at high temperatures to form barium salts.

Regarding Section 2.4:

4. Kiln stack particulate matter emissions are increased substantially when very small amounts of fine sand are used between the brick to prevent sticking and enhance brick movement during firing. Sand may also be applied on the brick surface to enhance the brick's final finish or texture. Today's high velocity kiln burners can blow and suspend the sand particles. Options to control or reduce particulate emissions include the use of washed, coarse, scalped sand to replace the fine sand or elimination of the sand. Thin paper is one alternative to using sand between the bricks.

Regarding Section 2.4, Paragraph 5:

5. Flashing emissions are a major source of carbon monoxide and VOC emissions. Uncombusted natural gas is added in large volumes to create the reducing atmosphere, which then rapidly cools the brick to retain the special colors. Pink, purple, dark red, and black color brick can be produced this way. The ferric sulfate to ferrous sulfide conversions create the color changes. Since the large dosages of natural gas needed for this process are expensive, used tires and used motor oil are frequently substituted. These waste products do increase emissions, create odors and add toxic emissions. To ensure emissions are controlled, afterburners or recycling the flash smoke to another area of the kiln for refiring does reduce some emissions.

Regarding Section 2.2, Paragraph 3:

6. Chromium and manganese emissions result from brass slag, steel dust, boiler fly ash, ground manganese, chromic oxide and similar additions to green brick or brick coatings. These color and texture enhancement emissions result from handling of the raw material or handling of raw bricks in the kiln area. Slags and other waste products also require careful selection to avoid excessive toxic emissions.

Per your request, enclosed is information regarding the stack testing and methods used to reduce emissions at an Illinois brick manufacturing facility, Marseilles Brick Company. The initial stack testing was conducted with zero lime. The second stack test included a 2% lime addition. The result was that 37% of the total sulfur emissions were removed. Routine process control or quality control practice requires firing one half of a brick. Both the unfired half and the fired half are laboratory tested and compared for total sulfur content. Continued testing found increasing lime additions up to 6% eliminates 95 to 100% of the sulfur emissions.

We hope this information will be of use to you as you finalize this section of AP-42. If you wish to discuss this information, please contact Mark Martin in the Bureau of Air, Permit Section at (217) 782-7187.

Sincerely,

Dennis Lawler, C.C.M., Manager
Division of Air Pollution Control

DL:kkwin/f-658

Enclosure

FUGRO

FUGRO MIDWEST, INC.

October 13, 1994
Report 0894-8885-2

9921 St. Charles Rock Road
St. Ann (St. Louis), Missouri 63074
Tel: (314) 428-8880
Fax: (314) 428-8719

Mr. Charles Laird
Marseilles Brick Venture, Ltd.
P.O. Box 306
1401 Broadway
Marseilles, Illinois 61341

Source Emissions Testing
Marseilles Brick
Marseilles, Illinois

Dear Mr. Laird:

Fugro Midwest, Inc. (Fugro) is pleased to provide you with this report on the results of the air emissions tests conducted at the Marseilles Brick facility located in Marseilles, Illinois. Testing was conducted on August 29, 1994 on the outlet of the kiln, and on August 30, 1994 on the outlet of the number one and number two dryer stacks.

This report describes the testing methodologies and summarizes the results of the emissions testing.

Fugro appreciates this opportunity to provide service to Marseilles Brick, and we look forward to working with you on future projects. Please call us if you have any questions concerning this report.

Sincerely,

FUGRO MIDWEST, INC.

Robert F. Folle

Robert F. Folle
Air Quality Scientist

Christopher N. Dawdy

Christopher N. Dawdy
Vice President
Manager, Air Quality Group

RFF:CND:nm

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JOCK LAIRD – (815) 795-6922

150,000 Modular Brick/Day (SBE)

1.0 INTRODUCTION

Fugro Midwest, Inc. (Fugro) was contracted by Marseilles Brick Venture, Ltd. to conduct source emissions testing at their facility located in Marseilles, Illinois. Marseilles Brick has two independent dryer tunnels approximately 200 ft. in length that hold 14 kiln cars each. Waste heat from the cooling section of the kiln is supplied to each dryer by a fan through a duct/plenum system. The heat to each dryer is boosted to 325°F by two natural gas burners, 442M BTU/hr. and 432M BTU/hr. respectively, located in the air supply duct. Moist warm air is exhausted to the atmosphere by a fan at the entrance end of each dryer tunnel. Dryer #1 and dryer #2 are independent of each other except for the common waste heat supply from the kiln.

The tunnel kiln used by Marseilles Brick to fire its brick is a 498 ft. metal jacketed natural gas fired kiln designed by Ceric. The kiln holds a total of 36 kiln cars with 20 in the pre-heat and furnace section and 16 in the cooling section. The pre-heat section is divided into 6 zones with a total of 32 gas fired side burners. The furnace section is divided into 7 zones with 19 natural gas fired top burners in each zone for a total of 133 top fired burners. The cooling section has a rapid cool zone (2 car lengths long) where the brick is cooled from 1930°F to approximately 1300°F by injecting ambient air directly on the brick. The balance of the cooling section is used to cool the brick to approximately 100°F before existing the kiln.

Waste heat is removed from the cooling section close to the exit to supply heated air to the dryers. The kiln exhaust fan is located near the entrance end of the pre-heat and exhausts the products of combustion to the atmosphere through a 40 ft high brick chimney.

Source emissions testing was conducted to determine mass emission rates of particulate, sulfur trioxide, sulfur dioxide, carbon monoxide, nitrogen oxide, and volatile organics. Three 1-hour test runs were conducted on each of the two dryer units and the kiln while firing bricks with a 17% shale/83% fireclay composition.

The emissions testing was conducted following the procedures outlined in 40 CFR Part 60, Appendix A, using USEPA Methods 1, 2, 3, 4, 5, and 6 to determine sampling point locations, volumetric flow rates, molecular weight, moisture concentrations, total particulate matter, and sulfur dioxide/sulfur trioxide, respectively. Additionally, USEPA Method 7E was used to determine nitrogen oxide (NO_x) emissions, USEPA Method 10 was used to determine carbon monoxide emissions, and USEPA Method 25A was used to determine total volatile organic emissions.

This report presents the results of the emissions testing. Copies of the field data sheets, laboratory analysis, equipment calibration records, calibration gas certifications, and example calculations are included in the appendices of this report.

2.0 SUMMARY OF TEST RESULTS

Fugro conducted source emissions testing at the Marseilles Brick facility located in Marseilles, Illinois, on August 29 and August 30, 1994 to quantify emission rates from three sources. An air emissions summary is presented in Table 2-1 for total particulate matter, NO_x, CO, and total hydrocarbon (THC) emissions. Table 2-2 presents the SO_2 and SO_3 results. The emissions were determined by averaging the results of three 1-hour test runs conducted on the exhaust of each unit. The testing was conducted during the use of a 17% shale/83% fire clay mixture and the north (#1) and south (#2) dryer, and the kiln stacks were tested.

Complete test results for total particulate matter, SO_2, and SO_3 are presented in Tables 6-1 through 6-9. Example calculations for Test Run No. 1 for total particulate matter are presented in Appendix F.

The continuous emissions monitoring results for total hydrocarbons (THC), NO_x, and carbon monoxide (CO) are presented in Section 6.0, Tables 6-10 through 6-15.

3.0 PURPOSE OF TESTING

Fugro conducted air emissions testing at the facility located in Marseilles, Illinois for the purpose of determining mass emission rates of particulate matter, sulfur trioxide, sulfur dioxide, carbon monoxide, nitrogen oxide and volatile organics. These emissions rates will be used to evaluate the potential emissions associated with the brick manufacturing operation. The testing was conducted as required by 35 Ill. Adm. Code 201.282(a) in association with Permit #89010009.

4.0 ACTIVITIES DURING THE TESTING

Messrs. Robert Folle, Todd Staley, and Dan Cusac of Fugro conducted the emissions testing. Mr. Charles Laird of Marseilles Brick scheduled the testing and coordinated the testing effort. Mr. Mark Martin and John Krolak of the Illinois EPA were present and observed the testing. Resumes of the test crew are presented in Appendix A.

5.0 TEST METHODS AND PROCEDURES

Fugro utilized USEPA Test Methods 1, 2, 3, 4, 5, and 6 as outlined in 40 CFR Part 60, Appendix A, to determine traverse point locations, stack gas velocity, volumetric flow rates, molecular weight, moisture, total particulate matter emissions and sulfur emissions, respectively. Additionally, Methods 7E, 10, and 25A were used to determine nitrogen oxide, carbon monoxide, and total hydrocarbon emissions.

Table 2-1
Emissions Summary
Marseilles Brick Venture Ltd.
Marseilles, Illinois

Source	Run	Parameter				
			Particulate	NO_x	CO	THC
Dryer #1	1	gr/dscf	0.0039	-	-	-
		lb/hr	0.645	0	0.46	0.21
		ppm	-	0	5.5	1.55
	2	gr/dscf	.0010	-	-	-
		lb/hr	0.1641	0	1.20	0
		ppm	-	0	14.6	0
	3	gr/dscf	.0026	-	-	-
		lb/hr	0.4483	0	0.46	0
		ppm	-	0	5.4	0
	Avg.	gr/dscf	.0025	-	-	-
		lb/hr	0.4190	0	0.71	0.52
		ppm	-	0	8.5	0.068
Dryer #2	1	gr/dscf	.0017	-	-	-
		lb/hr	0.2663	0	0.396	0
		ppm	-	0	4.7	0
	2	gr/dscf	.0017	-	-	-
		lb/hr	0.2640	0	0.246	0
		ppm	-	0	3.0	0
	3	gr/dscf	.0012	-	-	-
		lb/hr	0.1890	0	0.430	0
		ppm	-	0	5.0	0
	Avg.	gr/dscf	0.0016	-	-	-
		lb/hr	.2397	0	0.357	0
		ppm	-	0	4.23	0
Kiln	1	gr/dscf	.1427	-	-	-
		lb/hr	21.58	2.02	9.78	0.92
		ppm	-	16.38	130.10	7.8
	2	gr/dscf	0.0759	-	-	-
		lb/hr	11.36	1.92	9.41	0.72
		ppm	-	15.63	125.98	6.1
	3	gr/dscf	.0907	-	-	-
		lb/hr	14.33	0.93	10.64	0.76
		ppm	-	7.250	136.82	6.2
	Avg.	gr/dscf	0.1031	-	-	-
		lb/hr	15.75	1.62	9.94	0.798
		ppm	-	13.1	130.97	6.7

Table 2-2
Emissions Summary
Marseilles Brick Venture Ltd.
Marseilles, Illinois

Source	Run		Parameter	
			SO_2	SO_3
Dryer #1	1	mg	ND	0.18
		lb/hr	ND	0.0094
	2	mg	ND	0.25
		lb/hr	ND	0.0124
	3	mg	ND	10.67
		lb/hr	ND	0.556
	Avg.	mg	ND	3.70
		lb/hr	ND	0.193
Dryer #2	1	mg	ND	6.25
		lb/hr	ND	0.314
	2	mg	ND	3.31
		lb/hr	ND	0.165
	3	mg	1.60	2.33
		lb/hr	0.0796	0.116
	Avg.	mg	0.53	3.96
		lb/hr	0.0265	0.198
Kiln	1	mg	3,347	34.33
		lb/hr	119.89	1.26
	2	mg	3,411	44.14
		lb/hr	119.54	1.58
	3	mg	3,555	79.69
		lb/hr	127.36	2.95
	Avg.	mg	3,437.67	52.72
		lb/hr	122.26	1.93

ND = Non-detected

5.1 Field Procedures and Equipment (EPA Method 5 and 6)

5.1.1 Sampling Equipment and Procedures

The sampling equipment consists of the following:

1. Pitot Assembly
   a. Nozzle – Glass with a sharp, tapered leading edge.
   b. Probe – Stainless steel sheath with a 5/8-in. OD glass liner wrapped with nichrome wire; rheostat controlled and capable of maintaining a temperature of 248 degrees F +/- 25 degrees F.
   c. Pitot – Type "S" constructed and attached to probe according to specifications outlined in the "code of Federal Regulations, Chapter I, Title 40 Part 60, Appendix A, Method 2."
   d. Fyrite probe – Stainless steel 1/4-in. tubing attached to pitot tube in an interference-free arrangement.
   e. Thermocouple – Type "K" attached to the pitot tube such that the tip has no contact with the metal and does not interfere with the pitot tube face openings.

2. Filter Holder – Borosilicate glass with a glass fritted filter support and silicone rubber sealing gasket.

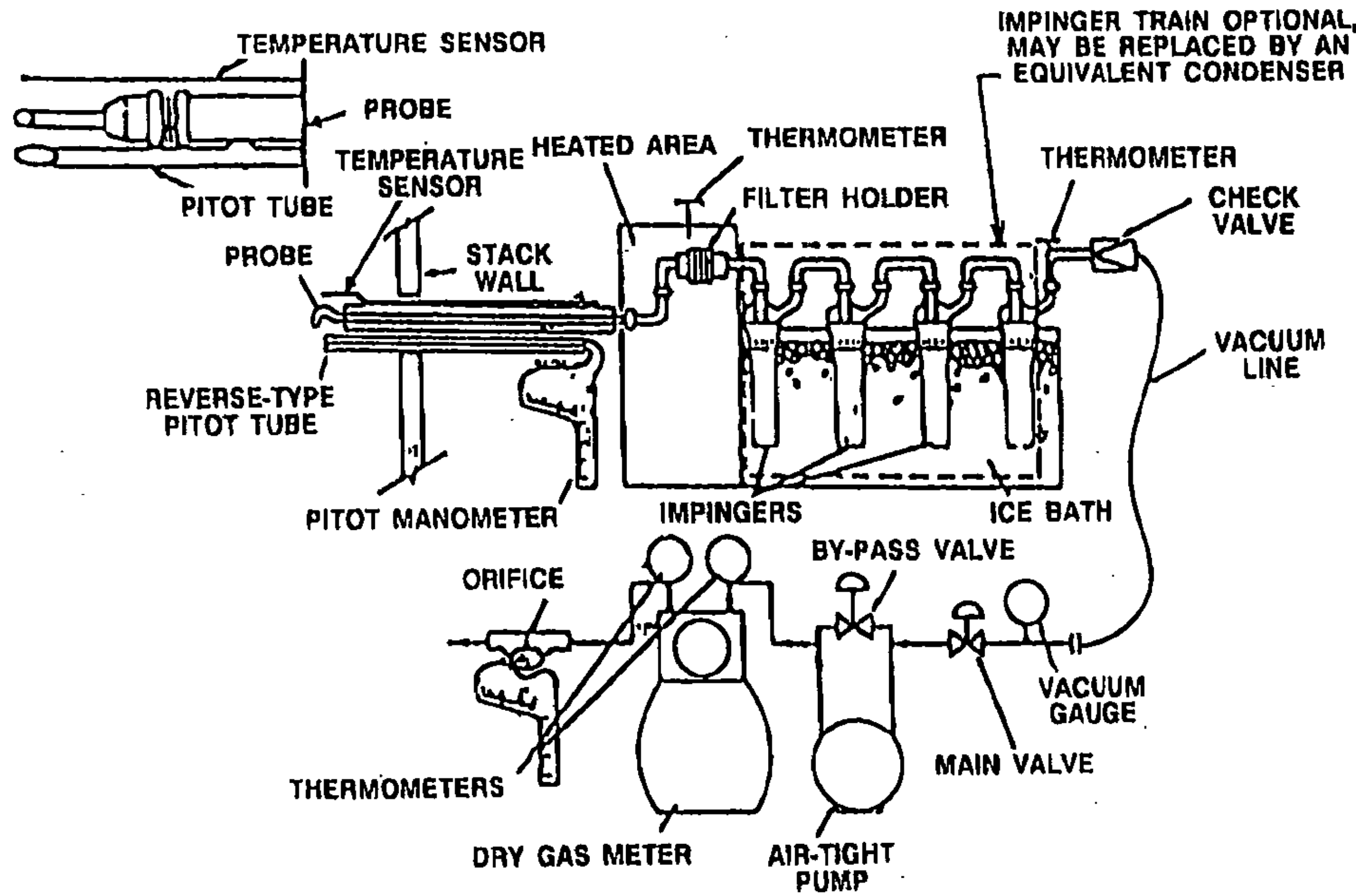
3. Filter Heating Assembly – Controlled heating element in aluminum module attached to end of probe; capable of maintaining 248 degrees F +/- 25 degrees F.

4. Impingers – Four glass impingers connected in series with glass ball joint fittings and placed in an ice bath. The first, third, and fourth impingers were of the modified Greenburg-Smith design. The second impinger was of the Greenburg-Smith design with a standard tip. Final gas exit temperature was measured to within +/- 5 degrees F with a thermometer immersed in the gas stream.

5. Control Box – Module containing the vacuum gauge, leak-free pump, thermometer capable of measuring temperature to within +/- 5 degrees F, dry gas meter with a minimum of 2% accuracy, valves and related equipment as required to maintain an isokinetic sampling rate and to determine sample volume.

6. Nomograph – To determine isokinetic sampling rate.

A schematic of the particulate sampling train is shown in Figure 5-1.



SOURCE: ENVIRONMENT REPORTER

Figure 5-1
PARTICULATE SAMPLING TRAIN
EPA METHOD 5

FUGRO McClelland

Prior to leaving the laboratory, glass fiber filters were numbered for identification purposes, heated for 2 hours at 220 degrees F, desiccated for 2 hours, and preweighed to the nearest 0.1 mg.

Upon arrival at the sampling site, the control box was leak-checked from the pump to the orifice at 5 to 7 in. of water.

The sampling train was prepared in the following manner: 100 ml of 80% isopropanol in the first impinger, 100 ml of 3% hydrogen peroxide was added to each of the next two impingers. The fourth impinger was left empty and the fifth impinger contained 250 grams of silica gel.

After assembling the train with the pitot tube, as shown on the schematic, the system was leak-checked by plugging the inlet to the probe nozzle and pulling a 15-in. mercury vacuum. A leakage rate not to exceed 0.02 cfm is considered acceptable. The pitot tube system was also leak-checked at 2 to 3 in. of water, and any leaks found were corrected.

The probe nozzle size and moisture content were derived from a preliminary velocity and temperature traverse measurement. Sampling points within the duct were selected in accordance with EPA Method 1 (40 CFR 60, Appendix A). The sampling probe was attached and the heater was adjusted to provide a gas temperature of approximately 248 degrees F, +/- 25 degrees F.

The filter heating system was turned on, and ice was placed around the impingers. After a suitable warmup period, the nozzle was placed at the first traverse point with the flow adjusted to isokinetic conditions. Using calculated sampling points and sampling times, the probe was repositioned to the next traverse point, and isokinetic sampling was re-established. This was accomplished for each point along the traverse until the run was completed. Readings were taken at each traverse point and at the calculated time interval. At the conclusion of each run, the pump was turned off and the final readings were recorded. A final leak check of the sampling system was performed, as previously described at the highest vacuum encountered during the test run. A leak check of the pitot system was also repeated.

5.1.2 Sample Recovery

The volume of liquid in the first four impingers was measured and recorded on the field data sheet. The probe nozzle, and all sample-exposed surfaces were washed with reagent-grade acetone and put into a clean sample bottle marked "prefilter." A brush was used to loosen any adhering particulate matter, and subsequent washings were put into the "prefilter" container. The filter was carefully removed from the fritted teflon support and placed in its original container. Any filter material that adhered to the filter support surfaces was carefully removed and added to the filter container. The silica gel was removed from the fifth impinger and transferred to its original container. A sample of the acetone used in washing the probe was saved as a blank for laboratory analysis. The liquid from the first four impingers was collected and labeled for shipment to the laboratory.

5.1.3 Analytical Procedures

The filter and any loose particulate matter were transferred from the filter container to a clean, tared glass weighing dish. The filter was placed in a desiccator for 24 hours and weighed to a constant weight. The original weight of the filter was deducted, and the weight gain recorded to the nearest 0.1 mg.

The "prefilter" wash and blank acetone solutions were transferred to individual clean, tared beakers, then evaporated to dryness and desiccated to a constant weight. The weight gain of the prefilter" was adjusted for the blank and recorded to the nearest 0.1 gram.

The impinger catch was shipped to Triangle Laboratory of North Carolina, for sulfur titrations. The analytical data sheets for particulate and SO_2/SO_3 analyses are presented in Appendix B.

5.2 Oxygen (O_2) and Carbon Dioxide (CO_2) Sampling

As required by EPA Method 3 (40 CFR 60, Appendix A), Oxygen and carbon dioxide samples were collected an analyzed. The collected sample was analyzed using a Horiba CMA-331A continuous gas analyzer. Oxygen and carbon dioxide concentrations were determined in percent of stack gas and stack gas molecular weight was then calculated.

Table 5-1 presents the equipment specifications of the continuous emissions monitors and Figure 5-2 presents a schematic of the analyzer system.

TABLE 5-1

CONTINUOUS EMISSIONS MONITORING
(CEM) SYSTEM
OXYGEN (O2) AND CARBON DIOXIDE (CO2)

CEM SYSTEM SPECIFICATIONS

PARAMETER:	O2	CO2
ANALYZER	HORIBA	HORIBA
MODEL	CMA-331A	CMA-331A
TYPE	PARAMAGNETIC	NDIR
RANGE	0-25 %	0-20 %
REPEATABILITY	+/- .5% Full scale (FS)	+/- .5% Full scale (FS)
DRIFT (ZERO)	+/- 1% FS/per week	+/- 1% FS/per week
DRIFT (SPAN)	+/- 2% FS per week	+/- 2% FS per week
RESPONSE TIME	90% FS < 1 MINUTE	90% FS < 1 MINUTE
ACCURACY	+/- 1% FS	+/- 1% FS
INPUT POWER	110-115 V.A.C./60 HZ.	110-115 V.A.C./60 HZ.

FUGRO

FUGRO MIDWEST, INC.

9921 St. Charles Rock Road
St. Ann (St. Louis), Missouri 63074
Tel: (314) 428-8880
Fax: (314) 428-8719

July 1, 1994
Report 0894-8885

Mr. Charles Laird
Marseilles Brick Venture, Ltd.
P.O. Box 306
1401 Broadway
Marseilles, Illinois 61341

Source Emissions Testing
Marseilles Brick
Marseilles, Illinois

Dear Mr. Laird:

Fugro Midwest, Inc. (Fugro) is pleased to provide you with this report on the results of the air emissions tests conducted at the Marseilles Brick facility located in Marseilles, Illinois. Testing was conducted on May 10, 1994 at the outlet of the number one dryer, and on May 11, 1994 at the outlet of the number two dryer and kiln.

This report describes the testing methodologies and summarizes the results of the emissions testing.

Fugro appreciates this opportunity to provide service to Marseilles Brick, and we look forward to working with you on future projects. Please call us if you have any questions concerning this report.

Sincerely,

FUGRO MIDWEST, INC.

Anna C. Nabb
Air Quality Scientist

Christopher N. Dawdy
Vice President
Manager, Air Quality Group

ACN:CND:ab

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APPENDICES

1.0 INTRODUCTION

Fugro Midwest, Inc. (Fugro) was contracted by Marseilles Brick Venture, Ltd. to conduct source emissions testing at their facility located in Marseilles, Illinois. Marseilles Brick has two independent Dryer tunnels approximately 200 ft. in length that hold 14 kiln cars each. Waste heat from the cooling section of the kiln is supplied to each dryer by a fan through a duct/plenum system. The heat to each dryer is boosted to 325°F by two natural gas burners, 442M BTU/hr. and 432M BTU/hr. respectively, located in the air supply duct. Moist warm air is exhausted to the atmosphere by a fan at the entrance end of each dryer tunnel. Dryer #1 and Dryer #2 are independent of each other except for the common waste heat supply from the kiln.

The tunnel kiln used by Marseilles Brick to fire its brick is a 498 ft. metal jacketed natural gas fired kiln designed by Ceric. The kiln holds a total of 36 kiln cars with 20 in the pre-heat and furnace section and 16 in the cooling section. The pre-heat section is divided into 6 zones with a total of 32 gas fired side burners. The furnace section is divided into 7 zones with 19 natural gas fired top burners in each zone for a total of 133 top fired burners. The cooling section has a rapid cool zone (2 car lengths long) where the brick is cooled from 1930°F to approximately 1300°F by injecting ambient air directly on the brick. The balance of the cooling section is used to cool the brick to approximately 100°F before existing the kiln.

Waste heat is removed from the cooling section close to the exit to supply heated air to the dryers. The kiln exhaust fan is located near the entrance end of the pre-heat and exhausts the products of combustion to the atmosphere through a 40 ft high brick chimney.

Source emissions testing was conducted to determine mass emission rates of particulate, sulfur trioxide, sulfur dioxide, carbon monoxide, nitrogen oxide, and volatile organics. Three 1-hour test runs were conducted on each of the two dryer units and the kiln while firing bricks with an 80% shale/20% fireclay composition.

The emissions testing was conducted following the procedures outlined in 40 CFR Part 60, Appendix A, using USEPA Methods 1, 2, 3, 4, 5, and 6 to determine sampling point locations, volumetric flow rates, molecular weight, moisture concentrations, total particulate matter, and sulfur dioxide/sulfur trioxide, respectively. Additionally, USEPA Method 7E was used to determine nitrogen oxide (NO_x) emissions, USEPA Method 10 was used to determine carbon monoxide emissions, and USEPA Method 25A was used to determine total volatile organic emissions.

This report presents the results of the emissions testing conducted at the Marseilles Brick facility. Copies of the field data sheets, laboratory analysis, equipment calibration records, calibration gas certifications, and example calculations are included in the appendices of this report.

2.0 SUMMARY OF TEST RESULTS

Fugro conducted source emissions testing at the Marseilles Brick facility located in Marseilles, Illinois, on May 10 and May 11, 1994 to quantify emission rates from three processes. An air emissions summary is presented in Table 2-1. The emissions were determined by averaging the results of three 1-hour test runs conducted on the exhaust of each unit. The testing was conducted during the use of 80% shale/20% clay mixture. Appendix A contains related process operations data.

3.0 PURPOSE OF TESTING

Fugro conducted air emissions testing at the facility located in Marseilles, Illinois for the purpose of determining mass emission rates of particulate matter, sulfur trioxide, sulfur dioxide, carbon monoxide, nitrogen oxide and volatile organics. These emissions rates will be used to evaluate the potential emissions associated with the brick manufacturing operation. The testing was conducted as required by 35 Ill. Adm. Code 201.282(a) in association with Permit #89010009.

4.0 ACTIVITIES DURING THE TESTING

Messrs. Robert Folle, Todd Staley, and Dan Cusac of Fugro conducted the emissions testing. Mr. Charles Laird of Marseilles Brick scheduled the testing and coordinated the testing effort. Resumes of the test crew are presented in Appendix B.

5.0 TEST METHODS AND PROCEDURES

Fugro utilized USEPA Test Methods 1, 2, 3, 4, 5, and 6 as outlined in 40 CFR Part 60, Appendix A, to determine traverse point locations, stack gas velocity, volumetric flow rates, molecular weight, moisture, total particulate matter emissions and sulfur emissions, respectively. Additionally, Methods 7E, 10, and 25A when used to determine nitrogen oxide, carbon monoxide, and total hydrocarbon emissions.

FUGRO

Report 0894-8885

Table 2-1
Emissions Summary
Marseilles Brick Venture Ltd.
Marseilles, Illinois

Source	Run		Particulate	SO_2	SO_3	NO_x	CO	THC
Dryer #1	1	gr/dscf	0.0074	0	0.0005	-	-	-
		lb/hr.	0.9765	0	0.0632	1.29	0.53	0.39
		ppm	-	ND	0.35	11.9	8.0	3.7
	2	gr/dscf	0.0023	0	0.0001	-	-	-
		lb/hr.	0.3741	0	0.0216	0.47	1.52	0.78
		ppm	-	ND	0.10	3.5	18.7	6.1
	3	gr/dscf	0.0041	0	0.0004	-	-	-
		lb/hr	0.6398	0	0.0625	0.26	1.86	0.88
		ppm	-	ND	0.30	2.0	24.0	7.3
	Avg.	gr/dscf	0.0046	0	0.0003	-	-	-
		lb/hr.	0.6635	0	0.0491	0.67	1.30	0.68
		ppm	-	ND	0.25	5.8	16.9	5.7
Dryer #2	1	gr/dscf	0.0057	0	0	-	-	-
		lb/hr.	0.7770	0	0	0.17	1.04	0.33
		ppm	-	ND	ND	1.5	14.9	3
	2	gr/dscf	0.0008	0	0	-	-	-
		lb/hr.	0.1199	0	0	0.29	1.50	0.32
		ppm	-	ND	ND	2.2	19.0	2.6
	3	gr/dscf	0.0008	0	0.0004	-	-	-
		lb/hr.	0.1206	0	0.0529	0.35	1.43	0.55
		ppm	-	ND	0.27	3.0	20.0	4.9
	Avg.	gr/dscf	0.0024	0	0.0001	-	-	-
		lb/hr.	0.3391	0	0.0176	0.27	1.32	0.40
		ppm	-	ND	0.09	2.2	18.0	3.5
Kiln	1	gr/dscf	0.0376	0.3800	0.0249	-	-	-
		lb/hr.	4.2421	42.9170	2.3903	2.36	6.98	0.80
		ppm	-	338.1	18.6	25.9	125.8	9.2
	2	gr/dscf	0.0381	0.3496	0.0197	-	-	
		lb/hr.	4.6234	42.3965	2.8082	2.67	7.23	0.61
		ppm	-	314.5	14.95	27.6	122.8	8.8
	3	gr/dscf	0.0347	0.3458	0.0163	-	-	-
		lb/hr.	3.8788	38.5965	1.8228	2.50	6.81	0.67
		ppm	-	310.8	12.4	28.0	125.5	7.8
	Avg.	gr/dscf	0.0368	0.3585	0.0203	-	-	
		lb/hr.	4.2481	41.3033	2.3404	2.51	7.01	0.70
		ppm	-	321.1	15.3	27.2	124.7	8.6

5.1 Field Procedures and Equipment (EPA Method 5 and 6)

5.1.1 Sampling Equipment and Procedures

The sampling equipment consists of the following:

1. Pitot Assembly
   a. Nozzle — Glass with a sharp, tapered leading edge.
   b. Probe — Stainless steel sheath with a 5/8-in. OD glass liner wrapped with nichrome wire; rheostat controlled and capable of maintaining a temperature of 248 degrees F +/- 25 degrees F.
   c. Pitot — Type "S" constructed and attached to probe according to specifications outlined in the "code of Federal Regulations, Chapter I, Title 40 Part 60, Appendix A, Method 2."
   d. Fyrite probe — Stainless steel 1/4-in. tubing attached to pitot tube in an interference-free arrangement.
   e. Thermocouple — Type "K" attached to the pitot tube such that the tip has no contact with the metal and does not interfere with the pitot tube face openings.

2. Filter Holder — Borosilicate glass with a glass fritted filter support and silicone rubber sealing gasket.

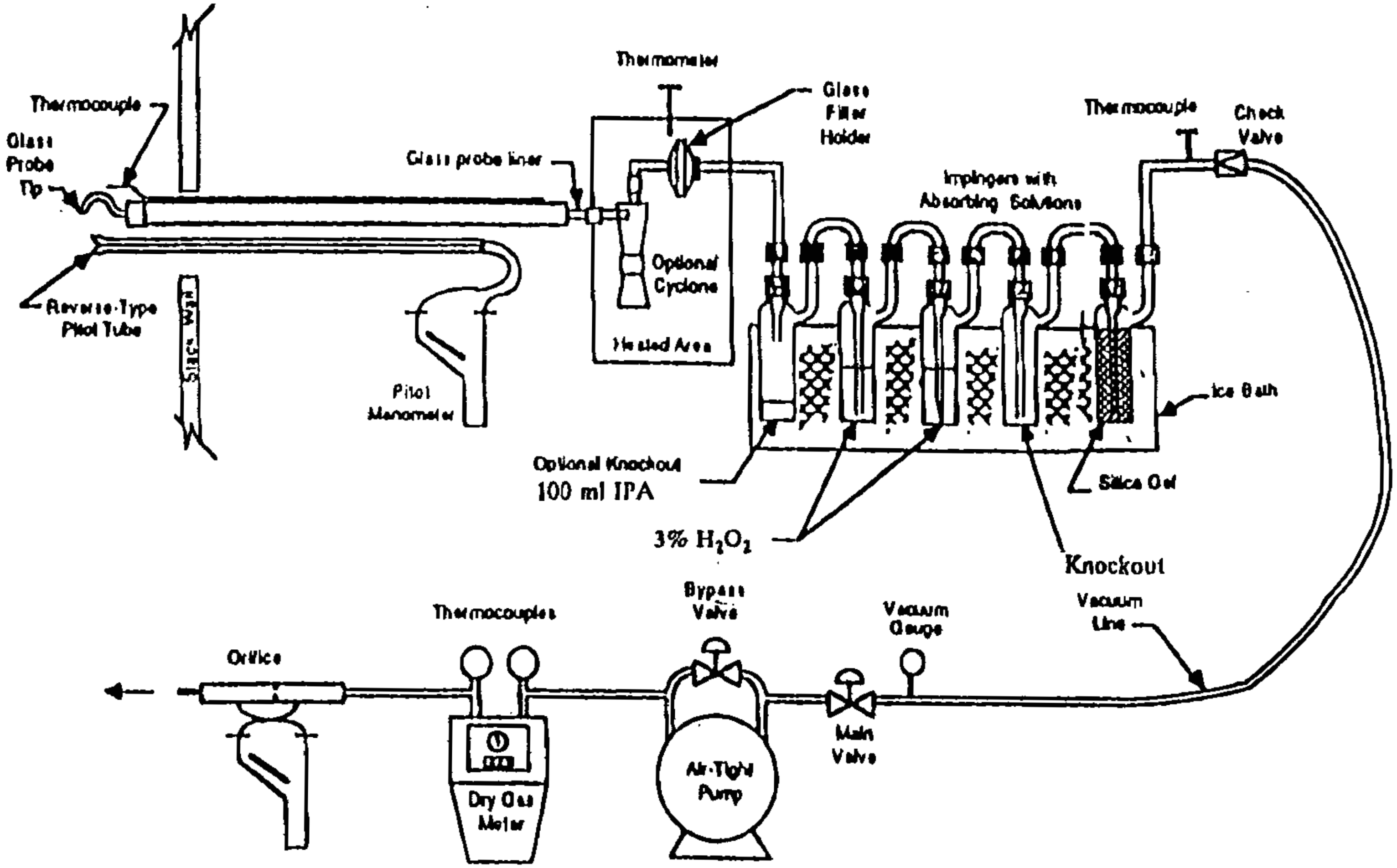
3. Filter Heating Assembly — Controlled heating element in aluminum module attached to end of probe; capable of maintaining 248 degrees F +/- 25 degrees F.

4. Impingers — Four glass impingers connected in series with glass ball joint fittings and placed in an ice bath. The first, third, and fourth impingers were of the modified Greenburg-Smith design. The second impinger was of the Greenburg-Smith design with a standard tip. Final gas exit temperature was measured to within +/- 5 degrees F with a thermometer immersed in the gas stream.

5. Control Box — Module containing the vacuum gauge, leak-free pump, thermometer capable of measuring temperature to within +/- 5 degrees F, dry gas meter with a minimum of 2% accuracy, valves and related equipment as required to maintain an isokinetic sampling rate and to determine sample volume.

6. Nomograph — To determine isokinetic sampling rate.

A schematic of the particulate sampling train is shown in Figure 5-1.



SOURCE: ENVIRONMENT REPORTER

FIGURE 5-1

Particulate Matter and Sulfur Dioxide Sampling Train

FUGRO McClelland

Prior to leaving the laboratory, glass fiber filters were numbered for identification purposes, heated for 2 hours at 250 degrees F, desiccated for 2 hours, and preweighed to the nearest 0.1 mg.

Upon arrival at the sampling site, the control box was leak-checked from the pump to the orifice at 5 to 7 in. of water.

The sampling train was prepared in the following manner: 100 ml of 80% isopropanol in the first impinger, 100 ml of 3% hydrogen peroxide water was added to each of the next two impingers. The fourth impinger was left empty and the fifth impinger contained 250 grams of silica gel.

After assembling the train with the pitot tube, as shown on the schematic, the system was leak-checked by plugging the inlet to the probe nozzle and pulling a 15-in. mercury vacuum. A leakage rate not to exceed 0.02 cfm is considered acceptable. The pitot tube system was also leak-checked at 2 to 3 in. of water, and any leaks found were corrected.

The probe nozzle size and moisture content was derived from a preliminary velocity and temperature traverse measurement. Sampling points within the duct were selected in accordance [illegible] attached and the heater was adjusted to provide a gas temperature of approximately 248 degrees F, +/- 25 degrees F.

The filter heating system was turned on, and ice was placed around the impingers. After a suitable warmup period, the nozzle was placed at the first traverse point with the flow adjusted to isokinetic conditions. Using calculated sampling points and sampling times, the probe was repositioned to the next traverse point, and isokinetic sampling was re-established. This was accomplished for each point along the traverse until the run was completed. Readings were taken at each traverse point and at the calculated time interval. At the conclusion of each run, the pump was turned off and the final readings were recorded. A final leak check of the sampling system was performed, as previously described at the highest vacuum encountered during the test run. A leak check of the pitot system was also repeated.

5.1.2 Sample Recovery

The volume of liquid in the first four impingers was measured and recorded on the field data sheet. The probe nozzle, and all sample-exposed surfaces were washed with reagent-grade acetone and put into a clean sample bottle marked "prefilter." A brush was used to loosen any adhering particulate matter, and subsequent washings were put into the "prefilter" container. The filter was carefully removed from the fritted teflon support and placed in its original container. Any filter material that adhered to the filter support surfaces was carefully removed and added to the filter container. The silica gel was removed from the fifth impinger and transferred to its original container. A sample of the acetone used in washing the probe was saved as a blank for laboratory analysis. The liquid from the first four impingers was collected and labeled for shipment to the laboratory.

5.1.3 Analytical Procedures

The filter and any loose particulate matter was transferred from the filter container to a clean, tared glass weighing dish. The filter was placed in a desiccator for 24 hours and weighed to a constant weight. The original weight of the filter was deducted, and the weight gain recorded to the nearest 0.1 mg.

The "prefilter" wash and blank acetone solutions were transferred to individual clean, tared beakers, then evaporated to dryness and desiccated to a constant weight. The weight gain of the "prefilter" was adjusted for the blank and recorded to the nearest 0.1 mg. The silica gel was weighed, and the weight gain was recorded to the nearest 0.1 gram.

The impinger catch was shipped to IT Analytical of Cincinnati, Ohio, for sulfur titrations. The analytical data sheets for particulate and SO_2/SO_3 analyses are presented in Appendix C.

5.2 Oxygen (O_2) and Carbon Dioxide (CO_2) Sampling

As required by EPA Method 3 (40 CFR 60, Appendix A), oxygen and carbon dioxide samples were collected by an integrated bag system for Orsat analysis. The Orsat sampling system consists of a stainless steel probe, flexible sample line from the probe to a condenser, a small vacuum pump with a critical orifice, and a tedlar bag. The collected sample was then analyzed using an Orsat gas analyzer. Oxygen and carbon dioxide concentrations were determined in percent of stack gas and stack gas molecular weight was then calculated.

The Orsat sampling procedure consists of the following leak check and sampling techniques. Prior to sampling, the base was leak-checked to 2 to 4 in. of water. The inlet to the condenser was plugged, and a vacuum of 10 in. of Hg was created. The outlet of the pump was then plugged and the pump was turned off. The vacuum was observed for 30 seconds to determine any leakage. The vacuum must hold steady for at least 30 seconds for the leak test to be acceptable. The sample line was then purged with stack gas and the bag was connected. Sampling was conducted at an appropriate constant rate at the same traverse points and for the same length of time as the other testing parameters were tested. At the conclusion of the run, the pump was turned off and the bag sealed.

After leak-checking, the Orsat gas analyzer, an average value for each gas was determined. The gas was analyzed until two values were obtained that fell within the specified variance of the gas tested. Data were recorded on the field data sheets, and the bag was evacuated for the next sample run.

Appendix D contains copies of all field data and sample custody sheets. Equipment calibration records are presented as Appendix E.

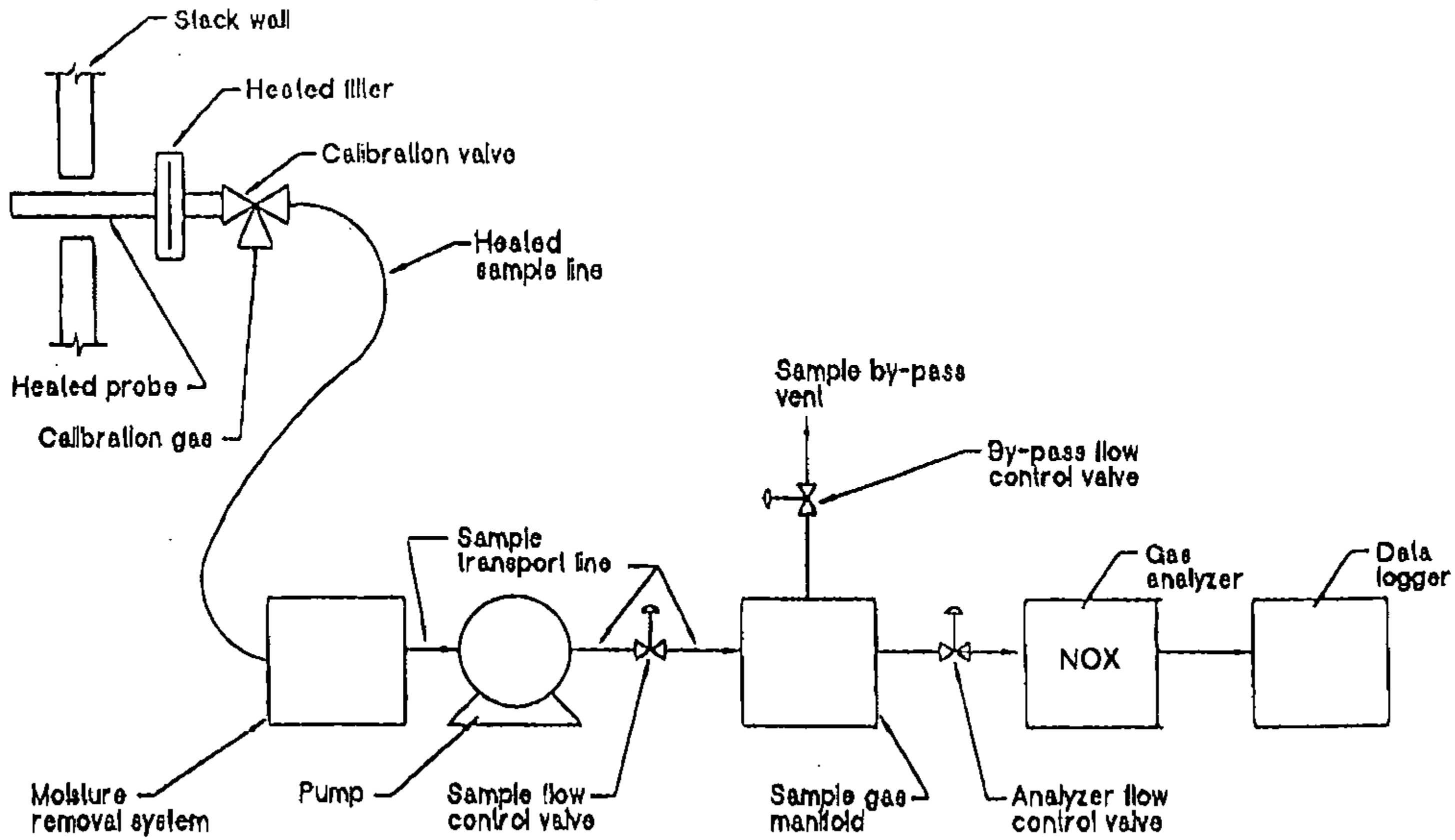
5.3 Oxides of Nitrogen Sampling - EPA Method 7E

Nitrogen oxide (NO_x) was measured following the procedures set forth in Method 7E of 40 CFR 60, Appendix A. The NO_x analysis was performed with a TECO, Model 10AR, chemiluminescent NO_x analyzer manufactured by Thermo Environmental Instruments, Inc. The TECO 10AR blends the gas sample with O_3 in a reaction chamber. The resulting chemiluminescence is monitored through an optical filter by a high-sensitivity photomultiplier positioned at one end of the chamber. The filter/photomultiplier combination responds to light in a narrow-wave length band unique to the reaction of NO and O_3. The output from the photomultiplier is linearly proportional to the NO concentration. To measure NO_x concentrations, the NO_x in the sample gas is converted to NO through a converter. The chemiluminescent response in the reaction chamber to the converter effluent is linearly proportional to the NO_x concentration entering the converter.

The electrical responses from the TECO 10AR were recorded on an Omega 5500 data logger. This data was digitized into 60-minute averages. The gas sample in the stack was drawn from the stack port with a Thomas Industries Model 107 diaphragm pump. The sample gas flow from the stack flowed through Teflon tubing to a glass condenser (ice bath) where the water vapor was removed. From the condenser, the gas flow was reduced by a valve before entering the pump. The gas sample was then pumped through the analyzer at a constant flow rate and pressure (Figure 5-2).

The nitrogen oxide analyzer was calibrated using a three-point calibration consisting of a zero gas, and two additional test concentrations of nitrogen oxide (NO) consisting of 86.7 parts per million (ppm) and 356 ppm of NO. The NO_x analyzer was calibrated before and after the NO_x tests. The certifications for the calibration gases used during the test are presented in Appendix E.

An initial analyzer calibration error test was performed for zero and upscale span calibrations on the analyzer to determine the difference between the gas concentrations exhibited by the gas analyzer and the known concentrations of the calibration gas, when the calibration gas is introduced directly to the analyzer's input (+/- 2% of span for each concentration is acceptable).



SOURCE: ENVIRONMENT REPORTER

FIGURE 5-2

Nitrogen Oxide (NO_x) Sampling System

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A sampling system bias test was performed on the analyzer system. Zero and calibration gases were introduced to the outlet of the sampling probe, and the difference between the bias readings and the initial analyzer calibration error readings (known gas concentrations introduced directly into the analyzer's input) were recorded (bias). Bias system limits for each concentration is +/- 5% of span. Sampling was performed simultaneously. Sampling was started at the first measurement point, as determined by Method 1, after twice the system response time (time it takes for calibration gas to travel up to the probe and back down to the analyzers input) had elapsed. System response time was 2 minutes and 36 seconds. Zero and calibration drift (span) tests were performed immediately preceding and following the test run before any adjustments to the measurement system (+/- 3% of span). All test runs were found to be within the system specifications and all zero and upscale calibrations were within the sampling system bias specifications.

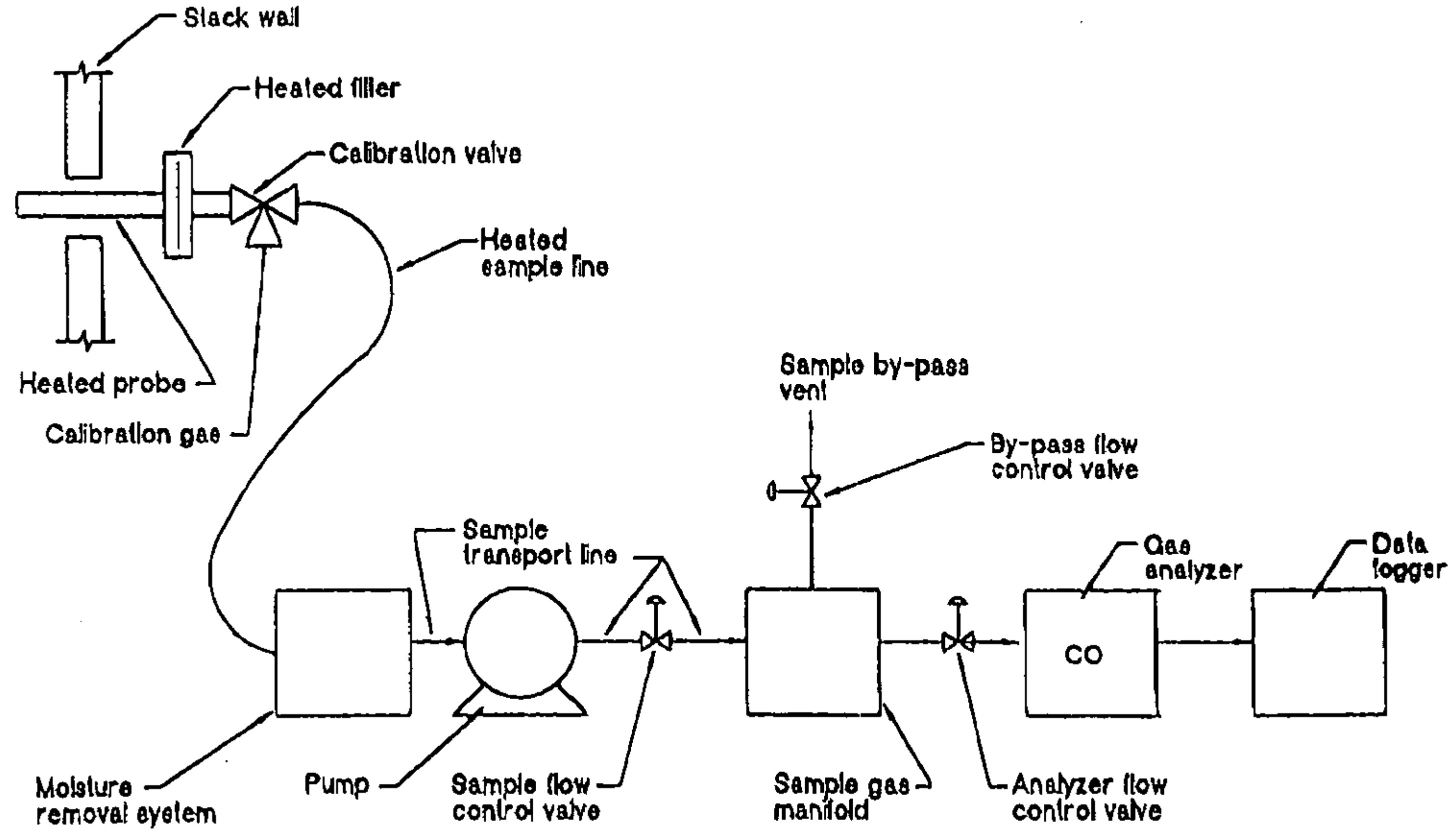
5.4 Sampling Equipment and Procedures for Carbon Monoxide (CO) Sampling Carbon Monoxide (CO) Sampling — EPA Method 10.

CO concentrations in the stack gas were monitored with a Horiba 331 CO Analyzer. This instrument utilizes gas filter correlation for CO measurement.

The gas sample was continuously drawn from the stack with a Thomas Industries Model 107 diaphragm pump. The gas flowed from the stack through Teflon tubing to a glass condenser where the majority of the water vapor was removed. From the condenser, the gas flow rate was reduced by a valve before entering the pump. The gas was then pumped through the analyzer at a constant flow rate and pressure (Figure 5-3). The CO analyzer was calibrated with known concentrations of certified N_2 for zero span and certified concentrations of CO for upscale span calibrations. The analyzer was calibrated before and after each test run. Protocol-1 calibration gas certificates are presented in Appendix E. Photocopies of the actual CO concentration readings recorded on a data logger/chart recorder are presented in Appendix F.

5.5 Sampling Equipment and Procedures for Total Hydrocarbon (THC) Determination (EPA Method 25A)

Total hydrocarbon concentrations (as propane) in the stack gas were continuously extracted and analyzed with a J.U.M. Model VE-7 heated total hydrocarbon analyzer. The analyzer utilizes a hydrogen flame ionization detector (FID) in a heated oven (190°C) to prevent the loss of high molecular weight hydrocarbons.



SOURCE: ENVIRONMENT REPORTER

FIGURE 5-3
Carbon Monoxide (CO) Sampling Train
EPA Method 10

FUGRO McClelland

Stack gas was continuously extracted from the source through heated teflon sample lines (250°F) connected to suitable stainless steel sampling probes. The stack gas was introduced directly into the heated total hydrocarbon analyzer at a constant flow rate and pressure. The total hydrocarbon analyzer was calibrated before and after each of the tests with known concentrations of USEPA Protocol-1 propane calibration gases for upscale span calibrations and drift checks and zero gas for zero calibrations.

The total hydrocarbon analyzer's responses (as propane) were continuously recorded on an Omega Model 5500 data logger. Figure 5-4 illustrates a schematic diagram of the total hydrocarbon sampling train. Calibration gas certifications for the USEPA Protocol-1 calibration gases are presented in Appendix E. Copies of the data logger records are presented in Appendix F.

6.0 EMISSION RESULTS

The emissions results of the testing are presented in Tables 6-1 through 6-9. Example calculations for test run number 1, conducted on the #1 dryer outlet on May 10, 1994, are presented in Appendix F.

Midwest Research Institute
Review/Approval

	Initials:	Date:
Project Lead:	BLS	12/6/96
Project Director/ Program Manager:	[signature] for Roy Neulicht	12/9/96

Document Control Sheet

Project No.: 4604-02 (Subtask No.) 02

Document Name: Brick Letter #2

CBI: ☐ Yes ☒ No

Originator: B. Shrager Ext. 5224

WP COMMENTS:

WP ID No.: 5442 - ltr
5443 - ID list

TH10

① Date to WP: 12/5
Due date/time: 12/5
☐ Flexible ☑ Firm ☐ RUSH
WP PROOF ☐ Yes ☐ No

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SPACING: ☐ 1 ☐ 1.5 ☐ 2

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Due date/time: 12/6
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WP PROOF ☐ Yes ☐ No

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SPACING: ☐ 1 ☐ 1.5 ☐ 2

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☐ Firm WP PROOF	☐ Format only		☐ Copies ____	__ Photo	__ Transparency	BY WP
☐ RUSH				__ Other	__ Satellite/other	
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Route: __________ Instructions/comments: __________

>Name: Brian Shrager
>email: MRI@ipass.net
>email: mozilla@ determined from log of ftpd

>Inquiry: I am looking for data for soil fluoride concentrations in various regions of the United States. Do you have any such information or know of any sources of this type of information? Thank you.
>
>

Brian,
I can only think of one comprehensive soil data publication by the USGS that has flourine data. The reference is:

I19.16:574-D

Shacklette, H.T. and Boerngen, J.G, 1984, Element concentrations in soils and other surficial materials of the conterminous United States: U.S. Geological Survey Professional Paper 1270, 105 p.

Sulfur or Fluorine

This should be available for purchase through your closest Earth Science Information Center (ESIC) which is located in Reston, VA

Reston ESIC
U.S. Geological Survey
507 National Center
Reston, VA 20192
1-800-USA-MAPS

You might also try searching the web for the U.S. Department of Agriculture, Soil Conservation Service.

I hope this helps. Elizabeth Bailey

****

Elizabeth A. Bailey
U.S. Geological Survey
4200 University Drive
Anchorage, AK 99508
TEL: 907-786-7442/ FAX: 907-786-7401
EMAIL: eabailey@tundra.wr.usgs.gov

****

OhioEPA
State of Ohio Environmental Protection Agency

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P.O. Box 1049
Columbus, OH 43216-1049

June 30, 1995

Mr. Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and Analysis Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Dear Mr. Myers:

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Because Ohio has a large number of Brick Plants, the AP-42 section on this industry is of great interest to this Agency. If you need additional information, please contact either Bill Juris (614/644-3593) or David Bola (614/644-4832) of the Engineering Section.

Sincerely,

Robert Hodanbosi

Robert Hodanbosi
Chief, Division of Air Pollution Control

cc: Bill Juris
David Bola

06/28/95

COMMENTS ON DRAFT REPORT ON BRICK AND STRUCTURAL CLAY MANUFACTURING

The Ohio EPA has stack test records for Brick and Structural Clay Manufacturing in Ohio from the following four facilities: BELDEN BRICK, CRESCENT, OHIO and NEW CASTLE.

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DAVID BOLA
OHIO EPA, DAPC

Scc_number	Facility	Applnumber	Cntrlequip	Maxcapacit	Test__da	Pollutant	Testmethod	Avgoperate	Avgemisrat	Avgemisfac
3-05-003-11	BELDEN BRICK	0679000008P014	NONE	5.87 TONS/HR	07/25/85	TSP	M 1-5	5.87 TONS/HR	4.08 LBS/HR	
3-05-003-11	BELDEN BRICK	0679000008P014	NONE	5.87 TONS/HR	07/25/85	SO2	M 6	5.87 TONS /HR	5.7 LBS/HR	
3-05-003-11	BELDEN BRICK	0679000008P014	NONE	5.87 TONS/HR	07/25/85	NOx	M 7	5.87 TONS/HR	2.8 LBS/HR	
3-05-003-11	CRESCENT	1576000771P004	NONE	10,600 LBS/HR	02/29/88	TSP	M 1-5	9,042 LBS/HR	1.75 LBS/HR	.023 LB/TON
3-05-003-11	CRESCENT	1576000771P004	NONE	10,600 LBS/HR	02/29/88	SO2	M 6	9,042 LBS/HR	12.98 LBS/HR	
3-05-003-12	OHIO	0857191337P901	BAGHOUSE	25.69 TONS/HR	04/15/88	TSP	M 1-5	25.05 TONS/HR	2.76 LBS/HR	
3-05-003-11 *	BELDEN BRICK	0679000008P014	NONE	23,490 LBS/HR	07/21/89	TSP	M 1-5	21,533 LBS/HR	3.04 LBS/HR	
3-05-003-11 *	BELDEN BRICK	0679000008P014	NONE	23,490 LBS/HR	07/21/89	SO2	M 6	21,533 LBS/HR	3.71 LBS/HR	
3-05-003-11 *	BELDEN BRICK	0679000008P014	NONE	23,490 LBS/HR	07/21/89	NOx	M 7	21,533 LBS/HR	2.84 LBS/HR	
3-05-003-11	NEW CASTLE	1576000082/P011	NONE	3141 LBS/HR	06/06/90	PM	5	3081 LBS/HR	0.1258	5.48 LB/HR

Comment 1.

Comment 2. The metals data from the General Shale (coal-fired) and Belden (natural gas-fired) facilities were combined because the magnitudes of the emission factors were generally similar. If the metals data from the proposed test at Triangle Brick are significantly different from the Belden data, a different approach is appropriate. A factor that should be considered is the use of additives (such as iron chromite) at Belden that may have contributed to the apparently high emission measurements. Another concern is that all of the available metals data (except for the suspect Belden data) is from facilities located in North Carolina and Tennessee, and other geographic regions are not represented. The proposed testing at Triangle will provide additional data from this well-represented geographic region.

Comment 3. One inordinately high data point (from the EPA-sponsored Belden test) was excluded from the average emission factor for SO_2 emissions from natural gas-fired kilns. Three additional data points ranging from 0.35 lb/ton to 0.65 lb/ton were used to develop the proposed emission factor of 0.50 lb/ton. The proposed testing at Triangle would supplement this factor, which is currently based on data from Ohio and Texas. The Ohio EPA indicated that an SO_2 test at Crescent Brick Company is also available.

Comment 4. Agree. Should the SO_2 dryer measurements from this test be added to the kiln measurements with the assumption that the dryer stack was venting some of the kiln exhaust?

Comment 5.

Comment 6. Agree.

Comment 7. Agree.

this page looks out of place

OhioEPA
State of Ohio Environmental Protection Agency

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Columbus, OH 43215-1099

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June 30, 1995

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OHIO EPA, DAPC

ce_number	Facility	Appnumber	Cntrlequip	Maxcapacit	Test_da	Pollutant	Testmethod	Avgoperrate	Avgemisrat	Avgemisfac
-05-003-11	BELDEN BRICK	0679000008P014	NONE	5.87 TONS/HR	07/25/85	TSP	M 1-5	5.87 TONS/HR	4.08 LBS/HR	
-05-003-11	BELDEN BRICK	0679000008P014	NONE	5.87 TONS/HR	07/25/85	SO2	M 6	5.87 TONS /HR	5.7 LBS/HR	
-05-003-11	BELDEN BRICK	0679000008P014	NONE	5.87 TONS/HR	07/25/85	NOx	M 7	5.87 TONS/HR	2.8 LBS/HR	
-05-003-11	CRESCENT	1576000771P004	NONE	10,600 LBS/HR	02/29/88	TSP	M 1-5	9,042 LBS/HR	1.75 LBS/HR	.023 LB/TON
-05-003-11	CRESCENT	1576000771P004	NONE	10,600 LBS/HR	02/29/88	SO2	M 6	9,042 LBS/HR	12.98 LBS/HR	
-05-003-12	OHIO	0857191337P901	BAGHOUSE	25.69 TONS/HR	04/15/88	TSP	M 1-5	25.05 TONS/HR	2.76 LBS/HR	
-05-003-11	* BELDEN BRICK	0679000008P014	NONE	23,490 LBS/HR	07/21/89	TSP	M 1-5	21,533 LBS/HR	3.04 LBS/HR	
-05-003-11	* BELDEN BRICK	0679000008P014	NONE	23,490 LBS/HR	07/21/89	SO2	M 6	21,533 LBS/HR	3.71 LBS/HR	
-05-003-11	* BELDEN BRICK	0679000008P014	NONE	23,490 LBS/HR	07/21/89	NOx	M 7	21,533 LBS/HR	2.84 LBS/HR	
-05-003-11	NEW CASTLE	1576000082/P011	NONE	3141 LBS/HR	06/06/90	PM	5	3081 LBS/HR	0.1258	5.48 LB/HR

INTRODUCTION AND PROCESS DESCRIPTION

On November 20, 1979, a series of three (3) particulate emission tests was conducted on the Tunnel Kiln TK-29 discharge located in Kingsport, Tennessee. Individual bricks are formed and stacked into kiln cars measuring approximately 9' X 9'. Cars are inserted on a regular basis into a long, continuous-fired tunnel kiln. As one car is discharged another is inserted. This provides a constant moving mass inside the kiln. Cars are pushed through the kiln at a slow, methodical pace requiring almost three (3) days for the complete travel. By means of a coal firing process, heat is increased in each chamber until the total firing is complete. As the car continues through the kiln from the main firing zone the temperatures are reduced to provide necessary cooling. The control device used was a baghouse with teflon bags.

Mr. Walt Banyas represented General Shale Products. Mr. Tom Isaacs of the Tennesse Air Pollution Control Division observed these tests. Mr. Scott Crownover and Mr. David Byrd of Guardian Systems, Inc. performed these tests.

SUMMARY OF TEST RESULTS

The following is a table of the Emissions during the tests. The process weights were provided by General Shale Products Corporation.

Test #	1	2	3
Process Weight, ton/hr	9.10	9.10	9.10
Particulate Emission Rate, lbs/hr	0.71	0.96	0.97
Allowable Emission Rate, lbs/hr *	14.12	14.12	14.12

* This value was calculated from the following equation found in Chapter 1200-3-7-.03 New Processes, Rules of Tennessee Department of Public Health, Bureau of Environmental Health Services, Division of Air Pollution Control.

$$E = 3.59\ p^{0.62}$$

$$p \leq 30 \text{ ton/hr}$$

Where: E = Emission per hour

P = Process weight rate in tons per hour

SUMMARY OF TEST RESULTS

Test Number	1	2	3
Date	11-20-79	11-20-79	11-20-79
Time	0845-0955	1100-1205	1310-1415
Moisture, %	2.14	1.69	1.88
Gas Temperature, °F	350	294	297
Stack Velocity, f/s	59.85	59.04	58.68
Volumetric Flow, ACFM	25385	25041	24885
Volumetric Flow, DSCFM	16330	17386	17175
Concentration, Grains/ACF	0.0033	0.0045	0.0046
Concentration, Grains/DSCF	0.0051	0.0065	0.0066
Particulate Mass Rate, lbs/hr	0.71	0.96	0.97
% Isokinetic	103.47	108.63	95.69

Stack sampling.

General Shale Products Corporation
Kingsport, Tennessee

Stack Analysis - Tunnel Kiln Baghouse - 29

November 20, 1979

Production:

Total Brick Per Day 92,160

Weight/Brick 4.54 lb.

Total Brick Weight Per Day 418,406.4

OR 18,216.35 Lb. Per Hour

Coal Used Per Day 18,786.0

OR 782.75 Lb. Per Hour

Total Process Weight

Brick @ 418,406.4

Coal @ 18,786.0

OR 9.10 Tons Per Hour

* Average weight of 10 brick at dryer.

Walter Banyas
November 20, 1979

COAL TEST RESULTS

TO: B. F. Archer

GSPC PLANT # 29 - Kingsport

Date Sample Received 11-12-79

CC: WH Hodges
PE Garland
JF Edwards

Sample Identification Weekly

Coal Grinding Information

Imp Mill Model Raymond #53

Hammer Placement 3 (Row F-1), 3 (2), 3 (3), 0 (4)

Coal Screening - Mesh 20M

Opening Size 0.030"

Wire Diameter 0.020"

Coal Size Analysis

Mesh Size	Per Cent Retained	Cumulative % Retained
14M	0	0
28M	0.8	0.8
48M	27.1	27.9
100M	29.6	57.5
200M	18.8	76.3
-200M	23.7	
Fineness Modulus	0.86	

Test Data

BTU/lb. (net @ 5% Moisture)

BTU/lb. (oven dry) 14,316

% Volatiles 29.97%

% Ash 5.82%

% Sulfur 1.00%

% Moisture (As Received) 1.32%

COMMENTS

COMMENTS (Continued)

C-112R

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Tennessee Division of Air Pollution Control

June 27, 1995

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and Analysis Division
Research Triangle Park, North Carolina 27711

Dear Mr. Myers:

This will acknowledge receipt of Emission Factor Documentation for AP-42, Section 11.3 Draft Report. We appreciate being a part of your revision process of the AP-42. In reviewing this agency's source test files, additional test data for References 12, and 13 cited in the document was discovered. Enclosed are excerpts from these tests for your review. A listing of the enclosed material is as follows:

1. A corrected October 11, 1983 particulate test of Tunnel Kiln-15 at the General Shale Products Corporation facility in Kingsport, Tennessee (4.2.11 Reference 12 in the Section 11.3 draft).

2. A November 20, 1979 particulate test of Tunnel Kiln-29 at the General Shale Products Corporation facility in Kingsport, Tennessee (4.2.12 Reference 13 in the Section 11.3 draft). We also have two earlier tests of the same source prior to the addition of emission control equipment. If you require copies of these tests please contact the individual listed below.

3. A September 30, October 1, 1976 test of Beehive Kilns 17, and 15 at the General Shale Products Corporation facility in Kingsport, Tennessee (No longer in existence.).

4. A December 12, 1978 particulate test of Tunnel Kiln 10-B at the General Shale Products Corporation facility in Johnson City, Tennessee.

5. A January 19, 1979 particulate test of Tunnel Kiln 10-B at the General Shale Products Corporation facility in Johnson City, Tennessee.

We hope this information will be of service to you. If you have any questions or comments contact Duke Chenault by phone at (615) 532-9190 or by fax at (615) 532-0614.

Sincerely,

Jeryl W. Stewart

for John W. Walton, P.E.
Technical Secretary
Tennessee Air Pollution Control Division

5 Enclosures

TABLE 4-1. SUMMARY OF TEST DATA FOR BRICK MANUFACTURING

Source	Pollutant	# of runs	Rating	EF range, lb/ton	Avg EF, lb/ton	Ref. No.
Natural gas-fired kiln	Cadmium	3	C	1.0×10^{-5}-5.7×10^{-5}	3.3×10^{-5} +1 OM	1
Natural gas-fired kiln	Chromium	3	A	0.0035-0.0151	0.0075 +2.5 OM	1
Natural gas-fired kiln	Cobalt	3	C	5.2×10^{-5}-0.00020	0.00011 +2 OM	1
Natural gas-fired kiln	Mercury	3	A	7.0×10^{-5}-0.00023	0.00016 +1.5 OM	1
Natural gas-fired kiln	Manganese	3	A	0.00043-0.0013	0.00073 +1 OM	1
Natural gas-fired kiln	Nickel	3	A	0.0017-0.0082	0.0042 +2 OM	1
Natural gas-fired kiln	Lead	3	C	6.3×10^{-5}-9.8×10^{-5}	7.9×10^{-5} ✓	1
Natural gas-fired kiln	Antimony	3	C	1.4×10^{-5}-2.7×10^{-5}	2.2×10^{-5} ✓	1
Natural gas-fired kiln	Selenium	3	C	0.00027-0.00051	0.00036 +1 OM	1
Coal-fired kiln[b]	Antimony	3	A	1.3×10^{-5}-1.5×10^{-5}	1.4×10^{-5}	2
Coal-fired kiln[b]	Arsenic	3	A	1.3×10^{-4}-1.4×10^{-4}	1.3×10^{-4} +1 OM	2
Coal-fired kiln[b]	Beryllium	3	A	1.4×10^{-5}-1.7×10^{-5}	1.6×10^{-5} +2 OM	2
Coal-fired kiln[b]	Cadmium	3	A	2.2×10^{-6}-4.3×10^{-6}	3.3×10^{-6} ✓	2
Coal-fired kiln[b]	Chromium	3	A	7.2×10^{-5}-8.7×10^{-5}	7.8×10^{-5} +3x	2
Coal-fired kiln[b]	Lead	3	A	7.7×10^{-5}-9.1×10^{-5}	8.6×10^{-5} ✓	2
Coal-fired kiln[b]	Manganese	3	A	4.5×10^{-5}-4.8×10^{-5}	4.7×10^{-5} ✓	2
Coal-fired kiln[b]	Mercury	3	A	8.8×10^{-5}-1.0×10^{-4}	9.6×10^{-5} +1 OM	2
Coal-fired kiln[b]	Nickel	3	A	1.6×10^{-4}-2.0×10^{-4}	1.7×10^{-4} +1 OM	2
Coal-fired kiln[b]	Phosphorus	3	A	5.3×10^{-4}-5.8×10^{-4}	5.5×10^{-4}	2
Coal-fired kiln[b]	Selenium	3	A	4.2×10^{-4}-5.2×10^{-4}	4.6×10^{-4} +1 OM	2
Sawdust-fired kiln	Arsenic	3	A	4.5×10^{-5}-5.5×10^{-5}	5.1×10^{-5} ✓	4
Sawdust-fired kiln	Beryllium	3	A	5.3×10^{-7}-1.1×10^{-6}	7.2×10^{-7} ✓	4
Sawdust-fired kiln	Cadmium	3	A	6.2×10^{-6}-2.9×10^{-5}	1.7×10^{-5} +1 OM	4
Sawdust-fired kiln	Chromium	3	A	3.3×10^{-5}-7.1×10^{-5}	5.3×10^{-5} ✓	4
Sawdust-fired kiln	Lead	3	A	1.7×10^{-4}-4.8×10^{-4}	3.3×10^{-4} +1 OM	4
Sawdust-fired kiln	Manganese	3	A	0.0010-0.036	0.013 +3 OM	4
Sawdust-fired kiln	Mercury	3	A	5.4×10^{-6}-1.5×10^{-5}	9.9×10^{-6} ✓	4
Sawdust-fired kiln	Nickel	3	A	2.1×10^{-5}-4.7×10^{-5}	3.4×10^{-5} ✓	4
Sawdust-fired kiln	Phosphorus	3	A	0.0011-0.0018	0.0014	4
Sawdust-fired kiln	Selenium	3	A	2.2×10^{-5}-1.2×10^{-4}	5.6×10^{-5} ✓	4
Natural gas-fired kiln	Antimony	3	A	0-1.9×10^{-4}	6.4×10^{-5}	22
Natural gas-fired kiln	Arsenic	3	A	7.6×10^{-6}-5.0×10^{-5}	2.3×10^{-5}	22
Natural gas-fired kiln	Beryllium	3	C ~~A~~	ALL RUNS BDL--2.1×10^{-7}-2.2×10^{-7}	BDL--2.1×10^{-7}	22
Natural gas-fired kiln	Cadmium	3	A	3.3×10^{-6}-7.1×10^{-6}	5.8×10^{-6}	22
Natural gas-fired kiln	Chromium	3	A	1.7×10^{-5}-2.3×10^{-5}	2.1×10^{-5}	22
Natural gas-fired kiln	Cobalt	3	C ~~A~~	ALL RUNS BDL--2.1×10^{-6}-2.2×10^{-6}	BDL--2.1×10^{-6}	22
Natural gas-fired kiln	Lead	3	A	1.2×10^{-5}-2.3×10^{-4}	8.6×10^{-5}	22
Natural gas-fired kiln	Manganese	3	A	7.7×10^{-5}-9.9×10^{-5}	8.5×10^{-5}	22
Natural gas-fired kiln	Mercury	3	C ~~A~~	ALL RUNS BDL--4.9×10^{-6}-5.3×10^{-6}	BDL--5.0×10^{-6}	22
Natural gas-fired kiln	Nickel	3	A	4.4×10^{-6}-1.9×10^{-5}	1.3×10^{-5}	22
Natural gas-fired kiln	Selenium	3	A	4.0×10^{-5}-4.6×10^{-5}	4.3×10^{-5}	22

[a]Emission factor units are lb of pollutant per ton of bricks produced, unless noted. BDL = below detection limit. Emission factors shown for BDL measurements are estimates that were calculated using one-half of the reported detection limit for each test run.

[b]Kiln fired by coal and supplemental natural gas

Filename: BRICK12.WQ1
GENERAL SHALE--KINGSPORT, TN
COAL-FIRED (W/ SUPPLEMENTAL NATURAL GAS) KILN #15

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported				
			Run 1	Run 2	Run 3	Run 4	
1	Stack temperature	Deg F	381	381	382	379	
	Moisture	%	5.82	6.95	6.83	6.91	
	Oxygen	%	17	17.3	16.5	17	
	Volumetric flow, actual	acfm	13419	13299	13307	13231	
	Volumetric flow, standard	dscfm	8016	7847	7852	7829	
	Isokinetic variation	%	100.09	100.91	100.93	100.6	
Circle: Production or feed rate Capacity:		TPH	5.36	5.36	5.36	5.36	
	Pollutant concentrations:						
	Filterable PM	G/dscf	0.0688	0.0704	0.0801	0.065	
	CO2	%	5.0%	4.5%	5.3%	4.0%	
	Pollutant mass flux rates:						
	Filterable PM	lb/hr	4.73	4.74	5.39	4.36	
	CO2	lb/hr	2746	2419	2851	2146	
	Emission factors:						AVERAGE
ENGLISH	Filterable PM	lb/ton	0.88	0.88	1.01	0.81	0.90
	CO2	lb/ton	513	452	532	400	474
METRIC	Filterable PM	kg/Mg	0.44	0.44	0.50	0.41	0.45
	CO2	kg/Mg	256	226	266	200	237

Brick Institute of America *THE NATIONAL AUTHORITY ON BRICK CONSTRUCTION*

November 4, 1994

Mr. Brian Shrager
Midwest Research Institute
401 Harrison Oaks Blvd. - Ste. 350
Cary, NC 27513

Dear Mr. Shrager:

Enclosed you will find test data on kiln and dryer stacks of General Shale's Atlanta, Georgia brick plants. This has been the only data received to date from our October 13 request to our member manufacturers for emission test data.

If I receive any additional data, I'll forward it to you. We have also included a request for data in our November BIA NEWS.

Very truly yours,

Nelson J. Cooney
President

NJC:cb

Enclosure

copy to: Walt Banyas

11490 Commerce Park Drive, Reston, Virginia 22091-1525 Phone: 703-620-0010 Fax: 703-620-3928

From: "Jim Southerland"
<jim_southerland@aq.ehnr.state.nc.us>
To: RTP10.RTPTSD(MYERS-RON)
Date: 1/31/97 3:22pm
Subject: NC Comments on Brick Factors Draft

Attached is a short report summarizing the collective comments on the subject AP-42 draft on the behalf of the NC Division of Air Quality. If you have any questions of further observations, please call at 715-7566, or to my e-mail address. The most reoccuring comment was the one related to the variability of fluoride in the clay/raw materials. Since NC is at the aparent top of that heap, it would cause us some problems to use a much smaller factor as an average. A footnote, equation or other way to strengthen using a higher factor in cases of higher Fl content in the soil or other raw materials would be very helpful and is sorely needed. The attachment comments on the AP-42 Section itself primarily. Also in the background report, some thoughts: Talk a bit more about fugitive dust; haul roads, etc. Define a few more terms such as "green" bricks, "tunnel" kilns (graphics?) etc. Also, have the reference to XATEF, SPECIATE and other outdated boilerplate in 3-1 revised to reflect timely and realistic actual activities. There is no reference to STIRS, yet TSAR is mentioned which is of marginal applicability. There is a statement made that all these other reports were searched for emission factors when in fact, the search was for test data and references that could be reconstituted to represent a test. These inaccuracies help perpetuate misunderstandings of what the value of these various resources is and how the factors are really developed. Again, thanks for the opportunity to review. If you would send all such external reviews to me, I will make sure that the proper NC persons who are most familiar with and deal most with the specific industries, get a copy for review.

James Southerland
NC DEHNR Air Quality Division
PO Box 29580
Raleigh, NC 27626-0580
919 715-7566

Any arguement worth making within the bureaucracy must be capable of being expressed in a simple declarative sentence that is obviously true once stated. McNaughton's Law

CC: RTPMAINHUB.INTERNET("Hudson@wsro.ehnr.state.nc.us"...

Bricks
Proposed AP-42 Revisions
NC DEHNR DAQ Comments

General

The revised Section is a major improvement over previously existing information and obviously represents considerable data and work. The preparers are commended on the efforts to make these improvements. However, continued efforts to develop more information and make further improvements needs to be made. North Carolina has a large number of brick plants and produces a large share of the nation's brick and would therefore like to be confident that the emissions are properly characterized.

Comments on Proposed Section

General: It would be helpful to start out with some additional definitions for those who use the Section but are not well versed in the terms. For example, technical definitions of what makes a clay or shale suitable or not for brick making; adobe brick; differences between chimney pipe and flue liners; between drain and sewer tile etc.

Process Description: 1). Is it germane to explain why additives such as barium carbonate are added? 2). Since HF is dependent almost solely upon characteristics of local clays, is it possible to make generalizations about Fluoride content of clays in various parts of the country, or do they vary greatly within limited geographical areas? 3). page ll.3-3, 2nd paragraph from bottom: "The firing zone is typically maintained at...." as opposed to "the firing zone typically maintains..." (Whit-ism). 4). Explain difference between steps, especially what is happening to the structure of the clay materials during oxidation, vitrification and flashing.

Emissions and Controls: 1). PM 2.5 should be included, especially since some "credible" data seem to exist. 2). TOC is included in the tables but not the write up on page 11.3-4, and the converse seems to be true for SVOC. 3). Mention is made of the influence of sulfur content on SO_2 but no discussion of sulfur contents of materials is given earlier. What is range; what is typical, etc. Is there a pattern to sulfur content of soils by parts of the country? 4). Since the constituents of the exhaust stream are reasonably well characterized, can you not make an estimate of TOC on the basis of actual mass and report it at least as a footnote or qualifier sentence in the text? 5). We presume that "relatively dry" material exists below 4% also? The implication in the wording is that it is only a narrow range near 4%.

Table 11.3-1: 1). Include column with PM-2.5 factors. 2). Include statistical confidence intervals using the data available. 3). We presume the "XX" SCC's will be determined and included in the final. Correct? 4). In spite of the rules of rating, a "D" for the entire contents of the table seems overly critical and disqualifying. Since there is good agreement in several cases, even in a small data set, this may be worthy of considering for a "promotion" to a higher rating for some of the factors. Ratings are more meaningful on an individual factor basis anyway. 5) You need another footnote so they go from a to z. How about putting somewhere in the table, text or footnote how much a brick weighs, or how many standard brick constitute a ton? What is breakage, recycle percentage, other such practical "insider" information, etc. Help the inspector types to be able to talk the lingo with the plant officials.

Table 11.3-2: 1). Footnotes c, h and m - may be appropriate to note that for mass balance, each pound of sulfur in raw materials will result in "X" lbs. of SO_2 in the exhaust, where x is normally 2 but may be reduced by some amount by contact with alkaline components of product or controls?? 2). For CO_2, a material balance of carbon burned should be of such confidence that you could give it an A rating. The amount stopping at CO is very small relatively and it will eventually end up as carbon dioxide also, anyway.

Table 11.3-3: 1). Reference earlier comments on TOC and SVOC, "x's" in SCC, etc. 2). Sawdust-fired kiln and sawdust dryers would have carbon dioxide emissions also? Calculate via material balance of carbon, consumed stoichiometrically. 3). It is very confusing to have a table labeled with a rating for the entire table, especially when footnotes reflect different ratings. Just rate each individually to start with. 4). Fluorine content seems to be very important for HF emissions and seems to vary by area of the country. This should be stated in the footnotes k and m with a method to do a material balance based on the raw material content. This may be key in NC where, from the test data, Fl is high and results in a top end estimate using actual data but lower emissions if you use the average factor in the table which we contend is inappropriate.

Table 11.3-4: 1). The listed compounds constitute less than 10% by approximate mental arithmetic, of the total TOC or VOC. What is the rest of it? 2). Do tetrachloroethane and trichloroethane not have CAS numbers? 3). Unless some of measurements showed positive results, it is inappropriate to take one half of the detection limit as the factor. Better to say "not detected at "x" lb/ton detection limit and let it go at that. If you have some detects and some non-detects, then it may be better to use the ½ factor.

Table 11.3-6: Is there similar, potentially conflicting data in Appendix and has it been updated to be consistent? A picture is worth a thousand words; ie a particle size distribution curve would be nice. As mentioned above, the 2.5 numbers should be incorporated into the PM tables where appropriate and can be done with reasonable levels of conjecture.

Respectfully submitted with appreciation for the opportunity! Esse Quam Videri!

UTAH DIVISION OF AIR QUALITY

FAX COVER SHEET

150 NORTH 1950 WEST

SALT LAKE CITY, UTAH 84114-4820

CANNON L770 FAX # (801) 536-0085

CONFIRMATION # (801) 536-4000

FROM: Patti Kimes

PHONE: (801) 536-4012

TO: Ron Meyers PHONE: (919) 541-5407

AGENCY/FIRM EPA

FAX NUMBER (919) 541-0684 CONFIRMATION #: ____________________

NUMBER OF PAGES TO FOLLOW: 1

SUBJECT: Brick and Structural Clay Product Manufacturing

REMARKS:

LOGGED: __________ SENT: __________ RECEIVED: __________ CONFIRMED: ________

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY

Michael O. Leavitt, Governor
Dianne R. Nielson, Ph.D., Executive Director
Ursula K. Trueman, Director

150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114 4820
(801) 536-4000 Voice
(801) 536-4099 Fax
(801) 536-4414 T.D.D.

January 30, 1997

Ron Myers
Emission Methodology and Analysis Division
Emission Factor and Inventory Group
US EPA
Research Triangle Park, NC 27711

RE: Brick and Structural Clay Product Manufacturing

Dear Ron:

I am sending this in response to your request for comments regarding the draft AP-42 Section 11.3, Brick and Structural Clay Product Manufacturing. Due to the fact that I don't have an extensive background in brick manufacturing, I focused my review on my understanding of the material presented. My general comment is that the material is clear and concise. I especially appreciate all the footnotes on the tables. Every time I had a question about something in the table, it was answered in the footnote.

In reviewing this section, I would have liked more information regarding the semivolatile organic compounds (SVOC). Please clarify which compounds contained in Table 11.3-4 are semivolatile, or if they are non-reactive, please explain that in the definition of SVOC. In addition, I would have liked more information regarding $PM_{2.5}$, especially considering the impending $PM_{2.5}$ standard.

I hope my few comments provide some assistance in your development of this AP-42 section. If you have questions, please call me at (801) 536-4012.

Sincerely,

Patti Kimes

Patti Kimes
Environmental Engineer

Georgia Department of Natural Resources
Environmental Protection Division, Air Protection Branch
4244 International Parkway, Suite 120, Atlanta, Georgia 30354
404/363-7000
Lonice C. Barrett, Commissioner
Harold F. Reheis, Director

January 27, 1997

Mr. Ronald E. Myers
Emission Methodology and Analysis Division
Emission Factor and Inventory Group
United States Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Dear Mr. Myers:

This letter is in response to your December 12, 1996 request for comments on the draft updates to the AP-42 section on brick and structural clay product manufacturing. We have reviewed the proposed changes as well as the draft report containing the supporting information. The report is well researched and seems to be a thorough survey of the available emissions data for this source category. We have checked our files for recent test reports and unfortunately have no new information that we can provide to you.

Naturally, having a larger database from which to develop the factors thereby causing an increase of the emission factors' ratings would be the single greatest improvement that could be made. However, we realize that an attempt has already been made to incorporate all reliable and recently developed test data. Nevertheless, the fact that the emission factor tables in this revised AP-42 section have "D" and "E" ratings as opposed to the "C" ratings of the previous section, could lead to some confusion. In order to avoid having to explain to third parties why the new factors are being used in preference to the old, especially where the new factors are lower, the language contained in section 4.4.2 of the Emission Factor Document should perhaps also be included in AP-42. This section explains that more stringent criteria were used to rate the new emission factors which were indeed developed from higher quality data. Moving the emission factor ratings for specific table entries from the footnote material in tables 11.3-1 and 11.3-3 to a separate column along side of the data, as in table 11.3-2, may also help avoid some confusion.

Another improvement we would like to see is the inclusion of information on geographical variations in fluorine concentrations if that type of information is available from the research that was performed. Hydrogen fluoride emissions are dependant upon the amount of fluorine compounds in the raw material, which the report states is highly variable. However, if the fluorine concentrations were consistent within a certain geographical area, this information would be useful to have in performing the recommended mass balance calculations.

We look forward to being able to use this document and appreciate the opportunity to be able to provide comments.

Sincerely,

Jack Taylor
Manager
Stationary Source Permitting Program

Brick Institute of America THE NATIONAL AUTHORITY ON BRICK CONSTRUCTION

January 30, 1997

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Methodology and Analysis Division
Research Triangle Park, NC 27711

Attention: Mr. Ronald E. Myers
Emission Factor and Inventory Group

Re: Brick Industry Response to Proposed AP-42 Section 11.3

Dear Mr. Myers:

In response to your letter of December 12, 1996 regarding the latest update of *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (AP-42) for Brick and Structural Clay Product Manufacturing (Section 11.3), we are pleased to submit the following comments. These comments reflect the views of the Air Emissions and Regulatory Subcommittee of the Brick Institute of America (BIA). BIA is the national trade association of U.S. brick manufacturers. BIA member companies manufacture over 80 percent of annual brick production in this country.

BIA believes the revisions to the brick section of AP-42 to date are a major improvement over earlier versions. The section reasonably portrays our industry's air emissions based on the best available information. We appreciate the opportunities we have had to assist in the development of the document.

Following are individual manufacturer comments on the AP-42 document for your consideration. Some of these comments are specifically directed to your request for discussion on the methods for estimating the control efficiency of building enclosures on grinding room emissions.

Comments of The Belden Brick Company

1. The 8.5 lbs/ton emission factor for a grinding plant (Table 11.3-1, page 11.2-7) processing dry material without a fabric filter is overstated as that number represents the inlet side of Plant 6 grinding plant and there is no correlation between what is picked up ahead of a duct collector and what leaves a building.

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Exhibit A calculates the emission factor to be 0.368 based on ambient air sampling taken at Plant 6 inside and outside (upstream and downstream) of the grinding plant at the same time as the grinding plant baghouse tests were taken.

2. Table 11.3-2 (page 11.3-8) shows an excessive emission level for CO and CO_2 coming from a brick dryer with a supplemental burner fired with natural gas. That number came from the MRI-EPA test of Belden's Plant 6 Dryer. You should note that at the time of test, the supplemental gas burner was not firing correctly, was dirty, and could not be adjusted properly. USEPA recognized this and subsequently did not include the VOC test results from this dryer in the AP-42 draft. The CO and CO_2 results should not be included either.

Comments of Boral Bricks, Inc.

3. Page 11.3-1: In the second paragraph of the Process Description, a sentence reads "From the grinding room, the material is conveyed to storage piles, which are typically enclosed." The words *"silos or"* should be added after the word "storage" for a more accurate description.

4. Page 11.3-3 and other locations: English units should be associated with numerical values rather than metric units to be consistent with the new format for emission factors. Metric units can be shown in parenthesis if necessary.

5. Page 11.3-4: In the first paragraph, it may be of interest to conclude the sentence that begins "Some plants have fuel oil available as a backup fuel..." by adding *"although most natural gas fired plants use vaporized propane as a backup fuel, if any."*

6. Page 11.3-4: The last paragraph includes the sentence "Organic compound emissions from brick dryers are primarily a result of volatilization of the lubricating oil that is typically applied to the formed material during extrusion, and may also result from volatilization of organic matter in the raw material." This sentence infers that the majority of VOC emissions from dryers is generated from the lubricating compound. Unless field or laboratory tests have confirmed this, please consider rewording the sentence or eliminating the sentence altogether because the statement is speculation.

7. Page 11.3-5: The last sentence of the fourth paragraph reads "In addition, fluoride emissions can be reduced by using raw materials with a low fluorine content." The sentence infers that changing a raw material source is a viable option to reduce emissions. Sufficient data is not available to confirm that low fluorine raw materials are available in localized areas. In addition, regardless of availability, changing raw material sources will rarely be an economically viable alternative.

8. Page 11.3-7: Aside from available data, does it really make sense that the PM_{10} emission factor for a grinding and screening operation with a fabric filter is higher than PM_{10} emissions from the same uncontrolled process (using wet material)?

9. Page 11.3-7: A clarification should be made specifying whether or not the grinding and screening factors represent enclosed processes. If not, an enclosure efficiency should be suggested in addition to the provided emission factors.

10. Page 11.3-7: Aside from available data, process knowledge and intuition suggest that the condensable portion of particulate emissions from a "sawdust fired kiln and sawdust dryer" would equal or exceed the emissions of a comparable natural gas fired or sawdust fired kiln. Are temperatures low enough to condense particulate emissions in the dryers or does another removal mechanism exist?

11. Page 11.3-8: A range should be established to define "high sulfur material" if separate SO_2 emission factors are included. Also, this emission factor (4.5 lb/ton) does not appear to be consistent with the sulfur analysis results reflected in the footnote (0.087%).

    See the following calculation:

    - = (.00087 parts sulfur) (2000 lb/ton) (64 parts SO_2/32 parts sulfur) = 3.48 lb SO_2/ton.

    - Considering that not all sulfur is evolved from a brick body in firing and that not all sulfur is emitted as SO_2, the emission factor and mass balance results are not consistent. Either the emission factor should be lowered or a suggested sulfur content should be increased above the draft value.

    - In addition, a specific method should be endorsed to define this range because different methods will produce different ranges.

12. Page 11.3-8: Boral Bricks possesses stack tests that suggest NO_X emissions from natural gas fired kilns are less than draft value. These reports have been included.

13. Page 11.3-8: Boral Bricks possess stack tests that suggest CO emissions from natural gas and sawdust fired kilns are less than draft value. These reports have been included.

14. Page 11.3-9: Is methane reported *"as propane"*? If not, the VOC factors should be corrected appropriately.

15. Page 11.3-9: The basis used to establish the difference between "HF" and "total fluorides" should be stated (i.e. different EPA test methodologies). Is total fluorides reported as HF?

16. Page 11.3-9: Does it make sense that HF emissions from a sawdust-fired kiln and sawdust dryer are less than emissions from other kilns? Are temperatures low enough to condense HF or does another removal mechanism exist? If not, this data should simply be compiled with other kiln data.

17. Pages 1.3-10-14: If a pollutant was not detected, is it necessary to supply any emission factor for the pollutant considering the magnitude of emissions of most of the hazardous air pollutants?

18. Page 11.3-14: Footnote "c" references a facility with a manganese surface treatment on the brick as a facility with a sawdust-fired kiln. This factor apparently should be applied to a natural gas, coal, or sawdust-fired kiln that produce brick with a manganese coating. The factor should be reformatted to reflect this.

In support of these comments, the following test results of various Boral Brick plants are provided:

Exhibit	Facility	Date	Fuel	Control Equipment	Pollutants
B	Salisbury #6	10/6/95	Sawdust	None	CO
C	Atlanta #2	8/27/96	Nat'l. Gas	None	filterable PM, CO, SO_2, NO_X, VOC_S, HF
D	Atlanta #1	8/28/96	Nat'l. Gas	None	filterable PM, CO, SO_2, NO_X, VOC_S, HF
E	Henderson	6/29/95	Nat'l. Gas	Limestone Adsorber	filterable PM, SO_2, No_x, HF
F	Henderson	2/15/95	Nat'l. Gas	Limestone Adsorber	filterable PM, NO_X, HF

19. Exhibit G is a memo summarizing the approach suggested for all Boral plants in estimating emissions from pneumatic control devices in operation. It suggests assuming a constant exhaust grain loading for pneumatic devices. The fabric filter factors are based on a compilation of the stack tests completed at General Shale and Belden Brick for the AP-42 revision. This is a more appropriate method for pneumatic devices rather than assuming that emissions are proportional to production rates. If operations are uncontrolled, emissions should be based on production rates (draft AP-42 factor) and incorporate a building removal efficiency where applicable.

Comments of General Shale Products Corporation

20. The previous draft of the brick section of AP-42 and the documentation for the current draft (page 4-52) show the factor for HCl to be 0.18 lbs/ton. This was based on the Belden tests with no new references or data being cited. Table 11.3-3, however, lists a factor of 0.21 lbs/ton. This appears to be simply an error which should be corrected.

21. The hydrogen fluoride (HF) emission factor has increased from 0.30 lbs/ton of fired brick to 0.38 lbs/ton. The questions arises whether this emission factor is applicable to coal, natural gas, and oil-fired kilns. Experience has shown that emissions of HF from coal-fired kilns, firing the same raw material, is significantly reduced when compared to natural gas or oil. This can likely be explained by the interaction of HF (acidic) with the coal fly ash (basic). (If this interaction is occurring, a mass balance on the raw material won't necessarily provide a better estimate of emissions.) The Environmental Protection Agency has been provided enough data from coal-fired facilities to develop a specific emission factor for coal-fired kilns. This may have particular importance relative to the upcoming MACT standard since only "major" sources (i.e. greater than 10 tons per year) will likely be subject to this regulation.

22. Since an emission factor has been added for total fluorides and since some states regulate total fluorides, this may affect the compliance status of brick manufacturing facilities in these states. Review of supporting documentation indicates that the proposed total fluoride emission factor is based on two tests; one test on a kiln firing structural clay tile, and the other at Boral Bricks Phenix City facility. A question arises as to the appropriateness of the structural clay tile results to brick kilns. With regards to the Boral test, the results indicated total fluoride results of 1.6 times the HF result. This factor is applied to the proposed HF factor (0.38 lbs/ton) to obtain the total fluoride factor from this test (0.61). This approach must be questioned when stack test results indicate that the majority, if not all, of the fluoride from brick firing is emitted as hydrogen fluoride.

Comments of Statesville Brick Company

23. Exhibit H are the test results of a CO test on the kiln exhaust at Statesville's plant facility. This facility is firing with 100 percent sawdust. Page 3 of Exhibit H shows the production rate as 19,475 pounds or 9.738 tons of ware per hour. The kiln exhaust exits through two ducts. Page 5 shows the averages for the dryer and kiln exhausts are 3.77 and 1.96 lbs/hour. Dividing 5.73 by 9.738 gives an emission factor of 0.5888 pounds per ton of ware produced. This indicates that the proposed AP-42 factor of 3.1 lbs/~~hour~~ ton is far too high and should be lowered substantially.

CONCLUSION

We thank the Emission Factor and Inventory Group for providing the brick industry with the opportunity to submit comments on the latest version of Section 11.3 of AP-42. As the states become more active in regulating emissions, there is some urgency in publishing the revisions to AP-42 so that the states will have the benefit of the best knowledge and data to date on brick plant air emissions.

Very truly yours,

Nelson J. Cooney
President
Brick Institute of America

NJC:cb

Enclosures

FAX MESSAGE/COVER SHEET

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Date: 1/31/96

Pages: 9

To: Mr. Ron Myers

FAX: 919-541-0684

Subject: AP-42 Draft

Please Note Our New Area Code of "864"

Brick, Tile, Toilets, And Refractories:
High Technology In Traditional Ceramic Products

CLEMSON
UNIVERSITY

January 31, 1997

Mr. Ronald E. Myers
Emission Methodology and Analysis Division
Emission Factor and Inventory Group
United States Environmental Protection Agency
Research Triangle Park, NC 27711

Re: Review of Proposed Section of the AP-42 For Brick and Structural Clay Product Manufacturing

Dear Mr. Myers:

Thank you for your letter of 12 December 1996, and I am pleased to enclose six pages of comments on the proposed AP-42 document. In general, I see progress in this document based on data collection by EPA and its contractors and based on the interaction between the Brick Institute of America's representatives and EPA. However, I have serious reservations on the current draft of the document. I firmly believe that additional revisions are in order prior to publication, and I offer to assist in appropriate ways.

My reservations on the current draft are based on the following general conclusions:

1) The whole section dealing with SO_2 and SO_3 needs attention.

2) The emission factors of CO, TOC, and VOC based in whole or part on MRI test data at The Belden Brick Company contain significant errors.

3) Inclusion of any information on the "medium efficiency scrubber" at Interstate Brick Company is inappropriate.

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4) Practices to generate an emission factor including any estimate of a quantity that was lower than detection limit are not based on norms of scientific or engineering accuracy.

5) Statements relative to sources of metals emissions are not based on fact.

I hope that the detailed statements will be used in your revision process. As a citizen and scientist, I want the same thing that you want - accurate published data. I will look forward to further revision of the AP-42 section on brick manufacturing.

With best regards,

Denis A. Brosnan

Denis A. Brosnan, Ph.D, PE
Professor and Director
SC Registration No. 13888

/dab

Comments on Text

1. p. 11.3.1 (last paragraph): the initial sentence should read that the majority of brick are produced by the extrusion process with a significant minority volume by the soft mud process. Brick have been historically produced by dry pressing, but there may be no plants in the United States now using this process.

2. p. 11.3.3 (second paragraph): the moisture content in the soft mud process may be in the range 15--22% but not 20-30%. At 30% moisture, the clay would be a slurry or slip.

3. p. 11.3.4 (third paragraph). I strenuously object to the statement that the primary sources of PM emissions include the kilns. Data in Table 11.3.1 clearly shows that the primary source of potential PM emissions is the grinding room as follows:

For gas fired kilns (the vast majority of kilns):

$$\frac{0.28 \text{ lb/t}}{0.28 \text{ lb/t (kiln)} + 8.5 \text{ lb/t (grinding)}} \times 100 = 3.2\% \text{ (obviously not a major source)}$$

For coal fired kilns (perhaps 30 out of 300 kilns):

$$\frac{1.2 \text{ lb/t}}{1.2 \text{ lb/t (kiln)} + 8.5 \text{ lb/t (grinding)}} \times 100 = 12.4\% \text{ (not a major if < 10\% of kilns)}$$

For sawdust fired kilns(perhaps 20 out of 300 kilns):

$$\frac{0.34 \text{ lb/t}}{0.34 \text{ lb/t (kiln)} + 8.5 \text{ lb/t (grinding)}} \times 100 = 3.8\% \text{ (not a major source if <7\% of kilns)}$$

4. p. 11.3.4 (third paragraph): I object to the statement that organic emissions are primarilly a result of volatilization of lubricating oil (brick oil). I don't think there is any scientific or engineering validity to this statement. Since many raw materials may exhibit total organic carbon in a range of 0.1-0.6% and since a fraction of this organic may volatilize in the dryer, the concentration from the raw material may be as significant as the lubricant. In the absence of engineering data, the most correct statement would be, "Organic emissions from brick dryers may include a contribution from petroleum products in those plants using petroleum based products as a lubricant in extrusion."

5. p. 11.3.5 (4th paragraph): Instead of stating that wet scrubbers are used in at least one facility, why not say that they are used in one facility or one plant location (the current tally for wet scrubbers in the US).

6. p. 11.3.5 (4th paragraph): I strenuously object to the statement that "Test data show that control efficiencies for total fluorides and SO_2 are greater than 99 percent for the packed bed scrubber" since in the very next sentence you indicate a control efficiency for SO_2 of 82% and no available fluoride control efficiency.

In Table 11.3.2, reference is made to the "medium efficiency scrubber" at Interstate Brick. How can you call a homemade scrubber as "medium efficiency"? This horizontal tunnel scrubber cannot be compared to anything I have seen in industry for controlling SO_2. The data from this scrubber can only be considered as atypical for any industrial process. I recommend you simply look at a picture of this scrubber before you consider if it is even worthy of mention, and if you do mention it, you must consider it a "scrubber not typical of current air pollution control technology".

Since there is only one scrubber that would be considered by the engineering community as "professionally designed", only the correct statement should be used.

Comments on Emission Factors

1. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Brick Dryer With Supplemental Gas Burner: The emission factor of CO of 0.44 lb/t is for a malfunctioning dryer with data taken during the EPA test at Belden brick. Subsequent to the EPA test, I was present at Belden when the burner was disengaged and watched the CO meter indicate a substantial reduction in CO. EPA should consider supplemental data from Belden and r revise the emission factor.

2. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Natural Gas Fired Kiln: The SO3 factor is attributed to a Center For Engineering Ceramic Manufacturing Report (Reference 26). In fact there were no SO3 values mentioned in that report since there was no speciation between SO2 and SO3. Therefore, this value must be removed.

2. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Natural Gas Fired Kiln: I vigorously object to the SO2 factor of 0.5 lb/t used in the table. The majority of brick plants in the US do not have pyrite in the raw material or they have an insignificant amount of pyrite in the raw material. Shale based plants typically have NO pyrite in the material. The Belden data is atypical and might apply to <10% of plants.

Therefore, the only way of scientific validity to present the data is to use the Triangle data as the basis for an emission factor giving an emission factor of 0.06 lb/t. This statement should be explained with a footnote saying that a mass balance test may be used to estimate emissions in the event that the raw materials contain sulfur species over the baseline based on low pyrite amount exhibited by most clays and the Triangle material.

In a paper I recently wrote on the topic which will be published in the August issue of the American Ceramic Society Bulletin, sulfur sources in the raw materials are dsicussed and it is concluded that the only accurate way to estimate sulfur emissions is through a mass balance or other procedure. Given the engineering discussion in the paper, it is appropriate to use the baseline factor given by the Triangle test of 0.06 lb/t or 0.1 lb/t.

Comments On Emission Factors (continued)

3. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Natural Gas Fired Kiln Firing High Sulfur Material: I vigorously object to the SO2 factor of 4.3 lb/t (uncontrolled) used in the table since footnote 8 gives the sulfur content of the raw material as 0.087%.

For 2000 lb, this yields 1.74 lb of sulfur (S), or 1.74 lb S/t. A simple conversion of S to SO2 may be written as follows:

S (32 grams/mole) + O2 (32 grams/mole) = SO2 (64 grams per mole)

The conversion of SO2 from S is therefore by a factor of 64/32 or 2.

This means a MAXIMUM of 3.48 lb/t was available for this raw material. I do not believe that a natural gas combustion factor can possibly increase this SO2 emission MORE THAN the factor for Triangle of 0.06 lb/t. Therefore, the emission factor can not be greater than about 3.54 lb/t.

The factor 4.3 lb/t is therefore in error and cannot be considered of sufficient weight for publication.

4. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Natural Gas Fired Kiln Firing High Sulfur Material (with medium efficiency wet scrubber) : I vigorously object to the inclusion of the data for Interstate's homemade scrubber on two bases:

(a) Previous argument: In Table 11.3.2, reference is made to the "medium efficiency scrubber" at Interstate Brick. How can you call a homemade scrubber as "medium efficiency"? This horizontal tunnel scrubber cannot be compared to anything I have seen in industry for controlling SO2. The data from this scrubber can only be considered as atypical for any industrial process. I recommend you simply look at a picture of this scrubber before you consider if it is even worthy of mention, and if you do mention it, you must consider it a "scrubber not typical of current air pollution control technology".

(b) The Interstate raw material is atypical of any in the United States in that the raw materials are of a volcanic origin likely containing sulfur species entrapped within glassy matter or encapsulated in the mineral matter. Since most brick plants are using highly weathered clays such as alluvial clays and shales, there is no reason to consider any results from this scrubber as typical.

Comments On Emission Factors (continued)

5. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Coal Fired Kiln: I object to footnote m since there is no data to indicate that the General Shale raw material contains pyrite. My own emission factor for this kiln was higher from the EPA test suggesting that the emission factor has been adjusted. If there was an adjustment, there should be a note explaining the adjustment so that the data could be applied to other kilns based on the sulfur content of the raw material in the kiln of interest.

6. Table 11.3-2 (Emission Factors For Brick Manufacturing Operations):

Coal Fired Kiln: In footnote c, references 8,12, and 15 refer only to Belden which has NO sawdust fired kilns. Reference 22 refers to Acme, Sealy, TX, which is a gas fired kiln. Reference 25 refers to Triangle, also a gas fired kiln. Reference 25 is the Center report which only gives 0.26 lb/t for a kiln fired only with sawdust. Since EPA did NOT measure SOx at Pine Hall, then 0.26 lb/t is the ONLY factor that can be used.

7. Table 11.3-3: (Emission Factors For Brick Manufacturing Operations)

Brick dryer: TOC emissions. I have a problems in a waste heat dryer from a gas fired kiln with TOC emissions >20% higher than TOC emissions from uncontrolled brick kilns. Once again, the defective Belden data (footnote e containing reference 8) has likely affected this result. As a minimum, the Belden data should be removed from the calculation or the revised Belden data should be used in the calculation.

8. Table 11.3-3: (Emission Factors For Brick Manufacturing Operations)

Brick dryer: VOC emissions: It appears that the calculation used Belden data, and I voice the same objection as in previous objections referring to Belden.

9. Table 11.3-3: (Emission Factors For Brick Manufacturing Operations)

Brick kilns with medium efficiency wet scrubber: I voice the same objection for inclusion of data from the homemade Interstate scrubber that I have also previously noted.

Comments On Emission Factors (continued)

10. Draft Table 11.3-4: (Emission Factors For Organic Pollutant Emissions From Brick Manufacturing Operations)

I vigorously object to any data with footnotes b or c on the basis that the estimation of any quantity as a fraction of the lower detection limit and inclusion of that estimate in any calculated value is with no scientific or engineering basis. If data does not exist of known precision, it can not be used.

11. 10. Draft Table 11.3-4: (Emission Factors For Metal Emissions From Brick Manufacturing Operations)

I vigorously object to the language in footnote a. There is no engineering information that allows EPA to conclude that colorants, as a body additive or as a surface treatment, increase metals emissions. This information is only inferred from the Pine Hall data.

I further question the statement in footnote a that metals emissions can be due to metallic additives used in the body of the brick. There are no additives listed in the Table other than manganese and chromium which MIGHT lead to air emissions, and there is no engineering data that they DO lead to emissions.

Document Control Sheet

Project No.: 4604-02 (Subtask No.) 02

Document Name: Fluorine + Sulfur Figures for Brick Background Report

CBI: ☐ Yes ☒ No

Originator: B. Shrager Ext. ______

WP COMMENTS:

WP ID No.: [illegible]

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Due date/time: 4/28

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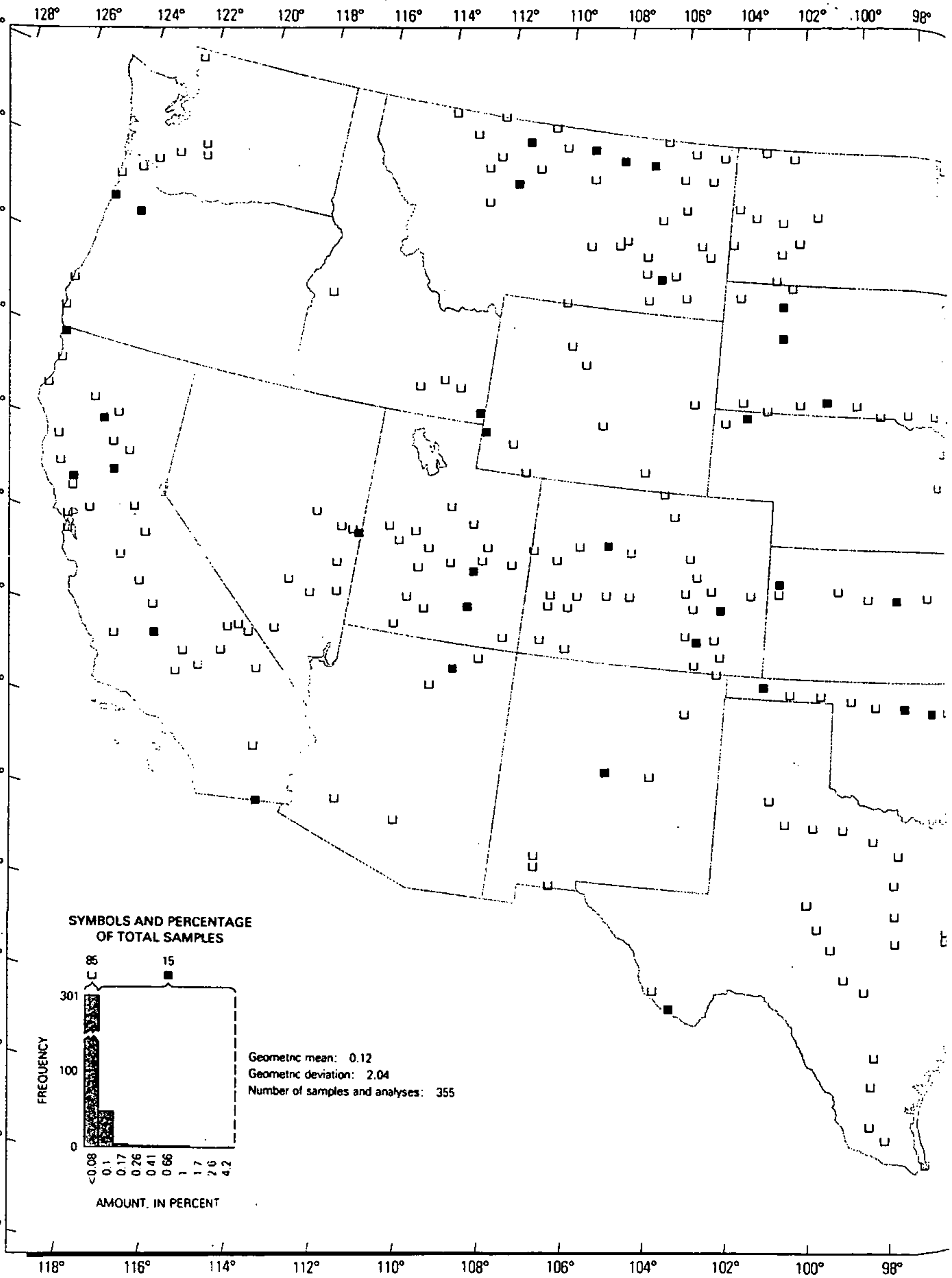

Figure 2-2. Sulfur Content of Soils[22]

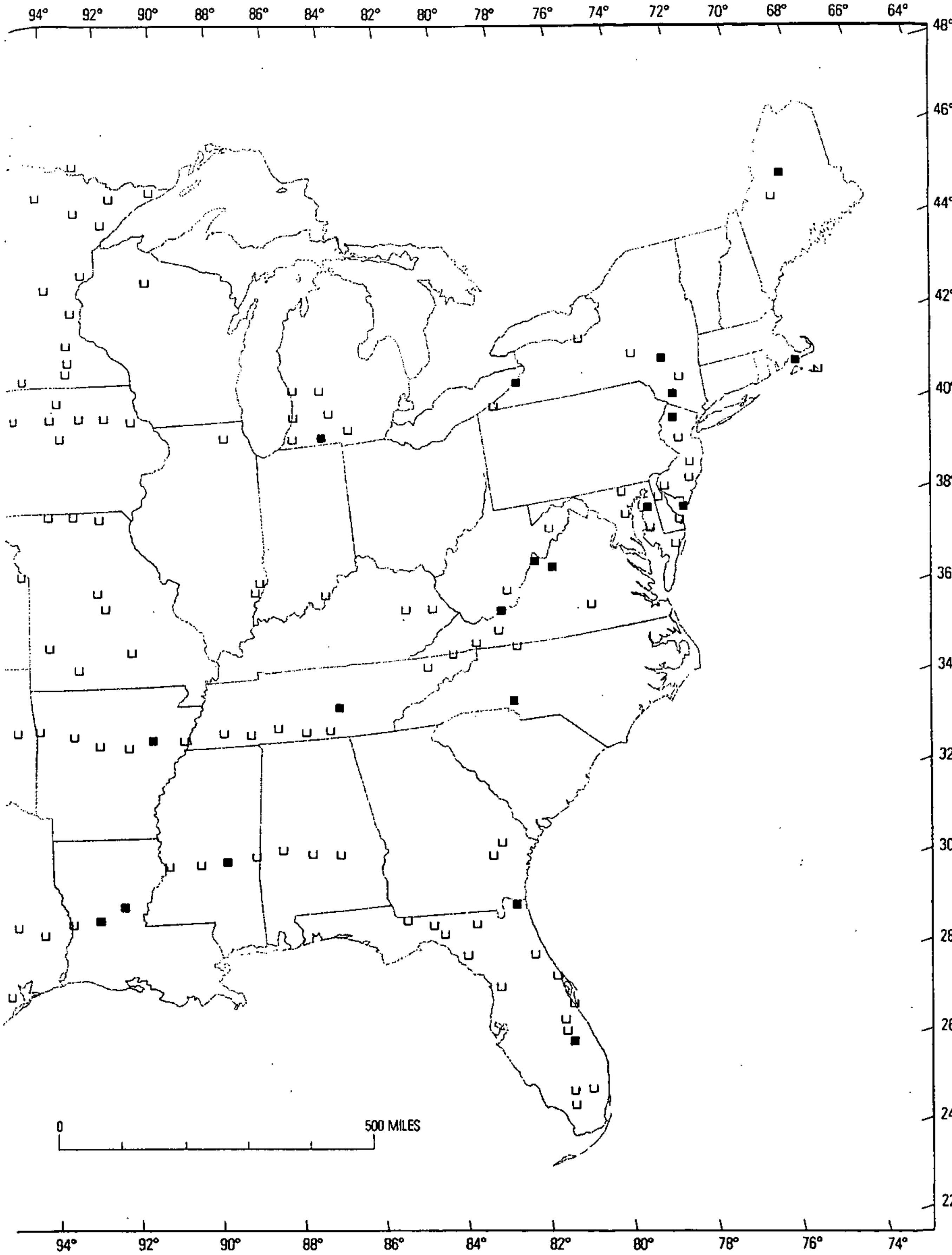

Figure 2-2. (continued)

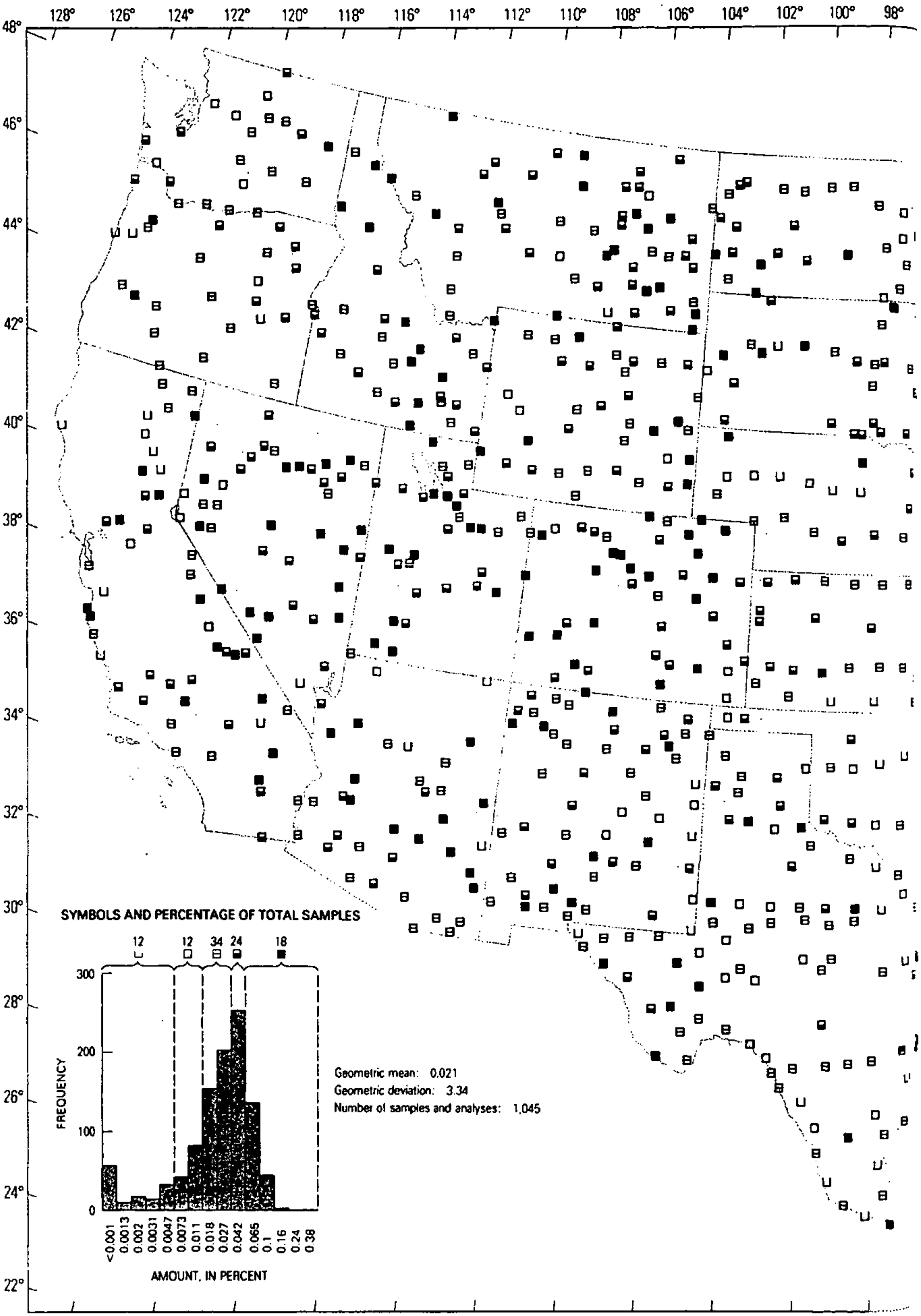

Figure 2-3. Fluorine Content of Soils[22]

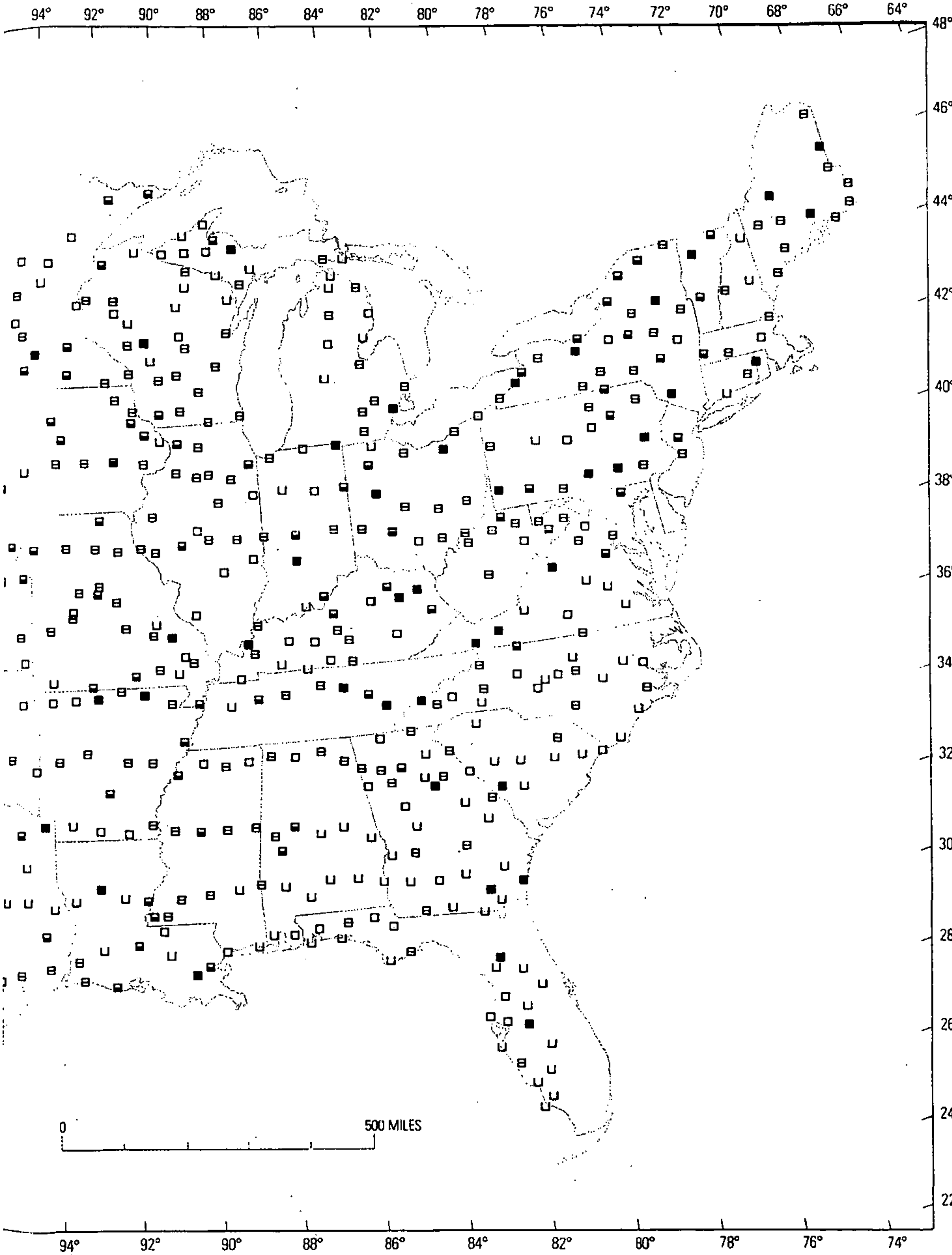

Figure 2-3. (continued)

Midwest Research Institute
Review/Approval

	Initials:	Date:
Project Lead:	BLS	12/6/96
Project Director/ Program Manager:	[signature] for Roy Neulicht	12/9/96

Take to Mary Taborn for coordination and mailing.

Document Control Sheet

Project No.: 4604-02 (Subtask No.) ____
Document Name: Brick Letter
CBI: ☐ Yes ☒ No
Originator: B. Shrager Ext. 5224

WP COMMENTS:

WP ID No.: 5439-1h
5440-1D 1h

TH2

①
Date to WP: 12/5
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WP PROOF ☐ Yes ☐ No

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MAIL COPY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

AUG 5 1994

Mr. Nelson Cooney
Brick Institute of America
11490 Commerce Park Drive
Suite 300
Reston, Virginia 22091-1525

Dear Mr. Cooney:

It was a pleasure meeting with you and the other members of the Brick Institute of America on July 26. In the meeting I described how the Emission Inventory Branch of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As we discussed in the meeting, we have almost finished the testing phase of our effort to update the AP-42 section for Brick Manufacturing. As part of this process, we are now seeking additional emission data and updated process descriptions for sections that are being revised.

Chapter 11 of AP-42 addresses the mineral products industry and is one of the chapters being updated. Enclosed is a copy of the existing Section 11.3, Brick and Related Clay Products. We would appreciate it if you or one of your associates would review the enclosed AP-42 section and would send us your comments. In addition, please feel free to distribute the enclosed documents among other interested persons in the brick industry. We would appreciate a response to this request by September 22, 1994.

As you can see from the AP-42 section, the current emission factors are based on data from only five emission test reports. Enclosed is a list of the test reports currently cited in AP-42 and additional test reports that have been obtained for use in developing emission factors. If you are aware of additional emission data that we could use to develop emission factors for brick manufacturing, we would appreciate your assistance in obtaining copies of the data. In particular, if any emission data for screening and grinding operations are available, we have relatively little data on these processes. Please note that the emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. We also would appreciate specific comments on the general process description presented in the enclosed AP-42 section, information on variations in brick manufacturing operations, and identification of specific air pollution emission points associated with brick manufacturing. General information on the brick industry, including the location of plants and annual production rates also would be helpful.

In our meeting we also discussed our use of information that would be considered by one or more of your member companies as Confidential Business Information (CBI). As I stated in the meeting we are sensitive to the needs of businesses to keep some information confidential. Therefore as I agreed, I am enclosing for your information our CBI procedures and the procedures we require our contractors to follow when handling CBI. Should your members wish to provide emission test data that contains CBI, I would ask that you have them identify the specific information in the test report that is considered CBI.

We appreciate your cooperation and look forward to receiving your comments. If you have any questions or need additional time to respond to this report, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E Myers

Ronald E. Myers
Emission Factors and Methodologies Section
Emission Inventory Branch

3 Enclosures

8.3 BRICKS AND RELATED CLAY PRODUCTS

8.3.1 Process Description

The manufacture of brick and related products such as clay pipe, pottery and some types of refractory brick involves the mining, grinding, screening and blending of the raw materials, and the forming, cutting or shaping, drying or curing, and firing of the final product.

Surface clays and shales are mined in open pits. Most fine clays are found underground. After mining, the material is crushed to remove stones and is stirred before it passes onto screens for segregation by particle size.

To start the forming process, clay is mixed with water, usually in a pug mill. The three principal processes for forming brick are stiff mud, soft mud and dry press. In the stiff mud process, sufficient water is added to give the clay plasticity, and bricks are formed by forcing the clay through a die. Wire is used in separating bricks. All structural tile and most brick are formed by this process. The soft mud process is usually used with clay too wet for the stiff mud process. The clay is mixed with water to a moisture content of 20 to 30 percent, and the bricks are formed in molds. In the dry press process, clay is mixed with a small amount of water and formed in steel molds by applying pressure of 3.43 to 10.28 megapascals (500 to 1500 pounds per square inch). A typical brick manufacturing process is shown in Figure 8.3-1.

Wet clay units that have been formed are almost completely dried before firing, usually with waste heat from kilns. Many types of kilns are used for firing brick, but the most common are the downdraft periodic kiln and the tunnel kiln. The periodic kiln is a permanent brick structure with a number of fireholes where fuel enters the furnace. Hot gases from the fuel are drawn up over the bricks, down through them by underground flues, and out of the oven to the chimney. Although lower heat recovery makes this type less efficient than the tunnel kiln, the uniform temperature distribution leads to a good quality product. In most tunnel kilns, cars carrying about 1200 bricks travel on rails through the kiln at the rate of one 1.83 meter (6 foot) car per hour. The fire zone is located near the middle of the kiln and is stationary.

In all kilns, firing takes place in six steps: evaporation of free water, dehydration, oxidation, vitrification, flashing, and cooling. Normally, gas or residual oil is used for heating, but coal may be used. Total heating time varies with the type of product, for example, 22.9 centimeter (9 inch) refractory bricks usually require 50 to 100 hours of firing. Maximum temperatures of about 1090°C (2000°F) are used in firing common brick.

TABLE 8.3-1. EMISSION FACTORS FOR BRICK MANUFACTURING WITHOUT CONTROLS[a]

EMISSION FACTOR RATING: C

Process	Particulates		Sulfur oxides		Carbon monoxide		Volatile Organic Compounds: Nonmethane		Volatile Organic Compounds: Methane		Nitrogen oxides		Fluorides[b]	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Raw material handling[c]														
Drying	35	70	-	-	-	-	-	-	-	-	-	-	-	-
Grinding	38	76	-	-	-	-	-	-	-	-	-	-	-	-
Storage	17	34	-	-	-	-	-	-	-	-	-	-	-	-
Brick dryer[d]														
Coal/gas fired	0.006A	0.012A	0.55S	1.10S	-	-	-	-	-	-	0.33	0.66	-	-
Curing and firing[e]														
Tunnel kiln														
Gas fired	0.012	0.023	Neg	Neg	0.03	0.06	0.0015	0.003	0.003	0.006	0.09	0.18	0.5	1.0
Oil fired	0.29	0.59	1.98S	3.95S	0.06	0.12	0.0035	0.007	0.013	0.025	0.525	1.05	0.5	1.0
Coal fired	0.34A	0.67A	3.65S	7.31S	0.71	1.43	0.005	0.01	0.003	0.006	0.73	1.45	0.5	1.0
Coal/gas fired	0.16A	0.31A	0.31S	0.62S	-	-	-	-	-	-	0.81	1.61	-	-
Sawdust fired	0.12	0.24	-	-	-	-	-	-	-	-	-	-	-	-
Periodic kiln														
Gas fired	0.033	0.065	Neg	Neg	0.075	0.15	0.005	0.01	0.01	0.02	0.25	0.50	0.5	1.0
Oil fired	0.44	0.88	2.93S	5.86S	0.095	0.19	0.005	0.01	0.02	0.04	0.81	1.62	0.5	1.0
Coal fired	9.42	18.84	6.06S	12.13S	1.19	2.39	0.01	0.02	0.005	0.01	1.18	2.35	0.5	1.0

[a]Expressed as units per unit weight of brick produced. One brick weighs about 2.95 kg (6.5 pounds). Dash = No data. A = % ash in coal. S = % sulfur in fuel. Neg = negligible.
[b]References 3, 6-10.
[c]Based on data from Section 8.7 on Ceramic Clay Manufacturing in this publication. Because of process variation some steps may be omitted. Storage losses apply only to that quantity of material stored.
[d]Reference 12.
[e]References 1, 5, 12-16.

TABLE 8.3-3. PARTICLE SIZE DISTRIBUTION AND EMISSION FACTORS FOR UNCONTROLLED COAL FIRED TUNNEL BRICK KILNS[a]

EMISSION FACTOR RATING: E

Aerodynamic particle diameter (µm)	Cumulative weight % ≤ stated size	Emission factor[b] (kg/Mg)
2.5	24.7	0.08A
6.0	50.4	0.17A
10.0	71.0	0.24A
	Total particulate emission factor	0.34A[c]

[a]References 12, 17.
[b]Expressed as cumulative weight of particulate ≤ corresponding particle size/unit weight of brick produced. A = % ash in coal. (Use 10% if ash content is not known).
[c]Total mass emission factor from Table 8.3-1.

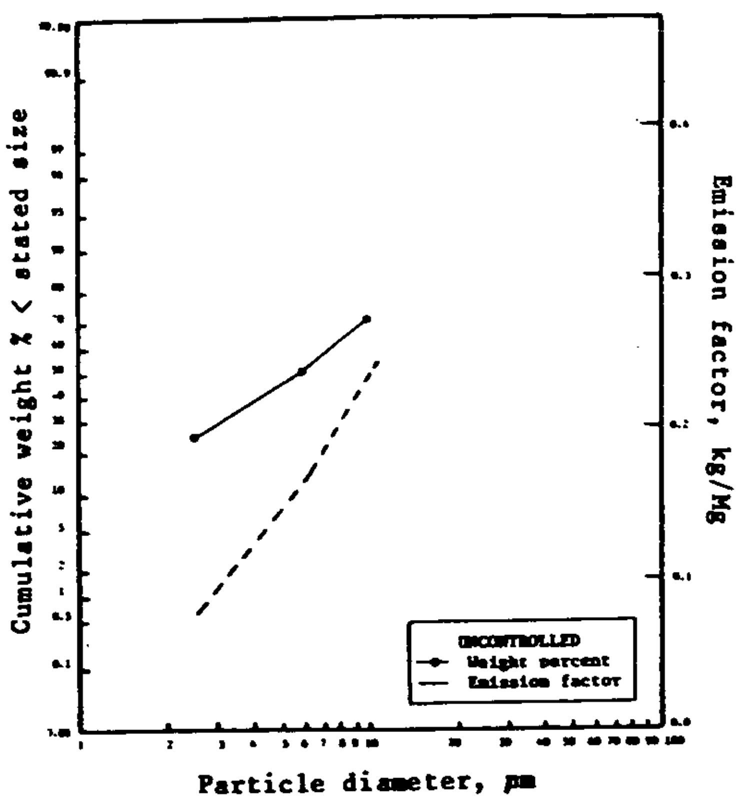

Figure 8.3-3. Cumulative weight percent of particles less than stated particle diameters for uncontrolled coal fired tunnel brick kilns

References for Section 8.3

1. Air Pollutant Emission Factors, APTD-0923, U. S. Environmental Protection Agency, Research Triangle Park, NC, April 1970.

2. "Technical Notes on Brick and Tile Construction", Pamphlet No. 9, Structural Clay Products Institute, Washington, DC, September 1961.

3. Unpublished control techniques for fluoride emissions, U. S. Department Of Health And Welfare, Washington, DC, May 1970.

4. M. H. Allen, "Report on Air Pollution, Air Quality Act of 1967 and Methods of Controlling the Emission of Particulate and Sulfur Oxide Air Pollutants", Structural Clay Products Institute, Washington, DC, September 1969.

5. F. H. Norton, Refractories, 3rd Ed, McGraw-Hill, New York, 1949.

6. K. T. Semrau, "Emissions of Fluorides from Industrial Processes: A Review", Journal Of The Air Pollution Control Association, 7(2):92-108, August 1957.

7. Kirk-Othmer Encyclopedia of Chemical Technology, Vol 5, 2nd Edition, John Wiley and Sons, New York, 1964.

8. K. F. Wentzel, "Fluoride Emissions in the Vicinity of Brickworks", Staub, 25(3):45-50, March 1965.

9. "Control of Metallurgical and Mineral Dusts and Fumes in Los Angeles County", Information Circular No. 7627, Bureau Of Mines, U. S. Department Of Interior, Washington, DC, April 1952.

10. Notes on oral communication between Resources Research, Inc., Reston, VA and New Jersey Air Pollution Control Agency, Trenton, NJ, July 20, 1969.

11. H. J. Taback, Fine Particle Emissions from Stationary and Miscellaneous Sources in the South Coast Air Basin, PB 293 923/AS, National Technical Information Service, Springfield, VA, February 1979.

12. Building Brick and Structural Clay Industry - Lee Brick and Tile Co., Sanford, NC, EMB 80-BRK-1, U. S. Environmental Protection Agency, Research Triangle Park, NC, April 1980.

13. Building Brick and Structural Clay Wood Fired Brick Kiln - Emission Test Report - Chatham Brick and Tile Company, Gulf, North Carolina, EMB-80-BRK-5, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1980.

14. R. N. Doster and D. J. Grove, Stationary Source Sampling Report: Lee Brick and Tile Co., Sanford, NC, Compliance Testing, Entropy Environmentalists, Inc., Research Triangle Park, NC, February 1978.

15. R. N. Doster and D. J. Grove, Stationary Source Sampling Report: Lee Brick and Tile Co., Sanford, NC, Compliance Testing, Entropy Environmentalists, Inc., Research Triangle Park, NC, June 1978.

Enclosure 2

TEST REPORTS AVAILABLE FOR USE IN DEVELOPING EMISSION FACTORS

Plant	Location and date	Fuel	Pollutants
Lee Brick and Tile Co.	Sanford, NC Apr. 1980	Coal	Kiln–PM, SO_2, NO_X, Particle size
Chatham Brick and Tile Co.	Gulf, NC Oct. 1980	Sawdust	Kiln–CO_2, Particle size
Lee Brick and Tile Co.	Sanford, NC Feb. 1978	Coal	Kiln–PM
Lee Brick and Tile Co.	Sanford, NC June 1978	Coal	Kiln–PM
Chatham Brick and Tile Co.	Sanford, NC July 1979	?	Kiln–PM
General Shale	Atlanta, Ga Mar. 9, 1993	Coal	Kiln–SO_2, NO_X, CO, THC, CO_2 Dryer–SO_2, NO_X, CO, THC, CO_2
General Shale	Glascow, Va Oct. 16, 1990	Coal	Kiln–Filt. PM, CO_2
General Shale	Kingsport, TN Oct. 11, 1983	Coal	Kiln–Filt. PM, CO_2
General Shale	Johnson City Feb. 7-9, 1984	Coal	Kiln–Filt. PM, CO_2, Particle sizing
General Shale	Kingsport, TN July 21, 1982	Coal	Kiln–Filt. PM, CO_2 Coal crusher–Filt. PM
General Shale	Knoxville, TN Apr. 22, 1986	Coal	Kiln–Filt. PM, CO_2
General Shale	Marion, VA Oct. 17-19,1990	Coal and supplemental gas	2 Kilns–Filt. PM, CO_2
General Shale	Mooresville, IN Dec. 2, 1986	Coal	Kiln/dryer–SO_2
Belden Brick	Sugarcreek, OH Mar. 3, 1992	Natural gas	Kiln–Filt. PM, SO_2, NO_X, CO_2
Belden Brick	Sugarcreek, OH July 21, 1989	Natural gas	Kiln–Filt. PM, SO_2, NO_X, CO_2
Acme Brick	Sealy, TX	Natural gas	Kiln–Filt. PM, HF, SO_2 Dryer–SO_2
Pine Hall Brick–EPA test	Madison, NC Oct.-Nov., 1992	Sawdust	Grinding room–Filt. PM, PM-10 Sawdust dryer–Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, methane, ethane, CO_2, HF/HCL, volatiles, semi-volatiles, metals Kiln–Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, methane, ethane, CO_2, HF/HCL, volatiles, semi-volatiles, metals
General Shale–EPA test	Johnson City, TN July 26-31,1993	Coal and supplemental gas	Grinding room–Filt. PM, PM-10 Brick dryer–THC Kiln–Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, methane, ethane, CO_2, HF/HCL, volatiles, semi-volatiles, metals
Belden Brick–EPA test	Sugarcreek, OH Nov. 8-12, 1993	Natural gas	Grinding room–Filt. PM, PM-10 Brick dryer–THC, methane, ethane Kiln–Filt. PM, Cond. PM, PM-10, SO_2, NO_X, CO, THC, CO_2, HF/HCL, volatiles, semi-volatiles, metals

Enclosure 3

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards (OAQPS)
Emission Standards Division (ESD)

January 1989

Summary of ESD/OAQPS
Procedures for Safeguarding Confidential Business Information (CBI)

1. Purpose

This memorandum describes Agency policy and procedures pertaining to the handling and safeguarding of information that may be entitled to confidential treatment for reasons of business confidentiality by the ESD, OAQPS, Office of Air and Radiation, U.S. Environmental Protection Agency.

2. Other Appliable Documents:

a. Clean Air Act as amended.

b. 40 CFR, Chapter 1, Part 2, Subpart B - Confidentiality of Business Information.

c. EPA Security Manual, Part II, Chapters 8 and 9.

d. Clean Air Act Confidential Business Information Security Manual for Federal Employees.

e. Clean Air Act Confidential Business Information Security Manual for Contractors.

3. Exception:

This document was prepared as a summary of data gathering and handling procedures used by the ESD, OAQPS, EPA. Nothing in this document shall be construed as superseding or being in conflict with any applicable regulations, statutes, or policies to which EPA is subject.

4. Definition:

Confidential Business Information - Information claimed by the provider to be confidential. This information may be identified with such titles as trade secret, secret, administrative secret, company secret, secret proprietary, privileged, administrative confidential, company confidential, confidential proprietary, or proprietary. NOTE: These markings should not be confused with the classification markings of National Security information identified in Executive Order 11652.

b. Receipt of Confidential Business Information

Upon receipt of information for which confidential treatment has been requested, the Office of the Director (OD) directs the logging of the material and the establishment of a permanent file. If confidential treatment is requested, but is not specifically marked, the material will be stamped "Subject to Confidentiality Claim." If part of the material is claimed to be confidential, that portion is marked "Subject to Confidentiality Claim." In compliance with Sections 2.204 and 2.208 of 40 CFR Part 2, the Branch Chief responsible for the requested information reviews the information to determine whether it is likely to be confidential in contrast to being available in the open literature, whether it is emission data, and whether it likely provides its holder with a competitive advantage. If the information is clearly not confidential, the Branch Chief prepares a letter for signature of the Division Director, ESD, to notify the business of this finding. If the information is possibly confidential, the Branch Chief sends a memorandum to inform the OD, ESD, of this finding, gives a brief description of the material (what it is, how many pages, etc.), identifies it with the correct ESD project number, and lists those persons who are authorized to have access to the information. The information and memorandum are hand carried to the OD and placed in the CBI files with the material. A record of who will see the information (Attachment A) is also filed with the folder containing the information. If CBI is received from the owner via an authorized representa-- or a third party, the same procedure is followed, with the addition of clearly identifying the information and its source. By regulation, information for which confidential treatment is requested must be so marked or designated by the submitter. The EPA takes additional measures to ensure that the proprietary designation is uniformly indicated and immediately observable. All unmarked or undesignated information (except as noted below) is freely releasable.

c. Storage of Confidential Business Information

Folders, documents, or material containing CBI (as defined) shall be secured, at a minimum, in a combination-locked cabinet. Normal ESD procedure is to secure this information in a cabinet equipped with a security bar and locked using a four-way, changeable combination padlock. In addition, the entrance door to the CBI storage room is equipped with a changeable combination simplex lock. The locked files are under the control of the OD.

Knowledge of the combinations of the locking devices is limited to the Document Control Officer (DCO) and the minimum number of persons required to effectively maintain normal business operations. Records of the locking device combination are stored elsewhere in conformance with the requirements of the EPA Security Manual.

contractors may be granted access to CBI by the Director, ESD. The following conditions apply when it has been determined that disclosure is necessary:

(1) the contractor designated as a representative and its employees (a) may use such confidential information only for the purpose of carrying out the work required, (b) must refrain from disclosing the information to anyone other than EPA without having received from EPA prior written approval of each affected business or of an EPA legal office, and (c) must return to EPA all copies of the information (and any abstracts or excerpts therefrom) upon request or whenever the information is no longer required for the performance of the work.

(2) The authorized contractor designated as a representative must obtain a written agreement from each of its employees who will have access to the information A copy of each employee agreement (Attachment B) must be furnished to EPA before access is permitted.

(3) The contractor designated as an authorized representative must agree that the conditions in the contract concerning the use and disclosure of CBI are included for the benefit of, and shall be enforceable by, both EPA and any affected business having a proprietary interest in the information.

Information may be released to or accessed by EPA employees other than OAQPS employees only upon approval of the Director, ESD.

Requests for CBI from other Federal agencies, Congress, the Comptroller Gene-- Courts, etc., are processed by the OD, ESD, in accordance with 40 CFR 2, Subpart .

Requests under the Freedom of Information Act are handled in accordance with 40 CFR 2, Subpart A. The ESD Freedom of Information Coordinator must be consulted prior to responding to any request for information if a claim of confidentiality has been asserted or if there is reason to believe that a claim might be made if the business knew release was intended.

e. Use and Disclosure of Confidential Business Information

The CBI as defined may not be used in publications, supporting documents, memoranda, etc., that become a part of the public domain, except as provided for in 40 CFR 2 Subpart B.

The CBI may not be summarized without the approval of the Project Manager responsible for the CBI. Any authorized reproduction shall be provided by the CBI office staff. Further, all authorized reproductions must be introduced into the CBI control system and treated according to the same procedures applicable to the original confidential material.

The EPA generated documents or material, or extracts of information containing CBI, must be stamped "Subject to Confidentiality Claim" and a cover sheet must be attached to identify the material as CBI.

Attachment A

CAA CONFIDENTIAL BUSINESS INFORMATION CONTROL RECORD

DATE RECEIVED:	RESPONSIBLE BRANCH:	CONTROL NUMBER:
DATE OF DOCUMENT:	DOCUMENT AUTHOR:	
DESCRIPTION (PROVIDING ORGANIZATION, TITLE, SUBJECT, NUMBER OF COPIES, NUMBER OF PAGES)		
RETURN DATE:	DESTRUCTION DATE:	INITIALS:

EACH PERSON WHO IS GIVEN ACCESS TO THIS DOCUMENT MUST FILL IN THE INFORMATION BELOW.

CHECK-OUT		CHECK-IN	
SIGNATURE	DATE	SIGNATURE	DATE

DO NOT DETACH

CAA Form 1

Enclosure 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

DESIGNATION OF AUTHORIZED REPRESENTATIVE FOR STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES (SECTION 111) AND SOLID WASTE COMBUSTION (SECTION 129), NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (SECTION 112), AND FEDERAL OZONE MEASURES (SECTION 183)

Under contract 68D10115, Midwest Research Institute (MRI) is hereby designated an Authorized Representative of the Administrator of the United States Environmental Protection Agency for the purpose of assisting in the development of national emission standards for hazardous air pollutants under 42 U.S.C. 7412, standards of performance under 42 U.S.C. 7411, and Federal ozone measures under 42 U.S.C. 7511 (b).

This designation is made pursuant to the Clean Air Act, 42 U.S.C. 7414. The United States Code provides that, upon presentation of this credential, the Authorized Representative named herein: (1) shall have a right of entry to, upon, or through any premises in which an emission source is located or in which records required to be maintained under 42 U.S.C. 7414 (a) (1), are located, and (2) may at reasonable times have access to and copy any records, inspect any monitoring equipment or method required under 42 U.S.C. 7414 (a) (1), and sample any emissions that the owner or operator of such source is required to sample.

Authorized Representatives of the Administrator are subject to the provisions of 42 U.S.C. 7414 (c) respecting confidentiality of methods or processes entitled to protection as trade secrets, as implemented by 40 CFR 2.301 (h) (41 FR 36912, September 1, 1976).

Date: NOV 07 1991

Designation Expires: September 30, 1992

for John S. Seitz
Director
Office of Air Quality Planning
and Standards

Document Control Sheet

Project No.: 460101 (Subtask No.) ____	WP COMMENTS:
Document Name: Brick letter	
CBI: ☐ Yes ☒ No	WP ID No.: 3200
Originator: B. Shrager Ext. 5224	

①

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Route: ____ Instructions/comments: Corrections/revisions & print on EPA letterhead. 2 enclosures included. Keep them w/document.

TJJ

③

Date to WP: 8/3 Due date/time: 8/3 ☐ Flexible ☒ Firm ☐ RUSH WP PROOF ☐ Yes ☐ No	FORMAT ☒ EPA ☐ MRI ☐ Note below ☐ Format only	SPACING ☐ 1 ☐ 1.5 ☐ 2	OUTPUT ☐ Draft ☐ Final ☒ Rainbow ☐ Copies ____ ☐ Scan __ Text __ Figure __ Photo __ Other ☐ Graphics __ General use __ 35 mm slides __ Transparency __ Satellite/other	WP INITIALS REKEYED BY WP ☐

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Route: ____ Instructions/comments: Put in INSERTS A & B as indicated. Label enclosures 1 and 2. (WAM has 3)

WDK

Document Control Sheet (continued)

Project No.: ______________ **(Subtask No.)** _____ | **WP ID No.:** ______________________

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④

Date to WP: ______________

Due date/time: ______________

☐ Flexible
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☐ RUSH

WP PROOF ☐ Yes ☐ No

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☐ MRI	☐ 1.5	☐ Final	__ Text	__ General use	
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⑤

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☐ RUSH

WP PROOF ☐ Yes ☐ No

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☐ MRI	☐ 1.5	☐ Final	__ Text	__ General use	
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Route: **Instructions/comments:** ______________________

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⑥

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WP PROOF ☐ Yes ☐ No

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☐ MRI	☐ 1.5	☐ Final	__ Text	__ General use	
☐ Note below	☐ 2	☐ Rainbow	__ Figure	__ 35 mm slides	REKEYED BY WP ☐
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			__ Other	__ Satellite/other	

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Route: **Instructions/comments:** ______________________

DRAFT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

MAY 19 1995

Mr. Steven Vozzo
North Carolina Department of Environment,
Health, and Natural Resources
3800 Barrett Drive, Suite 101
Raleigh, North Carolina 27609

Dear Mr. Vozzo:

The Emission Factor and Inventory Group of the U. S. Environmental Protection Agency (EPA) is in the process of updating the document *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources* (known more commonly as AP-42). As part of this process, we are now seeking comments on the draft sections that are to be included in the next update of AP-42.

Enclosed is a copy of the revised draft Section 11.3, Brick and Structural Clay Product Manufacturing, and the corresponding background report for the section. We would appreciate your organization reviewing the enclosed draft AP-42 section and background report and sending us your comments. In addition, please feel free to distribute copies of these documents to other interested persons. We would appreciate a response to this request by June 30, 1995.

The emission factors presented in AP-42 generally are based upon results from validated tests or other emission evaluations that are similar to EPA reference test methods. As a result, revisions to the emission factors presented in AP-42 must be supported by equivalent documentation. If you disagree with any emission factors presented in the enclosed AP-42 section or have additional supporting documentation, we would appreciate your providing either a copy of the documentation or information on how we can obtain copies of the supporting documentation. We would also appreciate specific comments on the process description and the process flow diagram presented in the enclosed draft AP-42 section.

We look forward to receiving your comments. If you have questions or need additional time to respond, I can be reached by telephone at (919) 541-5407 or by fax at (919) 541-0684.

Sincerely,

Ronald E. Myers
Emission Factor and Inventory Group
Emissions, Monitoring, and
Analysis Division

2 Enclosures

Document Control Sheet

Project No.: 4602-01 (Subtask No.) 02

Document Name: Brick Transmittal letter

CBI: ☐ Yes ☒ No

Originator: B. Shrager Ext. 5224

WP COMMENTS:

WP ID No.: 4123, 4124

TH5

① Date to WP: 5/18 Due date/time: 5/18

☐ Flexible ☒ Firm ☐ RUSH

WP PROOF ☐ Yes ☐ No

FORMAT: ☐ EPA ☐ MRI ☐ Note below ☐ Format only

SPACING: ☐ 1 ☐ 1.5 ☐ 2

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WP INITIALS lR

REKEYED BY WP ☐

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Route: Instructions/comments: Body of letter in 4602-01 WP ID # 3567

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TH12

② Date to WP: 5/18 Due date/time: 5/19 am

☐ Flexible ☒ Firm ☐ RUSH

WP PROOF ☒ Yes ☐ No

FORMAT: ☐ EPA ☐ MRI ☐ Note below ☐ Format only

SPACING: ☐ 1 ☐ 1.5 ☐ 2

OUTPUT: ☐ Draft ☐ Final ☐ Rainbow ☐ Copies ___ | ☐ Scan ___ Text ___ Figure ___ Photo ___ Other | ☐ Graphics ___ General use ___ 35 mm slides ___ Transparency ___ Satellite/other

WP INITIALS lR

REKEYED BY WP ☐

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Route: Instructions/comments: Couple of changes/corrections

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___ Revisions only
___ Format only
___ Spellcheck only
___ Format & content
___ Total proof
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F6

③ Date to WP: 5/19 Due date/time: 5/19

☐ Flexible ☐ Firm ☐ RUSH

WP PROOF ☐ Yes ☐ No

FORMAT: ☐ EPA ☐ MRI ☐ Note below ☐ Format only

SPACING: ☐ 1 ☐ 1.5 ☐ 2

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REKEYED BY WP ☐

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Route: Instructions/comments: ~~2~~ changes and ~~the~~ Rainbow

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___ Revisions only
___ Format only
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___ Format & content
___ Total proof
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Document Control Sheet (continued)

Project No.: ______________ (Subtask No.) _____	WP ID No.: ______________

4

Date to WP: ______________

Due date/time: ______________

☐ Flexible
☐ Firm
☐ RUSH

WP PROOF ☐ Yes ☐ No

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☐ MRI	☐ 1.5	☐ Final	___ Text	___ General use	REKEYED BY WP ☐
☐ Note below	☐ 2	☐ Rainbow	___ Figure	___ 35 mm slides	
☐ Format only		☐ Copies ____	___ Photo	___ Transparency	
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Route: ______________ Instructions/comments: ______________

5

Date to WP: ______________

Due date/time: ______________

☐ Flexible
☐ Firm
☐ RUSH

WP PROOF ☐ Yes ☐ No

FORMAT	SPACING	OUTPUT			WP INITIALS _____
☐ EPA	☐ 1	☐ Draft	☐ Scan	☐ Graphics	
☐ MRI	☐ 1.5	☐ Final	___ Text	___ General use	REKEYED BY WP ☐
☐ Note below	☐ 2	☐ Rainbow	___ Figure	___ 35 mm slides	
☐ Format only		☐ Copies ____	___ Photo	___ Transparency	
			___ Other	___ Satellite/other	

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Route: ______________ Instructions/comments: ______________

6

Date to WP: ______________

Due date/time: ______________

☐ Flexible
☐ Firm
☐ RUSH

WP PROOF ☐ Yes ☐ No

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☐ MRI	☐ 1.5	☐ Final	___ Text	___ General use	REKEYED BY WP ☐
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Route: ______________ Instructions/comments: ______________

QUICK MEMO

II-C?

401 HARRISON OAKS BOULEVARD, SUITE 350
CARY, NORTH CAROLINA 27513
(919) 677-0249 FAX (919) 677-0065

TO:

Bill Colby
GZA GeoEnvironmental
380 Harvey Road
Manchester, NH 03103

SUBJECT:

Brick AP-42
(Final draft; will be finalized in Feb. '97)

Bill,

Here is a draft of the AP-42 section and background report "Brick and Structural Clay Product Manufacturing". Ron Myers asked me to send you a copy. Please let us know if you have any comments.

Brian Shrager

☐ PLEASE REPLY ☐ NO REPLY NECESSARY

SIGNED

DATE 12/9/96

MRI

MIDWEST RESEARCH INSTITUTE
Suite 350
401 Harrison Oaks Boulevard
Cary, North Carolina 27513-2412
Telephone (919) 677-0249
FAX (919) 677-0065

July 18, 1996

John Hewitt
Interstate Brick
9780 South 5200 West
West Jordan, Utah 84088

Dear Mr. Hewitt,

As you know, the United States Environmental Protection Agency (EPA) is currently in the process of revising AP-42 Section 11.3, Brick and Structural Clay Product Manufacturing. Midwest Research Institute is working under contract (EPA Contract 68-D2-0159) to the Emission Factor and Inventory Group of EPA to revise this and other sections of the AP-42 document. Mr Ron Myers is the Work Assignment Manager and can be contacted at (919) 541-5407. Per your suggestion, I am writing to request emission test data from brick manufacturing operations at Interstate Brick. We are interested in data from your wet scrubber-controlled tunnel kiln, as well as data for any other sources that have been tested for air emissions. If possible, we would like complete test reports. In order to accurately characterize the process, we would appreciate a process description and any information pertaining to the raw material composition and the scrubber design and operating parameters. If you need any more information or have any questions, I can be reached at (919) 677-0249 ext. 5224. Thank you for your help, and I look forward to hearing from you.

Sincerely,

Brian Shrager
Environmental Engineer

EIB - Brick Institute Meeting 3/23/93

Ron Myers	ESD/ISB	(919) 541-5407
RICK MARINSHAW	MIDWEST RESEARCH INST.	(919) 677-0249
Brian Shrager	MIDWEST RESEARCH INSTITUTE	(919) 677-0249
Bill Maxwell	ESD/ISB	(919) 541-5430
DA Brosnan	Clemson Univ.	(803) 656-1094
WALT BANYAS	GENERAL SHALE	(615) 282-4661
Nelson Cooney	Brick Institute of Am.	(703) 620-0010
PETE CIESLAK	BRICK ASSOC. OF NC	(800) 622-7425
John Brown	TSD/EMB	919-541-0200

Brick and Related Clay Manufacturing

Although the test information is still being quality assured, preliminary results of the emission test at Pine Hall Brick indicate that the particulate and PM-10 emission factors are significantly less than the existing AP-42 section presents. The existing section has an emission factor of 76 lb/ton for grinding operations. The total filterable particulate emission from the secondary grinding and screening of the raw materials during the emission test was less than 0.02 lb/ton and PM-10 was 10% of the filterable PM. The primary crusher had emissions of less than $1X10^{-7}$ lb/ton of which about half was PM-10. Emissions were also determined for the brick kiln before and after the sawdust dryer for PM, Fl, CO, NO_X, TOC, methane, ethane, trace metals, volatile organic compounds and semi volatile organic compounds. The emissions factors resulting form the test were approximately as follows:

Pollutant\location	AP-42 EF lb/ton brick	Dryer inlet lb/ton brick	Dryer outlet lb/ton brick
Total Filterable PM	.24	0.3	1.4
Filterable PM-10	.2	.2	.26
Condensible PM		.28	.05
Carbon Monoxide	-	2.5	2.5
Nitrogen Dioxide	-	0.4	0.4
Total Hydrocarbons	-	0.04	0.2
Phenol		$1 X 10^{-4}$	$<1 X 10^{-4}$
Chloromethane		$7 X 10^{-4}$	$7 X 10^{-4}$
Fluorides	1.0	0.03 - 0.47	0.19
Manganese		0.01	0.005

Chloromethane, Manganese and Phenol are the only trace HAP's shown because other HAP's of the same type were emitted at a lower amount. The existing AP-42 section only has an emission factor of 0.24 lb/ton for total filterable particulate for a wood fired kiln. Because this test included emission following a sawdust dryer some of the emission factors from this emission test may also be able to be used for the wood products industry chapter.

March 23, 1993 Meeting with Brick Association

1. Results of Pine Hall Test
Method 13 not as good as Method 26.
Method 13 numbers will change from draft final report.
Inlet numbers highly variable. (M13)

update on raw material fluoride data - Denis Brosnan
— Data not fully understood yet.
— Publish test report without this data

Ron — AP-42 revised in October time frame.
Additional test - when?
where: possibly Merion, Va. → General Shale? Grinding room w/ bag house, concrete floor.
Kiln - 80 hr retention, mist area at end.
Coal fired. 3/4 % sulfur. Cleaned coal.

ACME Plant in Texas - not a typical raw material - higher moisture contents.
Gas fired w/scrubber on Kiln.
Recommend a plant in Ohio. Beldin?

Discussion of FTIR Method. → Can it replace M26, 26A? Can measure 100-130 of 189 HAPs. 30K-40K per test.

Ceramics? What will happen w/this section. Need info. on clay products.

Ron - Explained data gathering efforts @ State + local agencies.

Bill Maxwell - ISB most interested in Coal Fired plant - metals, combustion products.

Brick Assoc. interested in which contractors do FTIR

State (NC?) set March 31 deadline for permit(?)

Whitewares are produced using ~~[illegible]~~ drier material. (Tubs, toilets, tile)

Interstate Brick in UTAH? is the largest tile produced.

Pete + Dennis will review test report within 2 weeks.

Pollutants for next test

Metals, PM, PM-10, Fluorides, CO, NOx, Hydro (25A)

Suggest a general shale test.

October 14, 1993
BRICK TEST
MEETING NOTES

Questions/followup on test plan

1. Per John Hosenfeld, should be using "standard" SVOST train (not MRI variation) if looking for PNA's; use of standard train is normal MRI protocol in this case.
Action: need to assure staff know to use the standard train; revise final sspt after receiving any EPA comments.

2. Confirm that HCL/F train can be done in conjunction with Particulate; does BIF Method 0050 state one way or the other?

3. Figure 4-6: Clarify that the 1 inch plank is on top of (in addition to) the scaffolding floor; and that 5 planks are needed (one for each port)

4. Figure 4-6 and 4-7 still have a discrepancy between height shown from probe to scaffold; 13 versus 14 inches; I expect this is due to the 1" plank, but it is likely unclear to the person who will be building scaffolding. May want to just go with 14 " and ask facility to provide five 1x10's x 12's.

5. Table 7-1 Emission data format; needs to be revised and beefed up (NCO)

*** 6. CEMS measurements; Don't we also also need flow rates during these periods so concentrations can be converted to lb/hr ??? Are we making plans for this?? Do we need CO2 or O2 via CEMS measurements for diluent correction (as a check)

7. Table 9-1 needs modification:

-- PM/HCL/F train not listed
-- Dryer CEMS needs to be moved to Nov. 8 in order to stay on schedule

8. NOTE: Kiln operates continuously...so can't kiln testing go past Friday at noon if necessary??? or do they stop processing brick through kilnafter noon on Friday ???

Action items:

1. Follow up with plant on modifications (referring to test plan). Clearly specify which kiln stack (Kiln 3??) and dryer stack; review scaffold modifications; electrical requirements, and emphasize need for Sunday set-up; other??? (Miro)

2. Resolve /follow up on points noted above

3. Follow up with Ron re his review of test plan (Rick M.)

4. Metals budget and decision (Neulicht)

5. Vost budget and decision (Neulicht)

6. Specific staff asssignment and schedule (Miro)

7. List of sample fractions (i.e., lable #'s) (Miro)

8. Analytical request memo (Rick)

9. Contact site regarding schedule and modifications (Miro)

10. All normal test prep, including coordination re Ambient PM (Miro)

11. Confirm with plant how gas usage is measured (Rick M.)

NEXT MEETING:

Distribution

R Marinshaw
R. Neulicht
~~B. Shrager~~
Miro
April Carender
John Hosenfeld
J. Surman

7/26 MEETING w/BRICK ASSOCIATION

ADOPT a MACT Program
- Can get states to develop MACT standard. (if 1-5 states have most of plants)

AP-42 WORK
Testing Complete
Pine Hall Test Report Complete
General Shale → DRAFT
Section has not been updated (except Grinding Room)
Want to get enough data to do uncertainty analysis

Discussed new introduction to AP-42 and handed out

Time is critical because of State permitting. Brick industry committed to getting finished as quickly as possible.

Current PM numbers make most plants major sources.
Pine Hall factor

- Need to know about raw material in all regions. (Belden Material much drier than Pine Hall and General Shale)

- May be willing to provide coded test reports.
- Discussed CBI

Afternoon

- Would like as much industry participation as industry wants to provide.
- Concern about arsenic emissions.... does emission factor include arsenic in sawdust PM.
- Mass Balance Method - Dr. Brosnan

Note for AP-42 Section * would like to see a footnote in AP-42 stating that mass balance is preferable to the EF for a specific plant.

[illegible]

Brick Association Meeting July 29 1994

Ron Myers	EPA/TSD	(919) 541-5407
PETER CIESLAK	BRICK ASSOC NC	(910) 273-5566
Jim Southerland	EPA/TSD/EIB	919-541-5523
DENIS BROSNAN	CLEMSON U.	803-656-0603
Donald Grigg	Cherokee Sanford Group	(919) 774-5330
Nelson Cooney	Brick Inst. of Am	(703) 620-0010
Walt Banyac	General Shale	615 282-4661
BRIAN SHRAGER	MRI	(919) 677-0249
RICK MARINSHAW	MRI	(919) 677-0249
John Brown	EMB	
Ed Mc	EMB	

CONTACT REPORT--MRI Project No. 4602-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: October 3, 1994

Contacted by: Telephone

Company/Agency: Brick Institute of America

Telephone Number: (703) 620-0010

Person(s) Contacted/Title(s)

Nelson Cooney

CONTACT SUMMARY: Mr. Cooney was contacted to check on the status of the request for additional test data for brick manufacturing facilities made to the Brick Institute by EPA on July 26, 1994. Mr. Cooney stated that following a meeting (of the emission factor task force?) that took place a couple of weeks ago, they have decided to send out a letter to member companies requesting test data (particularly grinding room PM data) from member companies. This letter should go out next Monday, and they expect responses within two to three weeks. He suggested that we should wait to draft the AP-42 section until we receive the additional data that they are expecting.

CONTACT REPORT--MRI Project No. 4602-01

From: Brian Shrager, Environmental Engineering Department

Date of Contact: October 10, 1994

Contacted by: Telephone

Company/Agency: General Shale Products Corporation
Post Office Box 3547
Johnson City, TN

Telephone Number: (615) 282-4661

Person(s) Contacted/Title(s)

Dave McNees

CONTACT SUMMARY: Mr. McNees returned my call from the previous week and provided information requested by MRI regarding the burned brick weights for several different bricks produced at several General Shale facilities. The facility names, test dates, and burned brick weights are as follows:

Marion, VA kiln #6 (1990)--3.0 lb
Marion, VA kiln #28 (1990)--3.9 lb
Glascow, VA (1990)--4.2 lb
Mooresville, IN (1986)--3.8 lb
Knoxville, TN (1986)--3.85 lb
Kingsport, TN (queen size brick, 1983)--3.6 lb
Kingsport, TN (standard size brick, 1983)--3.6 lb