RESPONSE TO COMMENTS
AP42 SECTION 11.19.2 CRUSHED STONE PROCESSING AND PULVERIZED MINERAL PROCESSING

NOTICE

The information in this document has been funded by the National Stone, Sand and Gravel Association (NSSGA) for the U.S. Environmental Protection Agency (EPA). It has been reviewed by the EPA Office of Air Quality Planning and Standards and has been approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

BACKGROUND

In June 2003, EPA provided an updated version of AP42 Section 11.19.2 on the ttn website. The previous update of this section was published in January 1995. The update to Section 11.19.2 was requested by the National Stone, Sand and Gravel Association (NSSGA) because (1) NSSGA member companies were being asked by some state and local agencies to provide estimates of $PM_{2.5}$ emissions, (2) no $PM_{2.5}$ emission factors were available in the January 1995 edition, and (3) EPA had not had the time or resources available to incorporate $PM_{2.5}$ emission factor data submitted by NSSGA in 1996. NSSGA also proposed to increase the scope of Section 11.19.2 by the inclusion of emission factors for pulverized mineral processing operations. Pulverized mineral processing operations share the same extractive, crushing, and screening processing operation with crushed stone plants. Pulverized mineral operations continue to process the material to produce materials having an extremely small particle size distribution. The additional size reduction is achieved using a variety of grinding mills, classifiers, and dryers to produce materials having a very small particle size distribution. These plants are also being asked by regulatory agencies to supply emission estimates, and the previous editions of AP42 have not addressed these process operations.

Due to limited resources, EPA requested that NSSGA provide the draft update to Section 11.19.2 and the associated Background Document. Both of these documents were reviewed by EPA. The draft updated AP42 Section 11.19.2 was posted on the ttn website under the CHIEF heading in June 2003. At the request of the agency reviewers, EPA extended the submittal date for comments on the draft materials from September 30, 2003 to December 31, 2003. EPA reviewed four comments on this material. All of these comments addressed draft Section 11.19.2. None of the comments addressed the Background Document for Section 11.19.2.

Each of the comments received by EPA has been used to modify and finalize Section 11.19.2. This document summarizes the response to each of the comments and the revisions made to the draft material based on these comments. Each of the submittals received by EPA has been reproduced in the section below. For submittals that were lengthy and involved multiple issues, the comments have been divided into several sub-sections to allow for a summary of the response and the changes to the draft AP42 materials close to the point of the specific comment.

SUBMITTAL 1

Mr. Chuck E. Studer
Spokane County Air Pollution Control Authority (SCAPCA)
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SCPACA Comment 1.1 - Discrepancy in the Some SCC Codes

"There seems to be some discrepancy on the SCC codes in Tables 11.19.2-1 & 11.19.2-2. The SCC code for primary crushing in the past and in the table under primary crushing (controlled) is 3-05-020-01; however, that SCC code has been assigned to controlled screening in the table. If you look further down in the table, the same code is assigned to controlled primary crushing. Uncontrolled screening is given the same code as uncontrolled and tertiary crushing. Controlled secondary and fines crushing have been given the same code as controlled tertiary crushing (3-05-020-03). Also the controlled fines crushing code should, I believe, be 3-05-020-05, instead of 3-05-020-03. The table below (*note: modified from email text message format)* reflects how I think the SCC Codes should be."

Table 1 Summary of SCC Code Comments, Submittal 1
(Reformatted from email text file)

Source	Comment	Code Listed in the June 2003 Draft	Correct Code
Primary Crushing	Incorrect	3-05-020-02	3-05-020-01
Primary Crushing Controlled	Correct	3-05-020-01	3-05-020-01
Secondary Crushing	Correct	3-05-020-02	3-05-020-02
Secondary Crushing Controlled	Incorrect	3-05-020-03	3-05-020-02
Tertiary Crushing	Correct	3-05-020-03	3-05-020-03
Tertiary Crushing Controlled	Correct	3-05-020-03	3-05-020-03
Fines Crushing	Correct	3-05-020-05	3-05-020-05
Fines Crushing - Controlled	Incorrect	3-05-020-03	3-05-020-05
Screening	Correct	3-05-020-02-03	3-05-020-02-03
Screening Controlled	Incorrect	3-05-020-01	3-05-020-02-03
Conveyor Transfer Point	Correct	3-05-020-06	3-05-020-06
Conveyor Transfer Point-Controlled	Incorrect	3-04-020-06	3-05-020-06
Wet Drilling - Unfragmented Stone	Correct	3-05-020-10	3-05-020-10
Fines Screening	Correct	3-05-020-21	3-05-020-21
Fines Screening Controlled	Correct	3-05-020-21	3-05-020-21
Truck loading Unfragmented Stone	Correct	3-05-020-31	3-05-020-31
Truck Loading - Conveyor Crushed Stone	Correct	3-05-020-32	3-05-020-32

Response to Comment 1.1

EPA agrees with the revised SCC codes listed in this submittal. The SCC codes have been revised in AP42 Section 11.19.2 and in the Background Document for Section 11.19.2.

SCPACA Comment 1.2 - Arrangement of Listings in Tables 11.19.2-1 and 11.19.2-2.

"Also, it would be easier to find the correct emission factor if the table kept all sources with the same SCC together."

Response to Comment 1.2

The order of listings in Tables 11.19.2-1 and 11.19.2.2 was kept the same as the Fifth Edition of AP42, Section 11.19.2. However, EPA agrees that the emission factors for all sources with a common SCC code should be listed side-by-side. These changes have been included in the revised Section 11.19.2.

SCPACA Comment 1.3 - Table Format

"Column #5 should be expanded so that the "N" in EMISSION could be on the same line as the rest of the word."

Response to Comment 1.3

This change has been made.

SCPACA Comment 1.4 - Use of Emission Factors in Fire 6.23

"Also emission factors for primary, secondary, and tertiary crushers are given in FIRE 6.23. Why not use the more conservative of the two, since the quality ratings are generally the same?"

Response to Comment 1.4

The emission factors provided in FIRE 6.23 for primary, secondary, and tertiary crushing operations are derived directly from the emission factors in AP42 11.19.2. The factors in FIRE 6.23 should be updated to be consistent with those in the latest edition of Section 11.19.2. AP42 and FIRE are not intended to be alternative information sources. They are complimentary data sets based on the same underlying emission factor database. Note: Since this comment was written, EPA has issued FIRE 6.24. For the reasons discussed above, the new emission factors are not in FIRE 6.24. EPA anticipates that FIRE 6.25 will be available in October 2004. FIRE 6.25 will have the new emission factors.

SUBMITTAL 2

Mr. Roger Westman
ALAPCO Chair
Emissions and Modeling Committee
and
Mr. Herb Williams
STAPPA Chair
Emissions and Modeling Committee

STAPPA-ALAPCO Comment 2.1. Site Specific Data are Preferred Over AP42 Emission Factors

"STAPPA and ALAPCO commend EPA's continuing commitment to keep the AP-42 for stone crushing current. We agree that EPA should periodically update all AP-42 sections. We note, however, that we share EPA's opinion that use of the most accurate data available is always preferred and that emission factors should only be used when more accurate data is unavailable. In fact, EPA states in its *Introduction to Emission Factors* that "data from source-specific emission tests or continuous emission monitors are usually preferred for estimating a source's emissions because those data provide the best representation of the tested source's emissions." Further, *Figure 1* in the *Introduction* presents a hierarchical scheme from highest to lowest data quality in the following order: Continuous Emission Monitoring (CEM), Parametric Source Tests, Single Source Tests, Material Balance, AP-42 Emission Factors, and Engineering Judgment. EPA's *Introduction* concludes, "When such information [as source-specific data or data from equipment vendors] is not available, use of emission factors may be necessary as a last resort."

The revised AP-42 Emission Factors for Crushed Stone Processing should, therefore, be viewed in this context as a last resort method of estimating pollutants attributable to crushed stone processing. Many of the revisions to the PM_{10} and $PM_{2.5}$ emission factors are generated from mathematical extrapolation methods. With one exception, there is no new test data. Utilization of the old Method 5 data or other EPA approved test methods that generated information for the previous AP-42 versions in 1994 and 1995 are probably more acceptable in the EPA hierarchical scheme than the extrapolated information presented in certain sections of Section 11.19.2."

Response to Comment 2.1

The Fifth Edition of AP42 Section 11.19.2 used a factor of 2.1[1] to calculate total suspended particulate matter (TSP) factors based on the PM_{10} emission factors measured in accordance with EPA reference test methods. EPA requested the extrapolation method to replace the 2.1 factor and provide more flexibility to agencies having different definitions for TSP.

[1] The 2.1 factor was presented in footnote "c" in Tables 11.19.2-1 and 11.19.2-2 of the January 1995 edition of AP42 Section 11.19.2.

EPA believes that the extrapolation method provides a reasonable means to estimate TSP emissions from crushed stone processes. In most source categories, the estimated TSP emissions (defined in different ways, but usually as equal to or less than 100 micrometers) are equal to or slightly higher than those estimated using the 2.1 factor.

EPA agrees that it would be preferable to have either (1) site specific TSP emissions data or (2) a database of TSP emission factors obtained from a set of similar operating facilities. Unfortunately, very little TSP emissions data are available concerning fugitive emissions from the sources addressed in AP42 Section 11.19.2. It is unlikely that many tests for TSP will be conducted in the future on these sources because (1) TSP has been delisted as a regulated air pollutant since 1987, (2) TSP is addressed only as a nuisance pollutant, and (3) limited resources will be devoted in the future to tests for $PM_{2.5}$ and $PM_{10-2.5}$ particulate matter.

STAPPA-ALAPCO Comment 2.2 - Decreases from 1994 Emission Factors Not Explained

"Figures 1-3 in this letter compare the emission factors for the last three versions of Section 11.19.2 for Crushed Stone Processing (July 1994, January 1995, August 2003) for Total Suspended Particulate, PM_{10}, and $PM_{2.5}$. The table demonstrates that Total Suspended Particulate and PM_{10} emission factors dropped significantly in value from July 1994 to August 2003. We are aware of no changes in the activity of crushed stone processing that would explain this decrease in emissions and it is the opinion of STAPPA and ALAPCO that an explanation should be required by EPA."

Figure 1. Emission Factor Comparison, Total Particulate Matter

Process	SCC	Section 11.19.2 Total Particulate Matter Pounds per ton						Percent Change	
		AP42 7/94	EMF Rating	AP42 1/95	EMF Rating	AP42 8/03	EMF Rating	7/94 to 8/03	1/95 to 8/03
Screening (uncontrolled)	3-05-020-02,03	0.15	E	ND	N/A	0.025	E	-83%	100%
Screening (controlled)	3-05-020-03,03	0.0085	E	ND	N/A	0.0021	E	-75%	100%
Primary crushing	3-05-020-01	0.0007	E	0.0007	E	ND	N/A	-100%	-100%
Secondary crushing	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Tertiary crushing	3-05-020-03	0.036	E	ND	N/A	0.0054	E	-85%	100%
Primary crushing (controlled)	3-05-020-01	ND	N/A	ND	N/A	ND	N/A	ND	ND
Secondary crushing (controlled)	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Tertiary crushing (controlled)	3-05-020-03	0.0016	E	ND	N/A	0.0012	E	-25%	100%
Fines crushing	3-05-202-05	0.72	E	ND	N/A	0.039	E	-95%	100%
Fines crushing (controlled)	3-05-020-05	0.13	E	ND	N/A	0.0036	E	-97%	100%
Fines screening	3-05-020-21	0.3	E	ND	N/A	0.3	E	0%	100%
Fines screening (controlled)	3-05-020-21	0.0036	E	ND	N/A	0.0036	E	0%	100%
Conveyer transfer point	3-05-020-06	0.026	E	ND	N/A	0.0029	E	-89%	100%
Conveyer transfer point (controlled)	3-05-020-06	0.00014	E	ND	N/A	0.00013	E	-7%	100%
Wet drilling: unfragmented stone	3-05-020-10	ND	N/A	ND	N/A	ND	N/A	ND	ND
Truck unloading: fragmented stone	3-05-020-31	ND	N/A	ND	N/A	ND	N/A	ND	ND
Truck loading conveyor crushed stone	3-05-020-32	ND	N/A	ND	N/A	ND	N/A	ND	ND

Figure 2. Emission Factor Comparison, PM_{10}

Process	SCC	Section 11.19.2 PM_{10} Pounds per ton						Percent Change	
		AP42 7/94	794 to 8/03	AP42 1/95	EMF Rating	AP42 8/03	EMF Rating	7/94 to 8/03	7/95 to 8/03
Screening (uncontrolled)	3-05-020-02	0.015	C	0.015	C	0.0087	C	-42%	-42%
Screening (controlled)	3-05-020-02	0.00084	C	0.00084	C	0.00073	C	-13%	-13%
Primary crushing	3-05-020-01	ND	N/A	ND	N/A	ND	N/A	ND	N/A
Secondary crushing	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Tertiary crushing	3-05-020-03	0.0024	C	0.0024	C	0.0024	C	0%	0%
Primary crushing (controlled)	3-05-020-01	ND	N/A	ND	N/A	ND	N/A	ND	ND
Secondary crushing (controlled)	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Tertiary crushing (controlled)	3-05-020-03	0.00059	C	0.00059	C	0.00054	C	-8%	-8%
Fines crushing	3-05-202-05	0.015	E	0.015	E	0.015	E	0%	0%
Fines crushing (controlled)	3-05-020-05	0.002	E	0.0021	E	0.0021	E	5%	0%
Fines screening	3-05-020-21	0.071	E	0.071	E	0.071	E	0%	0%
Fines screening (controlled)	3-05-020-21	0.0021	E	0.0021	E	0.0021	E	0%	0%
Conveyer transfer point	3-05-020-06	0.0014	D	0.0014	D	0.0011	D	-21%	-21%
Conveyer transfer point (controlled)	3-05-020-06	0.000048	D	0.00048	D	4.5E-05	D	-6%	-6%
Wet drilling: unfragmented stone	3-05-020-10	0.00008	E	0.00008	E	8.0E-05	E	0%	0%
Truck unloading: fragmented stone	3-05-020-31	0.000016	E	0.000016	E	1.6E-06	E	-90%	-90%
Truck loading conveyor crushed stone	3-05-020-32	0.0001	E	0.0001	E	0.0001	E	0%	0%

Figure 3. Emission Factor Comparison, $PM_{2.5}$

Process	SCC	Section 11.19.2-$PM_{2.5}$ Pounds per ton						Percent Change	
		AP42 7/94	EMF Rating	AP42 1/95	EMF Rating	AP42 8/03	EMF Rating	7/94 to 8/03	1/95 to 8/03
Screening (uncontrolled)	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Screening (controlled)	3-05-020-02	ND	N/A	ND	N/A	0.00005	E	100%	100%
Primary crushing	3-05-020-01	ND	N/A	ND	N/A	ND	N/A	ND	ND
Secondary crushing	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Tertiary crushing	3-05-020-03	ND	N/A	ND	N/A	ND	N/A	ND	ND
Primary crushing (controlled)	3-05-020-01	ND	N/A	ND	N/A	ND	N/A	ND	ND
Secondary crushing (controlled)	3-05-020-02	ND	N/A	ND	N/A	ND	N/A	ND	ND
Tertiary crushing (controlled)	3-05-020-03	ND	N/A	ND	N/A	0.0001	E	100%	100%
Fines crushing	3-05-202-05	ND	N/A	ND	N/A	ND	N/A	ND	ND
Fines crushing (controlled)	3-05-020-05	ND	N/A	ND	N/A	ND	N/A	ND	ND
Fines screening	3-05-020-21	ND	N/A	ND	N/A	ND	N/A	ND	ND
Fines screening (controlled)	3-05-020-21	ND	N/A	ND	N/A	ND	N/A	ND	ND
Conveyer transfer point	3-05-020-06	ND	N/A	ND	N/A	ND	N/A	ND	ND
Conveyer transfer point (controlled)	3-05-020-06	ND	N/A	ND	N/A	1.5E-05	E	100%	100%
Wet drilling: unfragmented stone	3-05-020-10	ND	N/A	ND	N/A	ND	N/A	ND	ND
Truck unloading: fragmented stone	3-05-020-31	ND	N/A	ND	N/A	ND	N/A	ND	ND
Truck loading conveyor crushed stone	3-05-020-32	ND	N/A	ND	N/A	ND	N/A	ND	ND

"We note that $PM_{2.5}$ data was not available for July 1994 and January 1995 but was available for some nonmetallic mining processes in the August 2003 version. Although the data is therefore limited, it, too, dropped significantly for reasons that are unexplained in the AP-42."

Response to Comment 2.2

EPA agrees that changes in AP42 emission factors should be explained. In fact, EPA and their contractors who have prepared AP42 Section 11.19.2 and its predecessor sections have made a conscientious effort to include a full description of the technical basis for the emission factors and a summary of any major changes in the factors. The June 2003 draft Background Document for Section 11.19.2 continues to include comments concerning references that are no longer used for calculating emission factors (subsections "I" through "N").

Below is provided additional information concerning the changes since 1994. These will be addressed starting with $PM_{2.5}$, then PM_{10}, and finally total particulate matter. This is an appropriate approach because the discussion needed for total particulate matter is more detailed than that required for $PM_{2.5}$ and PM_{10}.

$PM_{2.5}$ Changes

The June 2003 draft Section 11.19.2 is the first version of this section to include $PM_{2.5}$ emission factors. Since there were no $PM_{2.5}$ emission factors available previously, the emission factors provided in the latest draft of Section 11.19.2 have not "dropped."

In reviewing the new $PM_{2.5}$ emission factors, it is helpful to review the ratio between the $PM_{2.5}$ and PM_{10} factors for the four types of process sources for which $PM_{2.5}$ emission factor data are available. These ratios are consistent with other material concerning the ratios between $PM_{2.5}$ and PM_{10} in fugitive dust emissions discussed in the Fourth External Draft of the Particulate Matter Criteria Document (June 2003).

PM_{10} Changes

The changes from the 1994 draft Section 11.19.2 to the June 2003 draft edition are due to two factors: (1) a typographical error in the truck unloading factor shown in the June 2003 edition and (2) the inclusion of additional tests for four processing operations.

The truck unloading factor was shown as 1.0×10^{-5} pound per ton instead of the correct figure of 1.0×10^{-6} pounds per ton. This has been corrected. There has been no change in this emission factor.

The relatively small changes in the PM_{10} emission factors for tertiary crushing, fines crushing, screening, and conveyor transfer points are due to the inclusion of tests conducted using EPA Method Preliminary-4 (adapted from Method 201A). These tests are described under the paragraph labeled as reference 8 in the Background Document for Section 11.19.2

Total Particulate Matter Changes

The changes in the total particulate matter emission factors from 1994 to June 2003 are due to EPA's adoption of a 2.1 multiplier to calculate the total particulate matter emissions from the equivalent PM_{10} emission factors. This change was appropriate because by 1995, a relatively large number of PM_{10} emission factor tests had been completed. All of the PM_{10} data were obtained using EPA reference methods. EPA emission testing specialists reviewed the test protocols prior to the tests, observed most of the tests, and reviewed the final test reports. The quality and scope of the PM_{10} data were considerably better than the very limited total particulate matter data.

In addition to the question concerning the changes in AP42 Section 11.19.2 since July 1994, EPA is aware that there have been some questions concerning the changes in emission factors from 1985 to 1994. Information provided in Attachment A addresses these additional questions.

STAPPA-ALAPCO Comment 2.3. - EPA-Supplied Reference Information for AP-42 Section 11.19.2

"EPA furnished 33 reference documents in "pdf" format to STAPPA and ALAPCO. These documents are listed in Table 1. Some of these references have been grayed out. Our comments only concern the references that remain in a white background. Of the 33 documents, 17 were not considered for review for the reasons given below:

- Seven documents focused on practices that have little or no relevance to usual industry practices. Three documents contained testing from baghouse stacks. Baghouses have never been common in the industry and most crushing spreads use a water suppression system to reduce dust emissions. We therefore viewed these tests as unrepresentative and did not consider them in the review. Four additional documents contained information regarding flash dryers, which are not present in nonmetallic mining pertaining to rock crushing.

- One document supplied information on stone crushing that utilizes a different process and different equipment from that generally used in stone crushing operations. The information in this report appeared to have no direct correlation to rock crushing.

- Nine documents were duplicates.

Table 1-List of EPA Documents (STAPPA-ALAPCO, Submittal 2)

This letter reference number	EPA Electronic Document	EPA Document Name	Date	Author	Applicable to Nonmetallic Mining?
1	c11s1902 draft_#1.pdf	A Report of Particulate Source Sampling Performed for Franklin Industrial Minerals in Sherwood, Tennessee	August 9, 1994	Frank Ward and Company	No. Test report for a baghouse system.
2	c11s1902 draft_#2.pdf	Performance Test Report Baghouse BH-570 Limestone System at Franklin Industrial Minerals at Alabaster, Alabama	May 2000	Advanced Industrial Resources, LLC	No. Test report for a baghouse system
3	c11s1902	Performance Test Report of Baghouse No.	November 1999	Advanced Industrial	No. Test report for a

	draft_#3.pdf	37 at Franklin Industrial Minerals at Dalton, Georgia		Resources, LLC	baghouse system.
4	c11s1902 draft_#4.pdf	Compliance Test Programs for Particulate Emissions from Flash Dryer #3 for Omya, Inc., Proctor, Vermont	October 27, 2000	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities.
5	c11s1902 draft_#5.pdf	Compliance Test Programs for Particulate Emissions from Flash Dryer #3 for Omya, Inc., Proctor, Vermont	January 24, 2001	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities.
6	c11s1902 draft_#6.pdf	Source Emission Compliance Test for Non-metallic Mineral Processing Plant for Omya, Inc., Proctor, Vermont	April 17, 1998	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities.
7	c11s1902 draft_#7.pdf	Source Emission Compliance Test for Non-metallic Mineral Processing Plant for Omya, Inc., Proctor, Vermont	July 14, 1997	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities.
8	c11s1902 draft_#8.pdf	Measurement of PM10 and PM2.5 Emission Factors at a Stone Crushing Plant, Vulcan Materials Company, Pineville, North Carolina	December 1996	Air Control Techniques, P.C.	Yes. Tests sponsored by National Stone Association.
9	c11s1902 draft_#9.pdf	PM10/PM2.5 Emission Factor Testing for the Pulverized Mineral Division of the National Stone Sand and Gravel Association	October 2001	Air Control Techniques, P.C.	No. Tests conducted for pulverized stone and not stone crushing. The equipment for pulverized stone is much different than the equipment used for stone crushing.
10	ref_01c11s1902 _1995.pdf	Air Pollution Control Techniques for Non-metallic Minerals Industry	August 1981	US EPA Emissions and Standards Division	Yes.
11	ref_03c11s1902 _1995.pdf	Emissions from the Crushed Granite Industry: State of the Art	February 1978	USEPA Office of Research and Development, EPA-600/2-78-021	Yes
12	ref_04c11s1902 _1995.pdf	Source Assessment: Crushed Stone	May 1978	USEPA Office of Research and Development, EPA-600/2-78-004L	Yes
13	ref_05c11s1902 _1995.pdf	Particulate Emission Factors for the Construction Aggregate Industry	January 1983	GCA Corporation subcontracted by USEPA-Air Management Technology Branch	Yes
14	ref_06c11s1902 _1995.pdf	Review Emissions Data Base and Develop Emission Factors for the Construction Aggregate Industry	September 1984	Engineering Science prepared for the Construction Aggregate Industries Steering Committee	Yes
15	ref_07c11s1902 _1995.pdf	Development of Emission Factors for Fugitive Dust Sources	June 1974	Midwest Research Institute for USEPA, EPA-450/3-74-037	Yes

Table 2-List of EPA Documents (STAPPA-ALAPCO Submittal, Continued)

This letter reference number	EPA Electronic Document	EPA Document Name	Date	Author	Applicable to Nonmetallic Mining?
16	ref_08c11s1902 _1995.pdf	Fugitive Emissions from Integrated Iron and Steel Plants	March 1978	Midwest Research Institute for USEPA, EPA-600/2-78-050	Yes. Parking lots from paved and unpaved roads.
17	ref_09c11s1902 _1995.pdf	PM10 Emission Factors for a Stone Crushing Plant Deister Vibrating Screen at Martin Marietta in Raleigh-Durham, North	June 1992	Entropy Environmentalists, Inc. for USEPA-Emission	Yes

		Carolina		Measurement Branch	
18	ref_10c11s1902_1995.pdf	PM10 Emission Factors for a Stone Crushing Plant Tertiary Crusher at Martin Marietta in Garner, North Carolina	February 17, 1992	Entropy Environmentalists, Inc. for USEPA-Emission Measurement Branch	Yes
19	ref_11c11s1902_1995.pdf	PM10 Emission Factors for a Stone Crushing Plant Deister Vibrating Screen and Crusher	December 1992	Entropy Environmentalists, Inc. for National Stone Association	Yes
20	ref_12c11s1902_1995.pdf	PM10 Emission Factors for a Stone Crushing Plant Tertiary Crusher and Vibrating Screen	December 1992	Entropy Environmentalists, Inc. for Science Applications International Corporation	Yes
21	ref_13c11s1902_1995.pdf	PM10 Emission Factors for Two Transfer Points at a Granite Stone Crushing Plant	January 1994	Entropy Inc. for USEPA-Emission Measurement Branch	Yes
22	ref_14c11s1902_1995.pdf	PM10 Emission Factors for a Stone Crushing Plant Transfer Point	April 1993	Entropy Environmentalists, Inc. for National Stone Association	Yes
23	ref_15c11s1902_1995.pdf	PM10 Emission Factors for a Limestone Crushing Plant Vibrating Screen and Crusher for Bristol, Tennessee	July 19, 1993	Entropy Environmentalists, Inc. for USEPA-Emission Measurement Branch	Yes
24	ref_16c11s1902_1995.pdf	PM10 Emission Factors for a Limestone Crushing Plant Vibrating Screen and Crusher for Maryville, Tennessee	July 19, 1993	Entropy Environmentalists, Inc. for USEPA-Emission Measurement Branch	Yes
25	ref_15db11s1902_june2003.pdf	Measurement of PM10 and PM2.5 Emission Factors at a Stone Crushing Plant, Vulcan Materials Company, Pineville, North Carolina	December 1996	Air Control Techniques, P.C for National Stone Association	Yes. Duplicate with Reference 8
26	ref_16db11s1902_june2003.pdf	PM10/PM2.5 Emission Factor Testing for the Pulverized Mineral Division of the National Stone Sand and Gravel Association	October 2001	Air Control Techniques, P.C.	No. Tests conducted for pulverized stone and not stone crushing. The equipment for pulverized stone is much different than the equipment used for stone crushing.
27	ref_17db11s1902_june2003.pdf	A Report of Particulate Source Sampling Performed for Franklin Industrial Minerals Located in Sherwood, Tennessee	August 9, 1994	Frank Ward and Company	See Reference 1.
28	ref_18db11s1902_june2003.pdf	Performance Test Report of Baghouse No. 37 at Franklin Industrial Minerals at Dalton, Georgia	November 1999	Advanced Industrial Resources, LLC	No. Test report for a baghouse system. See Reference 3.
29	ref_19db11s1902_june2003.pdf	Performance Test Report Baghouse BH-570 Limestone System at Franklin Industrial Minerals at Alabaster, Alabama	May 2000	Advanced Industrial Resources, LLC	No. Test report for a baghouse system. See Reference 2.

Table 3-List of EPA Documents (STAPPA-ALAPCO Submittal, Continued)

This letter reference number	EPA Electronic Document	EPA Document Name	Date	Author	Applicable to Nonmetallic Mining?
30	ref_20db11s1902_june2003.pdf	Source Emission Compliance Test for Non-metallic Mineral Processing Plant for Omya, Inc., Proctor, Vermont	July 14, 1997	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities See Reference 7.

31	ref_21db11s1902_june2003.pdf	Source Emission Compliance Test for Non-metallic Mineral Processing Plant for Omya, Inc., Proctor, Vermont	April 17, 1998	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities See Reference 6.
32	ref_22db11s1902_june2003.pdf	Compliance Test Programs for Particulate Emissions from Flash Dryer #3 for Omya, Inc., Proctor, Vermont	January 24, 2001	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities. See Reference 5.
33	ref_23db11s1902_june2003.pdf	Compliance Test Programs for Particulate Emissions from Flash Dryer #3 for Omya, Inc., Proctor, Vermont	October 27, 2000	Air Quality Technical Services, Inc.	No. Flash dryers not applicable / typical to aggregate crushing facilities. See Reference 4.

Of the 16 remaining documents, nine documents contained testing information (References 8, 17, 18, 19, 20, 21, 22, 23, 24) and seven documents were either EPA guidance or summary documents (References 10-16). Reference 31, *Fugitive Emissions from Integrated Iron and Steel Plants*, does not appear to pertain to nonmetallic mining and our comments do not address it.

Response to Comment 2.3 (four separate questions/issues)

Response to Comment 2.3, Use of Baghouses

EPA disagrees with the statement, "Baghouses have never been common in the industry and most crushing spreads use a water suppression system to reduce dust emissions." The information provided in the June 2003 draft of Section 11.19.2 concerning baghouses relates solely to pulverized mineral processes. In this segment of the stone crushing industry, baghouses are the control technique used in the large majority of process sources. It is appropriate to include emission factors for baghouse controlled particulate matter sources in the pulverized mineral sector of the stone crushing industry.

Many stone crushing plants also use baghouses for the control of crushers, screening operations, and conveyor transfer points. Baghouses are used where wet suppression is not technically feasible. Baghouses have been in service at stone crushing plants for more than thirty years. No changes to the draft materials have been made based on this comment.

Response to Comment 2.3, Use of Flash Dryers

EPA disagrees with the statement that, "Four additional documents contained information regarding flash dryers, which are not present in nonmetallic mining pertaining to rock crushing." Flash dryers have been in use for many years in the pulverized minerals processing sector of the stone crushing industry.

Response to Comment 2.3 - Relevance of $PM_{10}/PM_{2.5}$ Emission Factor Tests at Pulverized Mineral Process Sources

The document identified as "non-relevant" is the 2001 test report prepared by Air Control Techniques, P.C. concerning a series of $PM_{10}/PM_{2.5}$ tests at pulverized mineral processes sources. This material is directly relevant to the emission factors presented for these types of sources. This reference provides actual emissions data compiled using EPA

reference methods for processes sources previously not included in AP42. It is appropriate to include the data provided in this reference.

Response to Comment 2.3 - Iron and Steel Related Reference

EPA agrees that reference 31 concerning Integrated Iron and Steel Operations is not relevant to stone crushing plants (conventional aggregate and pulverized mineral processes). This reference has been removed from AP42 Section 11.19-2 and the Background Support Document for Section 11.19-2.

STAPPA-ALAPCO Comment 2.4 - Relevance of Reference 8, "Measurement of PM_{10} and $PM_{2.5}$ Emission Factors at a Stone Crushing Plant, Vulcan Materials Company, Pineville, North Carolina, December 1996."

"STAPPA and ALAPCO's comments focus specifically on and give brief synopses of some of these test reports. We note at the outset that, of the nine documents containing testing information, only one supplied data from a test that was performed after publication of the last revision of AP-42 Section 11.19.2 in 1995 (Reference 8). We emphasize that the revisions to this AP-42 were apparently justified by one new test (the applicability of which we question below), the inclusion of extrapolated PM_{10} and $PM_{2.5}$ data, and the addition of pulverized mineral processing to Section 11.19.2."

- Reference 8: *Measurement of PM10 and PM2.5 Emission Factors at a Stone Crushing Plant, Vulcan Materials Company, Pineville, North Carolina*, December 1996.

This test report supplied information for PM_{10} and $PM_{2.5}$ for tertiary crushers, a fines crusher, a conveyor transfer point and a vibrating sizing screen for a granite crushing facility located in Pineville, North Carolina. This report contained emission rates in lbs/ton stone for the equipment studied:

Equipment	PM2.5 (lb/ton)	PM10 (lb/ton)
Tertiary Crusher	0.00010	0.00036
Fines Crusher	0.00007	0.00032
Conveyor Transfer Point	0.000013	0.000042
Vibratory Screen	0.00005	0.00028

STAPPA and ALAPCO have identified a number of possible misprints in the document comparing the schematic on page 4 to the stone throughput rates presented in Section 3.3 on page 16. The schematic drawing on page 4 shows maximum processed stone amounts of 700 tons per hour (TPH) for C-4, 1,325 TPH for C-3, and 175 TPH for C-20. The throughput numbers in Table 9 of page 16 exceed the maximum capacity figures presented on page 4 for C-4 and C-20. If the numbers presented in this report are accurate and not a misprint, then this may indicate that the crushing spread was operating in a "run-around" mode. "Run-around" means the rock is being recirculated around the

system in a closed loop. The primary, secondary, or tertiary crushers, possibly due to an open setting on the crusher, are not actively crushing the rock down to a size that would allow the material to be screened out of the loop. If that is the case, we believe the numbers reported for emission factors in this report are not valid for a representative crushing operation because a representative crushing spread continuously produces rock of many different gradations."

Response to Comment 2.4

The material throughput data shown in Figure 1 of reference 8 are not the capacity limits of the C-4 or C-20 conveyors. Both units can operate at levels well above the 700 TPH level shown for conveyor C-4 and the 175 TPH level shown for conveyor C-20. The values shown on the drawing indicate only one of several different operating conditions for the facility. The production rates measured during the test program are consistent with common operating conditions at the facility. The drawing referenced in Submittal 2 was provided to the testing company by the host site solely to illustrate the position of the process equipment tested in the overall facility.

The production rate data obtained during the test program were obtained by stopping the conveyors and removing the stone on a measured length of the conveyor. The material throughput rate was then calculated based on the velocity of the conveyor. This is an accurate means to measure material throughput through specific process units. The production data are correct.

The plant was not operating in a "run-around" mode as suggested by the commenter. The proper operation of the crushers was indicated by the particle size data documented in the emission test report.

STAPPA and ALAPCO Comment 2.5 - Variability and Emission Factor Approach

"With regard to References 17-24, STAPPA and ALAPCO conclude that the test data indicates that there are dramatic variations in results depending on the geographical features and climate in which the tests were performed. It is our opinion that the variability of the results set forth below demonstrates that emission factors for this industry can reflect actual emissions only when they are not "one-size-fits-all" figures, but are, rather, based on specific regional conditions. In a letter to EPA dated February 7, 1996, titled "Use of EPA Emission Factors for Crushed Stone and Sand and Gravel Processing," Terry McGuire, then Chief of the Technical Support Division of the California Air Resources Board, stated "The new AP-42 emission factors…represent only a generic value, and we strongly recommend the use of valid, local source test data whenever available. My staff also spoke to Ron Myers of the U.S. EPA's Emission Factor and Inventory Group in Research Triangle Park, North Carolina. He, too, believes that locally collected emission data are preferable when conditions are different from those used to develop the AP-42 factors." The following data underscore the continued need for locally collected data and correspondingly more accurate emission factors:

- Reference 17: *PM10 Emission Factors for a Stone Crushing Plant Deister Vibrating Screen at Martin Marietta in Raleigh-Durham, North Carolina,* June 1992

This plant, located in Raleigh-Durham, North Carolina, produces crushed granite for construction and road projects. The emission factors suggested in the report for a vibrating screen are:

% Stone Moisture	PM10 Emission Factor
< 1.5 %	0.00618 lb/ton rock
>1.5 %	0.00054 lb/ton rock

- Reference 18: *PM10 Emission Factors for a Stone Crushing Plant Tertiary Crusher at Martin Marietta in Garner, North Carolina,* February 17, 1992

This plant, located in Garner, North Carolina, produces crushed granite for construction and road projects.

The emission factors suggested in the report for a tertiary crusher are:

% Stone Moisture	PM10 Emission Factor
< 1.5 %	0.001717 lb/ton rock
> 1.5 %	0.000813 lb/ton rock

- Reference 19: *PM10 Emission Factors for a Stone Crushing Plant Deister Vibrating Screen and Crusher*, December 1992.

The test was conducted at the Vulcan Materials, Inc. plant in Skippers, Virginia, which produces crushed granite for construction and road projects.

The emission factors suggested in the report are:

Equipment	% Stone Moisture	PM10 Emission Factor
Cone crusher	< 1.5 %	0.00397 lb/ton rock
Cone crusher	> 1.5 %	0.00026 lb/ton rock
Deister vibrating screen	< 1.5 %	0.02701 lb/ton rock
Deister vibrating screen	> 1.5 %	0.00103 lb/ton rock

- Reference 20: *PM10 Emission Factors for a Stone Crushing Plant Tertiary Crusher and Vibrating Screen*, December 1992

The test was conducted at the Nolan L. Teer stone crushing facility located in Raleigh-Durham, North Carolina, which produces crushed granite for construction and road projects.

Equipment	% Stone Moisture	PM10 Emission Factor
Tertiary crusher	< 1.5 %	0.01395 lb/ton rock
Tertiary crusher	> 1.5 %	0.00195 lb/ton rock

Vibrating screen	< 1.5 %	0.07041 lb/ton rock
Vibrating screen	> 1.5 %	0.00184 lb/ton rock

- Reference 21*: PM10 Emission Factors for Two Transfer Points at a Granite Stone Crushing Plant*, January 1994

The test was conducted at the Wake Stone Corporation stone crushing facility located in Knightdale, North Carolina, which produces crushed granite for construction and road projects.

Equipment	% Stone Moisture	PM10 Emission Factor
Sizing Screen Conveyor Transfer Point	< 1.5 %	0.000282 lb/ton rock
Sizing Screen Conveyor Transfer Point	> 1.5 %	0.000092 lb/ton rock
Resize Screen Conveyor Transfer Point	< 1.5 %	0.001049 lb/ton rock
Resize Screen Conveyor Transfer Point	> 1.5 %	0.000030 lb/ton rock

- Reference 22: *PM10 Emission Factors for a Stone Crushing Plant Transfer Point*, April 1993

This test was conducted at the Martin Marietta plant located in Raleigh-Durham, North Carolina, which produces crushed granite for construction and road projects. The test results for the transfer point showed:

Pollutant	% Stone Moisture	Emission Factor
Total Particulate Emissions	< 1.5 %	0.05504 lb/ton rock
Total Particulate Emissions	> 1.5 %	0.000080 lb/ton rock
PM10	< 1.5 %	0.00289 lb/ton rock
PM10	> 1.5 %	0.000015 lb/ton rock

- Reference 23: *PM10 Emission Factors for a Limestone Crushing Plant Vibrating Screen and Crusher for Bristol, Tennessee,* July 1993

This test was conducted at the Vulcan Materials Company, Bristol, Tennessee plant, which produces crushed limestone.

Equipment	% Stone Moisture	PM10 Emission Factor
Cone crusher	< 1.0 %	0.002917 lb/ton rock
Cone crusher	> 1.0 %	0.001055 lb/ton rock
Vibrating screen	< 1.0 %	0.018393 lb/ton rock
Vibrating screen	> 1.0 %	0.001222 lb/ton rock

- Reference 24: *PM10 Emission Factors for a Limestone Crushing Plant Vibrating Screen and Crusher for Maryville, Tennessee*, July 1993

This test was conducted at the Vulcan Materials Company, Maryville, Tennessee plant, which produces crushed limestone.

Equipment	% Stone Moisture	PM10 Emission Factor
Cone crusher	< 1.0 %	0.001041 lb/ton rock
Cone crusher	> 1.0 %	0.000147 lb/ton rock
Vibrating screen	< 1.0 %	0.006920 lb/ton rock
Vibrating screen	> 1.0 %	0.000549 lb/ton rock

The test information contained in References 8 and 17-24, as presented in the preceding pages, is test information from granite and limestone crushing operations located in Tennessee and North Carolina. Nonmetallic mining is, however, far more diverse across the United States than is reflected by testing done on these two kinds of rock. In the words of one authority, "The construction aggregates category generally includes the sub-categories of crushed stone, sand and gravel, and lightweight aggregates such as pumice. The crushed stone sub-category, in descending order of production, covers limestone and dolomite, granite, traprock, sandstone, quartz, and quartzite." *Review Emissions Data Base and Develop Emission Factors for the Construction Aggregate Industry*, September 1984, Engineering Science Consultants, pp 2-1 [from EPA-supplied cd-rom data, ref 06c11s1902/1995.pdf]

STAPPA and ALAPCO represent states with different geography and different climatology. Granite rock may be plentiful in one state and not available in another state. The climatology in one state may be responsible for mined stone that is already wet before being crushed and therefore large fugitive dust emissions are not possible. In another state, with sparse rainfall, the mined rock can remain dry during the crushing process, which would enhance fugitive dust emissions during the rock crushing process. Other parameters affecting the amount of dust generated from rock crushing facilities are wind speed, time of year, and time of day.

Because of the diversity of the nonmetallic industry, we believe EPA should reconsider its approach to AP-42 Section 11.19.2. We believe the approach discussed in *Review Emissions Data Base and Develop Emission Factors for the Construction Aggregate Industry*, September 1984, makes the most sense in determining nonmetallic mining emissions throughout the United States. The document breaks out emission tests by nonmetallic mineral category. In so doing, it allows a state the flexibility to assign an emission factor based on its unique geological and/or climatological characteristic. Table 5 on page 5-7 of that document would be a good template to use in modifying the proposed AP-42 Section 11.19.2

As stated earlier, EPA places testing information above derived information in evaluating the accuracy of emission factors. If EPA would take this regional approach and use most of the information in the above-referenced *Review Emissions Data Base and Develop Emission Factors for the Construction Aggregate Industry* document, the agency would

then be basing its emission factors on actual testing information rather than generating emission factors through an extrapolation scheme that predicts results rather than using results generated from EPA-approved testing methods. EPA's approach would, if this were to occur, be consonant with the provisions of the proposed AP-42 itself, as discussed starting on page 11-10.2-10 of the proposed AP-42 11.19.2 section: "A variety of material, equipment, and operating factors can influence emissions from crushing. These factors include (1) stone type, (2) feed size and distribution, (3) moisture content, (4) throughput rate, (5) crusher type, (6) size reduction ratio, and (7) fines content."

Response to Comment 2.5 (Four separate issues/comments)-

Response to Comment 2.5 - Variability of the Test Results

EPA disagrees that the test results are highly variable.

In fact, the variability of these crushed stone processing emission factors appears to be comparable to many other controlled and uncontrolled sources. It should be noted that there is insufficient data to make a definitive evaluation of the between source variability of the sources in this section. However, several source categories with considerably more supporting data indicate that a relative standard deviation of about 1 is typical for controlled particulate matter. In addition, some sources appear to have a much greater variability when emissions are compared without the use of the correction parameters. For example, when the correction parameters for moisture, silt content and vehicle weight are not incorporated in the unpaved road emissions, the variability significantly exceeds this level.

Response to Comment 2.5 - Diversity of Stone Type

The following statement in Submittal 2 is generally correct, "...The crushed stone sub-category, in descending order of production, covers limestone and dolomite, granite, traprock, sandstone, quartz, and quartzite." The production of limestone and granite accounts for more than 90% of the U.S. crushed production. Traprock, sandstone, and other materials (not including pumice) account for less than 10% of U.S. production. The EPA and NSSGA sponsored emission factor tests emphasized limestone and granite due to the dominance of these materials. Due to the limited resources available for emission factor testing, this emphasis was appropriate.

It is also important to note that research conducted to date on fugitive dust emissions from crushed stone operations have consistently supported the conclusion that rock type is not a major variable. For example, this conclusion is stated in the Engineering-Science report (AP42 1985-5) quoted in Submittal 2. Furthermore, the EPA and NSSGA sponsored tests did not indicate any significant differences between limestone and granite process fugitive dust emissions. The moisture content of the stone and to a lesser extent the size distribution of the stone appear to be dominant factors affecting emissions.

Response to Comment 2.5 - Emission Factor Approach in Engineering-Science Report

The authors of Submittal 2 have recommended that Table 5 on page 5-7 of the Engineering Science Report (AP42 reference 1985-5) provides a more useful approach to emissions factors than the present format of Section 11.19.2. EPA disagrees. Table 5 is simply an organized summary of all of the available emission factor data at the time. The emission factors are listed according to (1) the type of process equipment, (2) wet and dry conditions, (3) type of stone, and (4) type of test. The remainder of Section 5 in the Engineering Science report is devoted to a review of the emission data. Section 6 in this report organizes the available data into a matrix that emerges in a form essentially identical to the form of AP42 Section 8.19.2. Specifically, the emission factors are organized by (1) type of process equipment and (2) stone moisture content,

The authors of the Engineering-Science report stated the following as part of their review of the crushed stone industry emission factors.

> "In general, as compared to ambient sampling approaches, the extractive test approach is simpler, more straightforward in that no model assumptions are necessary, and tends to provide better repeatability in the test results." Engineering-Science Page 5-3.
>
> "In examining both the extractive test and receptor sampling categories of data there do not seem to be any discernable differences between primary, secondary, and tertiary crushing." Engineering-Science page 6-10.
>
> "In particular, no significant differences in emission factors between primary and secondary crushing or among limestone, granite, trap rock and sand and gravel could be discerned." Engineering-Science Page 7-1

The emission factor approach used by Engineering-Science in 1985 appeared to be logical and reasonable. The result of this evaluation was a set of emission factors formatted in a manner identical to the present Section 11.19.2 emission factors.

All of the emission factors data added to the crushed stone section since 1988 have involved extractive type tests using EPA reference methods. This approach is entirely consistent with the conclusions reached by Engineering-Science in reviewing the 1985 emission factor data.

Response to Comment 2.5 - List of Variables Potentially Affecting Emissions

The authors of Submittal 2 state that, "A variety of material, equipment, and operating factors can influence emissions from crushing. These factors include (1) stone type, (2) feed size and distribution, (3) moisture content, (4) throughput rate, (5) crusher type, (6) size reduction ratio, and (7) fines content." The authors of the Engineering-Science report include almost an identical list on page 6-1. With regard to this list, the authors of the Engineering-Science report stated the following:

> "The use of this many parameters in a matrix would make a very large number of combinations; so large that it is unlikely that sufficient test data could be accumulated over a reasonable amount of time so that very many slots in the matrix would be filled." Engineering-Science Page 6-2
>
> "It seems obvious from the data presented in the previous section that there is insufficient data to prepare a set of recommended emission factors using the proposed matrix." Engineering-Science, Page 6-3

EPA and NSSGA have devoted considerable resources to considerably expand the available emission factor data for crushed stone processing operations; however, these tests are both expensive and time consuming. The emission testing work since 1991 has necessarily emphasized the variables (especially stone moisture content) that are most important in affecting emissions and the dominant types of stone processed (limestone and granite). It is unlikely that there will be sufficient data in the foreseeable future to address all of the variables listed in the Engineering-Science report.

STAPPA-ALAPCO Comment 2.6 - Additional Information

STAPPA and ALAPCO have received nonmetallic mining testing information from the state of Arizona, which is attached here. (Note: Reprinted spreadsheets provided in Submittal 2 have been reproduced as Attachment B).

Response to Comment 2.6 - Additional Information

Air Control Techniques, P.C. has reviewed the limited data provided concerning the two tests. These data are not sufficiently complete for inclusion in AP42. Specifically, the missing information includes, but is not limited to the following.

- Type of material processed
- Material moisture content
- Test location (stack diameter, upstream and downstream distances to disturbances
- Test program quality assurance data

Despite these limitations, Air Control Techniques, P.C. has calculated the total particulate matter emission factors for these two tests. The test at Phelps Dodge yielded an average emission factor of 0.000029 Lbs./ton. The test at Cyprus Sierritta yielded an average emission factor of 0.000033 Lbs./ton. Both of these values are well below the primary, secondary, and tertiary crusher total particulate matter emission factors included in the June 2003 draft Section 11.19.2. Due to the lack of a full test report, these data have not been included in the revised version of Section 11.19.2

Submittal 3

Mr. Alan Frazier
Chattanooga-Hamilton County Air Pollution Control Bureau (Chattanooga-Hamilton CAPCB)

(Chattanooga-Hamilton County APCB) Comment 3.1 - Truck Loading Emission Factors

1.) The PM_{10} factor for "truck loading - conveyor: crushed stone" in Table 11.19.2-1 (Metric Units) should be "5.0×10^{-5}" instead of "5.0×10^{-6}".

2.) The PM_{10} factor for "truck unloading: fragmented stone" in Table 11.19.2-2 (English Units) should be "1.60×10^{-5}" instead of "1.60×10^{-6}".

Response to Comment 3.1- Truck Unloading Emission Factors

The emission factors have been changed as stated in Submittal 3.

(Chattanooga-Hamilton County APCB) Comment 3.2- Footnotes and References

"3.) The footnote for "truck loading – conveyor: crushed stone" in Table 11.19.2-1 (Metric Units) should be "k" instead of "j". This footnote is correctly given as "k" in Table 11.19.2-2 (English Units). However, footnote k is left out of the footnote list for both tables. Footnote k should refer to either "Reference 12" or "Reference 27", as these two references are identical in the reference list at the end of the section. References 11 and 26 are also identical in this reference list. (Footnote j for both tables refers to Reference 26.)"

Response to Comment 3.2 - Footnotes and References

The footnotes have been corrected as described in Comment 3.2. The duplicate references have been deleted.

(Chattanooga-Hamilton County APCB) Comment 3.3 - Rounding

"4.) As every factor in Table 11.19.2-1 (Metric Units) should be one-half of the corresponding factor in Table 11.19.2-2 (English Units), after rounding to two significant figures, the PM_{10} factors for "screening (controlled)" in the two tables are slightly inconsistent. Either the metric factor should be 0.00036 or 0.00037 instead of 0.00038 or the English factor should be 0.00075, 0.00076, or 0.00077 instead of 0.00073.

Response to Comment 3.3 - Rounding Differences

Changes have been made to correct the rounding differences. The value in Table 11.19.2-1 has been changed from 0.00038 to 0.00037 to be consistent with the data provided in the Background Document. The value in Table 11.19.2-2 has been changed from 0.0073 to 0.0074 to be consistent with the metric value.

SUBMITTAL 4

Mr. Thomas Pregger
University of Stuttgart

University of Stuttgart, Comment 4.1 - Additional Data for a Crusher and a Screen Operation

Three tables in a spreadsheet format were transmitted. These are reproduced in Attachment C.

Response to Comment 4.1 - Additional Data for a Crusher and a Screen Operation

The additional PM_{10}, $PM_{2.5}$, and PM_1 emission factor data cannot be included in AP42 Section 11.19.2 at this time. A complete test report is required. This should include but not necessarily be limited to the following information and data.

- Plant name and location
- Stack diameter and distances to the nearest upstream and downstream disturbances
- Emission testing procedures
- Stone moisture content
- Production rates for the equipment being tested
- Test program quality assurance information

A preliminary review of these test data suggests that the PM_{10} and $PM_{2.5}$ emission factors measured in this test program will be equal to or below those included in the June 2003 draft Section 11.19.2 for crushing operations and screening operations. Furthermore, the ratio between total particulate matter and PM_{10} particulate matter suggests that total emissions are only slightly above the PM_{10} emissions. This is not consistent with the estimated total particulate matter emission factors in draft Section 11.19.2, which are at least a factor of two above the measured PM_{10} emission factors.