AP42 Section: 11.26

Title: Comments to Talc Processing section

1995

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Date: July 21, 1995

Subject: AP-42 Section 11.26, Talc Processing
Review and Update of Mineral Products Industry and Metallurgical Industries Sections of Chapters 11 and 12 of AP-42
EPA Contract 68-D2-0159, Work Assignment 2-01
MRI Project 4602-01

From: Richard Marinshaw

To: Ron Myers
EPA/EFIG/EMAD (MD-14)
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Here is a copy of the final draft background report and AP-42 section on Talc Processing. As a result of the external review of the previous draft (which was the second external review for this section), we received comments from the Bureau of Mines (minor comments) and from two talc plants, and two new test reports from two Luzenac America (Luzenac) facilities in Montana. The two test reports included the results of tests on 15 emission sources. As we discussed in early June, we sent the background report and section back to Luzenac for a final review following the incorporation of the additional test data. Luzenac provided final comments and also provided two additional reports that document tests on three sources. We then reviewed those test reports and incorporated the data into the enclosed final draft report. The following is a summary of the changes made to the background report and AP-42 section as a result of the external review.

- Because of the relative amount of new data, the format of the background document was changed from a memorandum to a background report.

- One of the plants objected to our use of the metals data from their facility (taken from three test reports [References 5, 6, and 7 of Section 4 of the background report] that the plant submitted to the State agency) and said that metals emissions are a function of talc deposit, are inconsistent, and should not be representative of the industry. They also asked that all references to their facility be deleted from the final report. In response (as we discussed), we eliminated the metals emission factors from the section, but indicated that metals may be emitted depending on the characteristics of the talc deposit. We also coded the test reports from that plant and placed in the CBI files: the letter from the facility

requesting anonymity, and a copy of the title page of each of the test reports.

- Descriptions of the four new references (References 8 through 11) were added to the background report.

- New emission factors were added for ore drying, classifying, pellet drying, pneumatic conveyor venting, and storage bin loading (separate factors for storing crushed talc, ground talc, and final product).

- As we discussed, the PM factors are presented as "total PM" as a result of the inclusion of back-half data.

- Factors now are presented in units of lb/1,000 lb.

- The factor for pelletizing presented in the previous draft was deleted based on information provided by Luzenac, which indicated that the factor was unrealistically high and more likely represents emissions from the loading of the storage bin that feeds the pelletizer.

- With the exception of the factors for CO_2 emissions from grinding, all of the factors from the previous draft section changed as a result of the new data. With the exception of the PM factor for grinding, all of the revised factors are higher than the previous ones. See the summary of changed factors below.

Source	Factor for total PM, lb/1,000 lb	
	Previous draft	Final draft
Primary crushing	0.00055	0.00074
Screening and transfer	0.0037	0.0043
Grinding	0.067	0.022
Pelletizing	0.054	Deleted
Packaging	0.0027	0.0090

- The process flow diagram was modified to correspond with the emission sources for which we have data and to facilitate assigning source classification codes (SCC's), which have been incorporated into the report.

Please let me or Brian know if you have any final comments or if we should prepare the electronic copies of the report.

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June 16, 1995

William R. Kraemer
Environmental Coordinator
Luzenac America
767 Old Yellowstone Trail
Three Forks, Montana 59752-9313

Dear Mr. Kraemer:

Enclosed is a copy of the background report for the revised draft AP-42 Section 11.36, Talc Processing. Please note that Chapter 5 of the background report includes a copy of the revised draft AP-42 section. The background report has been revised to incorporate the comments and additional data received as a result of the industry review of the previous draft report on talc processing. Most of the revisions to the report are based on the two emission test reports that you transmitted to me on April 25, 1995, for the Luzenac America Three Forks and Sappington Mills. Therefore, we would appreciate it if you could review the enclosed revised report and send us you comments. Please note that the reports for the Three Forks and Sappington Mills correspond to References 8 and 9 in Chapter 4 of the background report and References 12 and 13 in the AP-42 section.

Due to time constraints, we would appreciate your comments no later than June 30, 1995. If you have any questions or need additional information, I can be reached by telephone at (919) 677-0249, Extension 5359, or by Fax at 919-677-0065.

Sincerely,

Richard Marinshaw
Senior Environmental Engineer

cc: Ron Myers, EFIG (MD-14)

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

JAN 25 1995

Mr. Richard A. Valentinetti
Director
Air Pollution Control Division
Vermont Agency of Natural Resources
103 S. Main Street
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Dear Mr. Valentinetti:

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 11.26, Talc Processing, and the corresponding background memorandum for the section. Following the previous industry review of the draft AP-42 section, we received copies of several emission test reports for talc processing facilities. Consequently, we have made significant changes to the draft AP-42 section. We would appreciate your organization reviewing the enclosed revised draft AP-42 section and background memorandum 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 March 3, 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 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

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
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2 Enclosures

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Enclosure 2

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Date: February 14, 1994
(Revised November 28, 1994)

Subject: Background Information for Proposed AP-42 Section 11.26, Talc Processing
Review and Update of Mineral Products Industry and Metallurgical Industries Sections of Chapters 11 and 12 of AP-42
EPA Contract 68-D2-0159, Work Assignment 2-01
MRI Project 4602-01

From: Richard Marinshaw

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

I. Introduction

This memorandum presents the background information that was used to develop the proposed AP-42 Section 11.26 on talc processing. A description of the industry is presented first. A process description followed by a discussion of emissions and controls is then presented. A review of the available test data on talc processing is then described. Finally, the reference list is provided. The draft AP-42 section is provided as the attachment.

II. Industry Description[1-4]

Talc, which is a soft, hydrous magnesium silicate ($3MgO{\cdot}4SiO_2{\cdot}H_2O$), is used in a wide range of industries including the manufacture of ceramics, paints, paper, and asphalt roofing. The end uses for talc are determined by variables such as chemical and mineralogical composition, particle size and shape, specific gravity, hardness, and color. The Standard Industrial Classification (SIC) code for talc mining is 1499 (miscellaneous nonmetallic minerals, except fuels), and the SIC code for talc processing is 3295 (minerals and earths, ground or otherwise treated). There is no Source Classification Code (SCC) for the source category.

The word talc refers to a wide variety of rocks and rock products. Soapstone is a massive, impure, talcose rock that has a variable talc content that can exceed 50 percent. It has a slippery feeling and can be carved by hand. Steatite contains a high-purity talc suitable for making electrical insulators. These talc-containing minerals (soapstone and steatite) will be treated as talc in this section. The color of talc varies from snow-white to greenish-gray and various shades of green. The specific gravity of talc ranges from 2.6 to 2.8.

In theory, talc is composed of 63.4 percent silicon dioxide (SiO_2), 31.9 percent magnesium oxide (MgO), and 4.7 percent water (H_2O). The actual composition of commercial talc may vary widely from these levels. Talcose rocks may contain mineral impurities that are composed of one or more of

the following oxides, ranging in concentration from a trace to several percent: iron, titanium, aluminum, calcium, chromium, cobalt, manganese, nickel, phosphorus, potassium, or sodium. For most end-uses, these impurities are undesirable and are removed to the extent feasible. Tremolite, anthophylite, and actinolite, which are associated with asbestos, may be found in talc deposits, but are rarely fibrous in such deposits. Chrysotile also can be found in some talc deposits, but is extremely rare.

Talc deposits can be found in many parts of the world. In 1992, talc minerals were mined and processed at 19 mines in 8 States, and domestic production amounted to 997,000 megagrams (Mg) (1,099,000 tons). Talc mines in Montana, New York, Texas, and Vermont accounted for about 98 percent of total domestic production in 1992.

The largest use of talc-group minerals is for manufacturing of ceramics (31 percent of total 1992 U.S. production), which includes sanitary ware, floor and wall tile, dinnerware glazes, and electrical porcelains. For these end-products, adding talc to the usual clay-silica-feldspar body mixtures facilitates the firing of the ware and improves the quality. The second largest user of talc minerals is the paper industry (20 percent). The third major use of talc is as a filler or a pigment for paints (18 percent), followed by roofing applications (9 percent), plastics (5 percent), and cosmetics (5 percent). Talc also is used in the production of synthetic rubber, insecticides, and pharmaceuticals.

Grades of talc are most frequently identified with the end use. Some of the important desirable properties are softness and smoothness, color, luster, high slip tendency, moisture content, oil and grease absorption, chemical inertness, fusion point, heat and electrical conductivity, and high dielectrical strength.

III. Process Description[1-2,4-7]

Most domestic talc is mined from open-pit operations; over 95 percent of the talc ore produced in the United States comes from open-pit mines. Mining operations usually consist of conventional drilling and blasting methods. The softness of talc makes it easier to mine and process than most other minerals.

Figure 1 is a process flow diagram for a typical domestic talc plant. Talc ore generally is hauled to the plant by truck from a nearby mine. The ore is crushed, typically in a jaw crusher, and screened. The coarse (oversize) material then is returned to the crusher. Rotary dryers may be used to dry the material. Secondary grinding is achieved with pebble mills or roller mills, producing a product that is 44 to 149 micrometers (μm) (325 to 100 mesh) in size. Some roller mills are designed to use heated air to dry the material as it is being ground. Hammer mills or air jet mills may be used to produce additional fine products. Air classifiers (separators), generally in closed-circuit with the mills, separate the material into coarse, coarse-plus-fine, and fine fractions. The coarse and coarse-plus-fine fractions then are stored as products. The fines may be concentrated using a shaking table (tabling process) to separate product containing small quantities of nickel, iron, cobalt, or other minerals, and then undergo a one-step flotation process. The resultant talc slurry is dewatered and filtered prior to passing through a flash dryer. The flash-dried product is then stored for shipment, or it may be further ground to meet customer specifications. The classified material may also be pelletized prior to packaging for specific applications. In the pelletizing step, processed talc is mixed with water to form a paste and then extruded as pellets.

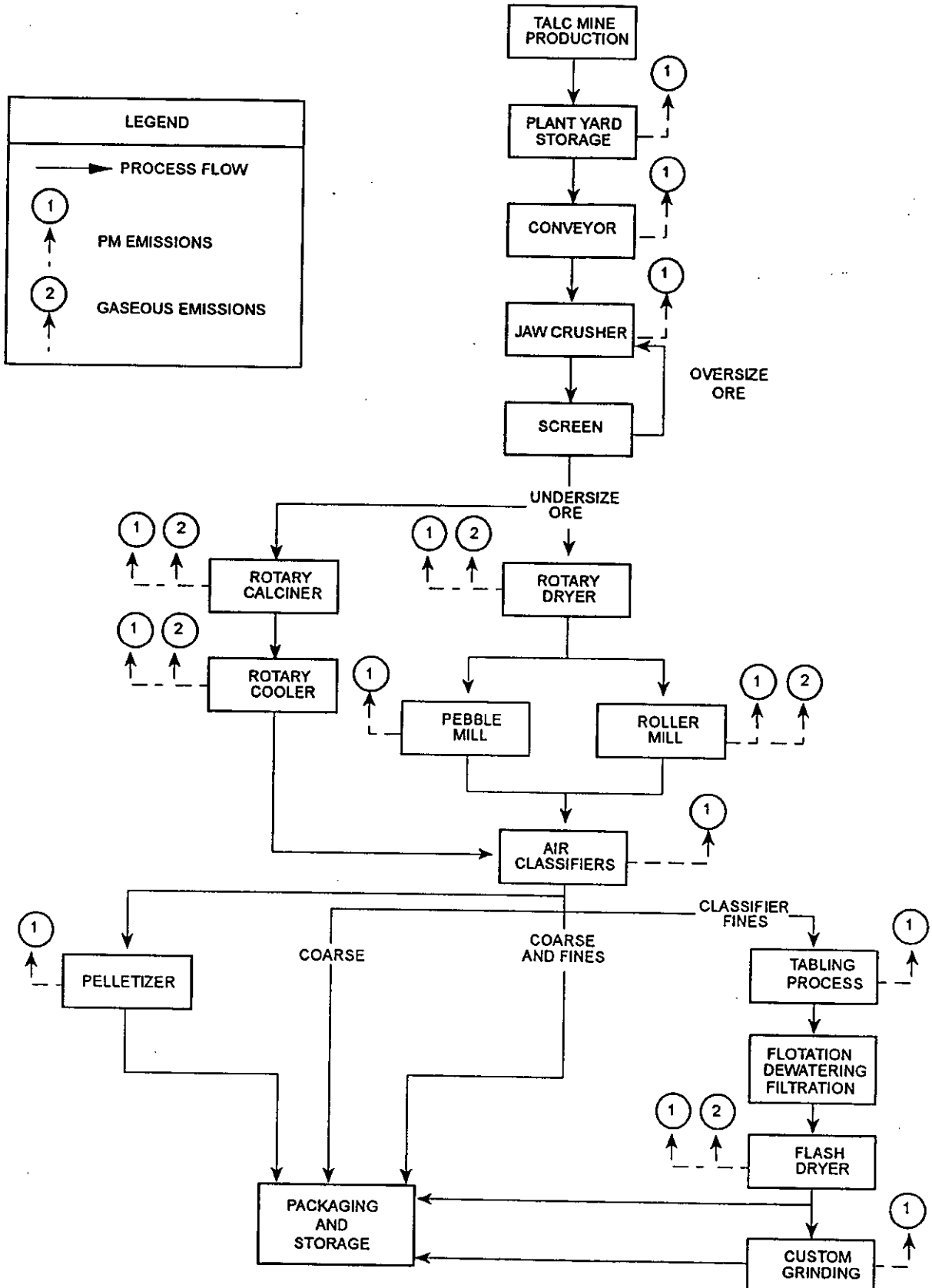

Figure 1. Process flow diagram for talc processing.[1,4,6]

Talc deposits mined in the southwestern United States contain organic impurities and must be calcined prior to additional processing to yield a product with uniform chemical and physical properties. Prior to calcining, the mined ore passes through a crusher and is ground to a specified screen size. After calcining in a rotary kiln, the material passes through a rotary cooler. The cooled calcine (0 percent free water) is then stored for shipment, or it may be further processed. Calcined talc may be mixed with dried talc from other product lines and passed through a roller mill prior to bulk shipping.

IV. Emissions and Controls[1-2,4-5,8-15]

The primary pollutant of concern in talc processing is particulate matter (PM) and PM less than 10 μm (PM-10). Particulate matter is emitted from drilling, blasting, crushing, screening, grinding, drying, calcining, classifying, materials handling and transfer operations, packaging, and storage. Although pelletizing is a wet process, PM may emitted from the transfer and feeding of processed talc to the pelletizer. Particulate matter emissions may include trace amounts of several inorganic compounds that are listed hazardous air pollutants (HAP), including arsenic, cadmium, chromium, cobalt, manganese, nickel, and phosphorus.

The emissions from dryers and calciners include products of combustion, such as carbon monoxide, carbon dioxide, nitrogen oxides, and sulfur oxides, in addition to filterable and condensible PM. Volatile organic compounds (VOC) also are emitted from the drying and calcining of southwestern United States talc deposits, which generally contain organic impurities. Products of combustion and VOC may also be emitted from roller mills that use heated air and from the furnaces that provide the heated air to the mill.

In the mid to late 1970's, the suspected presence of asbestos in the talc deposits located in upper New York State was a major controversy. The National Institute for Occupational Health and Safety (NIOSH) reported that the talc deposits in that region contained significant quantities of tremolite and anthophylite asbestos and reported elevated rates of lung cancer among those exposed to the talc. Later studies funded by the company mining the talc concluded that the material identified as asbestos in the NIOSH report was amphibole cleavage fragments rather than asbestos. The studies also concluded that the elevated cancer rates did not appear to be related to exposure to the talc dust mined from the deposits in question. Although some disagreement remains, the preponderance of evidence does not support the conclusion that the talc from those deposits contains asbestos.

Emissions from talc dryers and calciners are typically controlled with fabric filters. Fabric filters also are used at some facilities to control emissions from mechanical processes such as crushing and grinding.

V. Review of Emission Test Data

A. Reference 8

This report documents an emission test at a talc processing plant conducted in 1976. Uncontrolled and controlled filterable and condensible inorganic PM emissions and particle size distribution were measured. The PM emissions were measured using a modified Method 17. The particle size distribution was measured using an Alundum thimble connected to the nozzle by a 12-in. steel probe, followed by a 47-millimeter-type SGA filter. The particle size distribution of the portion of the sample found to be less than 45 μm was determined using electronic particle counter methods.

Table 1 summarizes the particle size distribution. Because the test report did not include process operating rates, emission factors could not be developed from the emission data. Because optical procedures rather than inertial separators were used to determine the particle size distribution, the data are rated E.

B. Reference 11

This report documents the results of emission tests conducted on a talc processing impact mill and a talc pelletizer. The tests were conducted in 1986 to demonstrate compliance with State regulations.

The sources tested were each ducted to a separate fabric filter, and only controlled emissions were measured. Filterable PM emissions were quantified using Method 5. Although three test runs were conducted, the report includes only the average production rates and filterable PM emission concentrations for the tests. In addition, due to the configuration of the stack, measurements could be made along one traverse only.

Emission factors were developed for filterable PM emissions from the grinding and the pelletizing operations. Because of the lack of adequate detail in the report and the deviation in sampling procedures described above, the emission data are assigned a rating of D.

C. Reference 12

This report documents measurement of filterable PM emissions from a talc primary crusher, crushed ore screen, roller mill, and bagging operation. The sources tested were each ducted to a separate fabric filter, and only controlled emissions were measured. The tests were conducted in 1990 to demonstrate compliance with State regulations.

The primary crusher reduces material up to 100 centimeters (cm) (40 in.) in size to less than 14.6 cm (5.75 in.). Emissions from the crusher are collected at the ore feed point, at the crushed ore discharge point, and along the skirted conveyor that transports crushed material to the screen. The emission stream is ducted to a cartridge type fabric filter. The material exiting the screen is deposited through a chute onto a conveyor. Emissions from the screen are combined with emissions collected from two pickup points along the conveyor located on the discharge side of the screen and ducted to a cartridge type fabric filter. In the roller mill, crushed talc ore is ground to a fine powder. The roller mill system includes a furnace to provide heated makeup air to entrain the fine particles, which are passed through a product recovery cyclone. The recovered product is classified by means of a pair of vibrating screens. Undersize material is pneumatically conveyed to storage and oversize material is returned to the roller mill. In the bagging operation, talc of four different grades (Grades 36, 85, and 100, and a special order) is bagged separately. Emissions from the bagging operation are ducted to two fabric filters.

Filterable PM emissions were quantified using Method 5, and three test runs were conducted. In addition, carbon dioxide (CO_2) concentrations in the exhaust stream from the roller mill were measured using fyrite. Although no problems were identified in the report, the information provided in Reference 13 indicates that the fabric filter that controlled emissions from the roller mill was malfunctioning during the test.

TABLE 1. SUMMARY OF PARTICLE SIZE DISTRIBUTION DATA FROM A TALC CRUSHING AND GRINDING FACILITY[a]

Process	Diameter, μm[b]	Cumulative weight, g	Cumulative percent less than diameter
Primary/secondary crushing	55.4	1.564	91.3
	34.9	3.932	78.2
	22.0	7.822	56.7
	17.4	9.546	47.2
	11.0	11.063	38.8
	6.9	14.197	21.4
	3.0	17.521	3.0
	2.0	17.898	0.94
	1.0	18.049	0.11
Vertical mill	29.0	0.002	100.0
	18.8	0.017	99.7
	14.9	0.031	99.4
	11.9	0.144	97.1
	9.4	0.943	80.8
	7.5	2.792	43.3
	4.7	4.554	7.5
	3.0	4.821	2.1
	1.9	4.908	0.28
	1.0	4.920	0.04
Storage, bagging, air classification	43.9	0.014	99.9
	27.7	0.339	97.9
	17.4	2.141	86.6
	13.8	4.289	73.2
	11.0	6.922	56.8
	6.9	12.108	24.5
	4.4	14.847	7.4
	3.0	15.534	3.1
	2.0	15.885	0.92
	1.0	16.016	0.10

[a]Reference 8. Data rated D.
[b]Optical procedures rather than inertial separators used to determine particle size distribution; data may be suspect.

Emission factors were developed for filterable PM emissions from all sources and for CO_2 emissions from the roller mill. The emission factors for the primary crushing, screening, and bagging operations were rated B; the test method was sound and no problems were reported but run-by-run process rates were not provided. The filterable PM data for the roller mill is rated D due to the problem with the control device. Finally, the CO_2 data for the roller mill was downrated to C because of the test method used and the lack of run-by-run process data.

D. Reference 13

This report documents the results of a retest of the roller mill subsequent to the test documented in Reference 12. Emissions from the mill were tested after repairs were made to the fabric filter that controls emissions from the mill. The test was conducted in 1990, three months after the test documented in Reference 12.

Filterable PM emissions were quantified using Method 5, and three test runs were conducted. In addition, carbon dioxide (CO_2) concentrations in the exhaust stream from the roller mill were measured using fyrite. No problems were identified in the test report.

Emission factors were developed for emissions of filterable PM and CO_2 from the roller mill. The filterable PM emission factor was rated B; the test method was sound and no problems were reported but run-by-run process rates were not provided. The CO_2 data for the roller mill was downrated to C because of the test method used and the lack of run-by-run process data.

E. Reference 14

This report documents measurements of emissions of filterable PM and four metals from a talc roller mill. Emissions from the mill are controlled with a fabric filter, and only controlled emissions were measured. The tests were conducted in 1993 to demonstrate compliance with State regulations.

Filterable PM emissions were quantified using a modified Method 17 to allow measurement of metals emissions also. The modification consisted of the stainless steel sampling train equipment being replaced with teflon coated equipment. The sample was analyzed for four metals (arsenic, cadmium, hexavalent chromium, and nickel) using National Institute for Occupational Safety and Health (NIOSH) Method 7300. Two runs were conducted. The talc product and fabric filter catch also were analyzed for the same metals. Table 2 summarizes the results of those analyses.

Emission factors were developed for emissions of filterable PM, arsenic, and nickel; hexavalent chromium and cadmium were not detected in the samples. The emission data were rated C because only two test runs were conducted and average rather than run-by-run process rates were provided in the report.

F. Reference 15

This report documents measurements of emissions of filterable PM and four metals from a talc roller mill. Emissions from the mill are controlled with a fabric filter, and only controlled emissions were measured. The tests were conducted in 1993 to demonstrate compliance with State regulations.

TABLE 2. SUMMARY OF METALS ANALYSIS OF TALC PRODUCT AND FABRIC FILTER CATCH

Analyte	Concentration, mg/kg		
Talc product			
arsenic	802	699	1.55
cadmium	<0.50	0.964	0.408
total chromium	NA	NA	6.53
hexavalent chromium	1.96	<4.03	<0.094
nickel	522	965	207
Fabric filter catch			
arsenic	55.1	658	3.32
cadmium	<0.431	0.984	0.339
total chromium	NA	NA	12.6
hexavalent chromium	4.88	<4.06	<0.100
nickel	490	960	244
Reference	14	15	16

NA = not applicable, analyte not quantified.

Filterable PM emissions were quantified using a modified Method 17 to allow measurement of metals emissions also. The modification consisted of the stainless steel sampling train equipment being replaced with teflon coated equipment. The sample was analyzed for four metals (arsenic, cadmium, hexavalent chromium, and nickel) using NIOSH Method 7300. Two runs were conducted. The talc product and fabric filter catch also were analyzed for the same metals. Table 2 includes the results of those analyses.

Emission factors were developed for emissions of filterable PM, hexavalent chromium, and nickel; arsenic and cadmium were not detected in the samples. The emission data were rated C because only two test runs were conducted and average rather than run-by-run process rates were provided in the report.

G. Reference 16

This report documents measurements of emissions of filterable PM and four metals from a talc roller mill. The roller mill was located at the same facility for the test documented in Reference 15. Emissions from the mill are controlled with a fabric filter, and only controlled emissions were measured. The tests were conducted in 1993 to demonstrate compliance with State regulations.

Filterable PM emissions were quantified using a modified Method 17 to allow measurement of metals emissions also. The modification consisted of the stainless steel sampling train equipment being replaced with teflon coated equipment. The sample was analyzed for five metal analytes (arsenic, cadmium, hexavalent chromium, total chromium, and nickel) using NIOSH Method 7300. Only one test run was conducted. The talc product and fabric filter catch also were analyzed for the same metals. Table 2 includes the results of those analyses.

Emission factors were developed for emissions of filterable PM, hexavalent chromium, and nickel; arsenic and cadmium were not detected in the samples. However, the emission data were not rated because only one test run was conducted.

VI. Development of Candidate Emission Factors

Table 3 summarizes the available data on emissions from talc processing, and Table 4 presents the candidate emission factors for the AP-42 Section 11.26, Talc Processing. The following paragraphs describe the candidate emission factors were developed from the data presented in Table 3.

For primary crushing, and for screening and transfer of crushed talc, filterable PM data from one B-rated test were available. The candidate emission factors developed from the data are assigned a rating D because they are based on a single test. These emission factors are in units of kg/Mg (lb/ton) of crushed talc production.

For filterable PM emissions from talc grinding, data were available from one B-rated test, two C-rated tests, and two D-rated tests. The average emission factor calculated from the B-rated (Reference 13) data set is between 1 and 2 orders of magnitude lower than the average factors developed from the other data sets. Based on the information provided in the test reports, there is no apparent explanation for why the Reference 13 data are so much lower in magnitude than the other data sets. Furthermore, because the emission stream sampled for Reference 13 included emissions from screening as well as grinding, the factor developed from Reference 13 data would be expected to be comparable if not higher in magnitude than the factors developed from the other references. In view of this inconsistency in the data and the lack of a reason for excluding any of the data sets, the data from all five sets were combined. The average factors developed from References 12 and 13 were first combined because they represent emissions from the same grinding mill. That average factor was then average with the factors developed from the other three data sets. The resulting candidate emission factor is 0.067 kg/Mg (0.14 lb/ton) of ground material produced; this factor is rated E because it is based primarily on C- and D-rated data.

For talc pelletizing, one D-rated data set was available. The candidate emission factor developed from the data is rated E; the units for the factor are kg/Mg (lb/ton) of talc pellets produced.

For processed talc packaging and storage, one B-rated data set was available. Because this factor is based on data for a specific combination of talc grades, it may not be representative of emissions from general packaging and storage operations. Therefore, the factor is assigned a rating of E. The units for the factor are kg/Mg (lb/ton) of talc packaged and stored.

TABLE 3. SUMMARY OF TEST DATA FOR TALC PROCESSING

Process	APCD	Pollutant	No. of runs	Data rating	Emission factor						Ref. No.
					kg/Mg			lb/ton			
					Minimum	Maximum	Average	Minimum	Maximum	Average	
Grinding (impact mill)	FF	filterable PM	3	D	NS	NS	0.054	NS	NS	0.11	11
Pelletizing	FF	filterable PM	3	D	NS	NS	0.064	NS	NS	0.13	11
Packaging and storage	FF	filterable PM	3	B	0.0013	0.0049	0.0029	0.0027	0.0098	0.0059	12
Primary crushing	FF	filterable PM	3	B	0.00039	0.00071	0.00053	0.00078	0.0014	0.0011	12
Grinding (roller mill) and screening	FF	filterable PM	3	D	0.088	0.11	0.097	0.18	0.21	0.19	12
		CO2	3	C	4.0	7.9	6.6	8.0	16	13	12
Crushed talc screening and transfer	FF	filterable PM	3	B	0.0011	0.0085	0.0037	0.0023	0.017	0.0074	12
Grinding (roller mill) and screening	FF	filterable PM	3	B	0.0014	0.0023	0.0019	0.0028	0.0047	0.0039	13
		CO2	3	C	8.3	16	12	17	33	24	13
Grinding (roller mill)	FF	filterable PM	2	C	0.13	0.20	0.16	0.26	0.39	0.33	14
		arsenic	2	C	7.3E-06	1.2E-05	9.6E-06	1.5E-05	2.4E-05	1.9E-05	14
		nickel	2	C	5.1E-05	7.7E-05	6.4E-06	0.00010	0.00015	0.00013	14
Grinding (roller mill)	FF	filterable PM	2	C	0.0046	0.0077	0.0062	0.0093	0.015	0.012	15
		Cr+6	2	C	4.1E-06	9.8E-06	6.9E-06	8.2E-06	2.0E-05	1.4E-05	15
		nickel	2	C	1.3E-05	1.3E-05	1.3E-05	2.5E-05	2.6E-05	2.6E-05	15
Grinding (roller mill)	FF	filterable PM	1	NR	NA	NA	0.010	NA	NA	0.021	16
		cadmium	1	NR	NA	NA	2.3E-07	NA	NA	4.5E-07	16
		chromium	1	NR	NA	NA	4.5E-07	NA	NA	8.9E-07	16
		nickel	1	NR	NA	NA	6.3E-06	NA	NA	1.3E-05	16

APCD = air pollution control device; FF = fabric filter; NS = not specified; NA = not applicable; NR = not rated; Cr+6 = hexavalent chromium.

TABLE 4. SUMMARY OF CANDIDATE EMISSION FACTORS FOR TALC PROCESSING

Process	Control	Pollutant	No. of tests	Average emission factor (a)			References
				kg/Mg	lb/ton	Rating	
Primary crushing	fabric filter	filterable PM	1	0.00055	0.0011	D	12
Screening and transfer (b)	fabric filter	filterable PM	1	0.0037	0.0074	E	12
Grinding	fabric filter	filterable PM	5	0.067	0.14	E	11-15
Grinding	fabric filter	arsenic	1	9.5E-06	1.9E-05	E	14
Grinding	fabric filter	hexavalent chromium	1	7.0E-06	1.4E-05	E	15
Grinding	fabric filter	nickel	3	3.9E-05	7.8E-05	E	14-15
Grinding (c)	none	CO2	2	9.3	19	E	12-13
Pelletizing	fabric filter	filterable PM	1	0.054	0.13	E	11
Packaging and storage (d)	fabric filter	filterable PM	1	0.0027	0.0059	E	12

(a) Emission factors in units kg/Mg and lb/ton of production.
(b) For crushed talc.
(c) For roller mill using heated makeup air.
(d) For combination of Grades 36, 85, 100 talc, and specialty product talc.

VII. REFERENCES

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11.26 TALC PROCESSING

11.26.1 Process Description[1-7]

Talc, which is a soft, hydrous magnesium silicate ($3MgO{\cdot}4SiO_2{\cdot}H_2O$), is used in a wide range of industries including the manufacture of ceramics, paints, paper, and asphalt roofing. The end-uses for talc are determined by variables such as chemical and mineralogical composition, particle size and shape, specific gravity, hardness, and color. There is no Source Classification Code (SCC) for the source category.

Most domestic talc is mined from open-pit operations; over 95 percent of the talc ore produced in the United States comes from open-pit mines. Mining operations usually consist of conventional drilling and blasting methods. The softness of talc makes it easier to mine and process than most other minerals.

Figure 11.26-1 is a process flow diagram for a typical domestic talc plant. Talc ore generally is hauled to the plant by truck from a nearby mine. The ore is crushed, typically in a jaw crusher, and screened. The coarse (oversize) material then is returned to the crusher. Rotary dryers may be used to dry the material. Secondary grinding is achieved with pebble mills or roller mills, producing a product that is 44 to 149 micrometers (μm) (325 to 100 mesh) in size. Some roller mills are designed to use heated air to dry the material as it is being ground. Hammer mills or jet air mills may be used to produce additional final products. Air classifiers (separators), generally in closed-circuit with the mills, separate the material into coarse, coarse-plus-fine, and fine fractions. The coarse and coarse-plus-fine fractions then are stored as products. The fines may be concentrated using a shaking table (tabling process) to separate product containing small quantities of nickel, iron, cobalt, or other minerals and then undergo a one-step flotation process. The resultant talc slurry is dewatered and filtered prior to passing through a flash dryer. The flash-dried product is then stored for shipment, or it may be further ground to meet customer specifications. The classified material also may be pelletized prior to packaging for specific applications. In the pelletizing step, processed talc is mixed with water to form a paste and then extruded as pellets.

Talc deposits mined in the southwestern United States contain organic impurities and must be calcined prior to additional processing to yield a product with uniform chemical and physical properties. Generally, a separate product will be used to produce the calcined talc. Prior to calcining, the mined ore passes through a crusher and is ground to a specified screen size. After calcining in a rotary kiln, the material passes through a rotary cooler. The cooled calcine (0 percent free water) is then stored for shipment, or it may be further processed. Calcined talc may be mixed with dried talc from other product lines and passed through a roller mill prior to bulk shipping.

11.26.2 Emissions and Controls[1-2,4-5,7-11]

The primary pollutant of concern in talc processing is particulate matter (PM) and PM less than 10 μm (PM-10). Particulate matter is emitted from drilling, blasting, crushing, screening, grinding, drying, calcining, classifying, materials handling and transfer operations, packaging, and storage. Although pelletizing is a wet process, PM may emitted from the transfer and feeding of processed talc to the pelletizer. Particulate matter emissions may include trace amounts of several inorganic compounds that are listed hazardous air pollutants (HAP), including arsenic, cadmium, chromium, cobalt, manganese, nickel, and phosphorus.

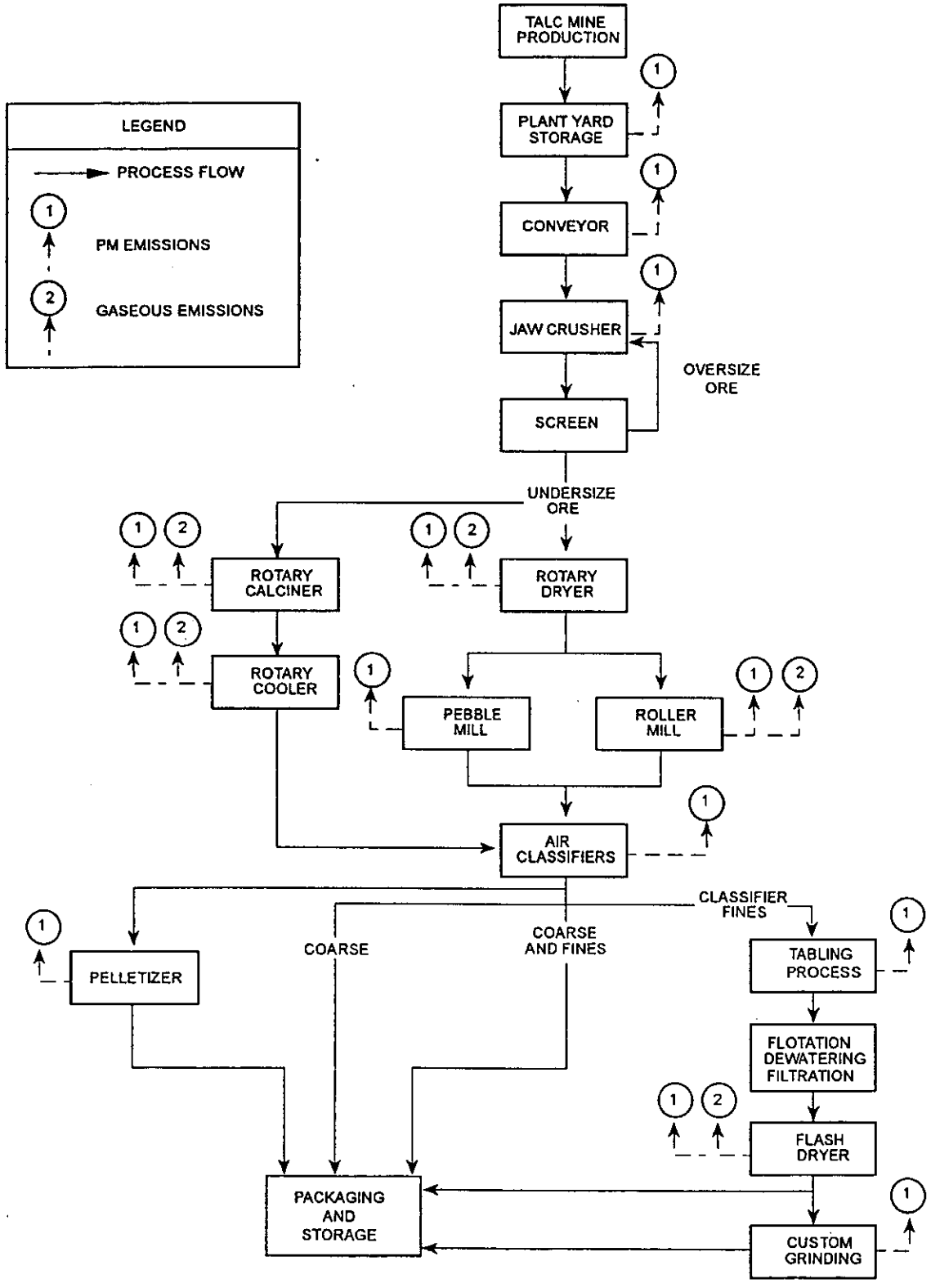

Figure 11.26-1. Process flow diagram for talc processing.[1,4,7]

The emissions from dryers and calciners include products of combustion, such as carbon monoxide, carbon dioxide, nitrogen oxides, and sulfur oxides, in addition to filterable and condensible PM. Volatile organic compounds also are emitted from the drying and calcining of southwestern United States talc deposits, which generally contain organic impurities. Products of combustion and VOC may also be emitted from roller mills that use heated air and from the furnaces that provide the heated air to the mill.

Emissions from talc dryers and calciners are typically controlled with fabric filters. Fabric filters also are used at some facilities to control emissions from mechanical processes such as crushing and grinding. Emission factors for PM emissions from talc processing are presented in Table 11.26-1 (metric and English units). Emission factors for other pollutants are presented in Table 11.26-2. Particle size distributions for talc processing are summarized in Table 11.26-3 and are depicted graphically in Figure 11.26-2.

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Table 11.26-1 (Metric And English Units).
EMISSION FACTORS FOR TALC PROCESSING--PM[a]

EMISSION FACTOR RATING: E

Process	Filterable PM[b]	
	kg/Mg	lb/ton
Primary crushing, with fabric filter[c] (SCC 3-05-__-__)	0.00055	0.0011
Screening and transfer, with fabric filter[d] (SCC 3-05-__-__)	0.0037	0.0074
Grinding, with fabric filter[e] (SCC 3-05-__-__)	0.067	0.14
Pelletizing, with fabric filter[f] (SCC 3-05-__-__)	0.054	0.13
Packaging and storage, with fabric filter[g] (SCC 3-03-0__-__)	0.0027	0.0059

[a]SCC = Source Classification Code. Emission factors in units of kg/Mg and lb/ton of production.
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Table 11.26-2 (Metric And English Units).
EMISSION FACTORS FOR TALC PROCESSING--OTHER POLLUTANTS[a]

EMISSION FACTOR RATING: E

Process	Pollutant	Emission factor	
		kg/Mg	lb/ton
Grinding[b] (SCC 3-05-___-__)	CO_2	9.3	19
Grinding, with fabric filter (SCC 3-05-___-__)	Arsenic[c]	9.5×10^{-6}	1.9×10^{-5}
	Hexavalent chromium[d]	7.0×10^{-6}	1.4×10^{-5}
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Table 11.26-3. SUMMARY OF PARTICLE SIZE DISTRIBUTIONS FOR TALC PROCESSING[a]

Process	Diameter, μm	Cumulative percent less than diameter
Primary/secondary crushing	55.4	91.3
	34.9	78.2
	22.0	56.7
	17.4	47.2
	11.0	38.8
	6.9	21.4
	3.0	3.0
	2.0	0.94
	1.0	0.11
Grinding	29.0	100.0
	18.8	99.7
	14.9	99.4
	11.9	97.1
	9.4	80.8
	7.5	43.3
	4.7	7.5
	3.0	2.1
	1.9	0.28
	1.0	0.04
Storage, bagging, air classification	43.9	99.9
	27.7	97.9
	17.4	86.6
	13.8	73.2
	11.0	56.8
	6.9	24.5
	4.4	7.4
	3.0	3.1
	2.0	0.92
	1.0	0.10

[a]Reference 5. Optical procedures rather than inertial separators used to determine particle size distribution; data may be suspect.

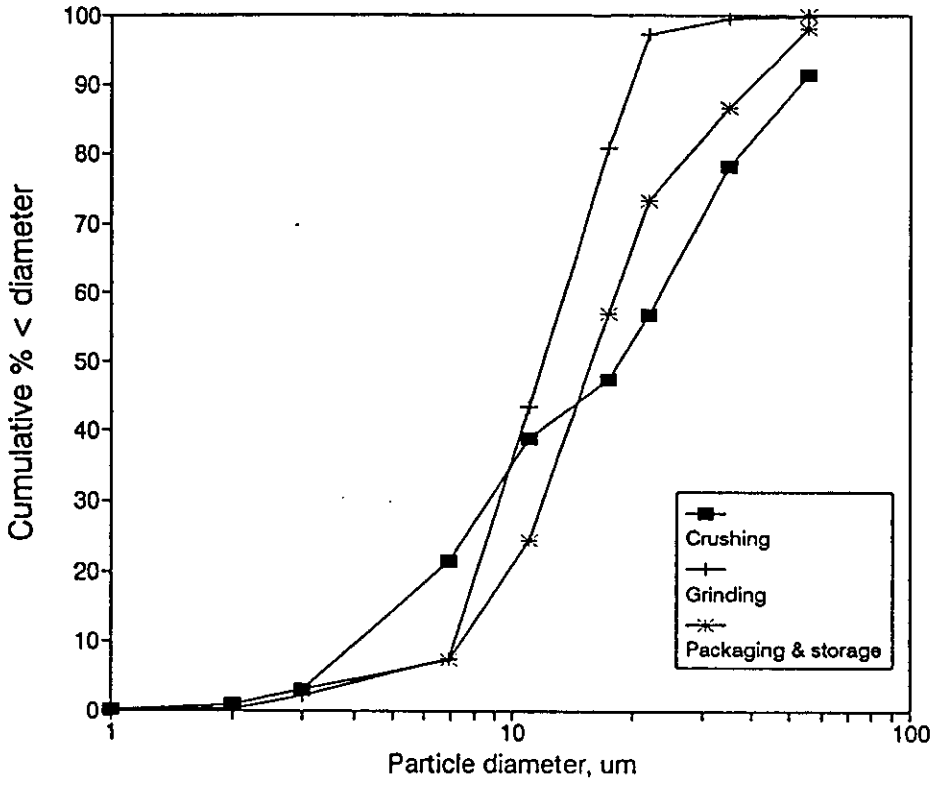

Figure 11.26-2. Particle size distribution for talc processing.[5]

DRAFT

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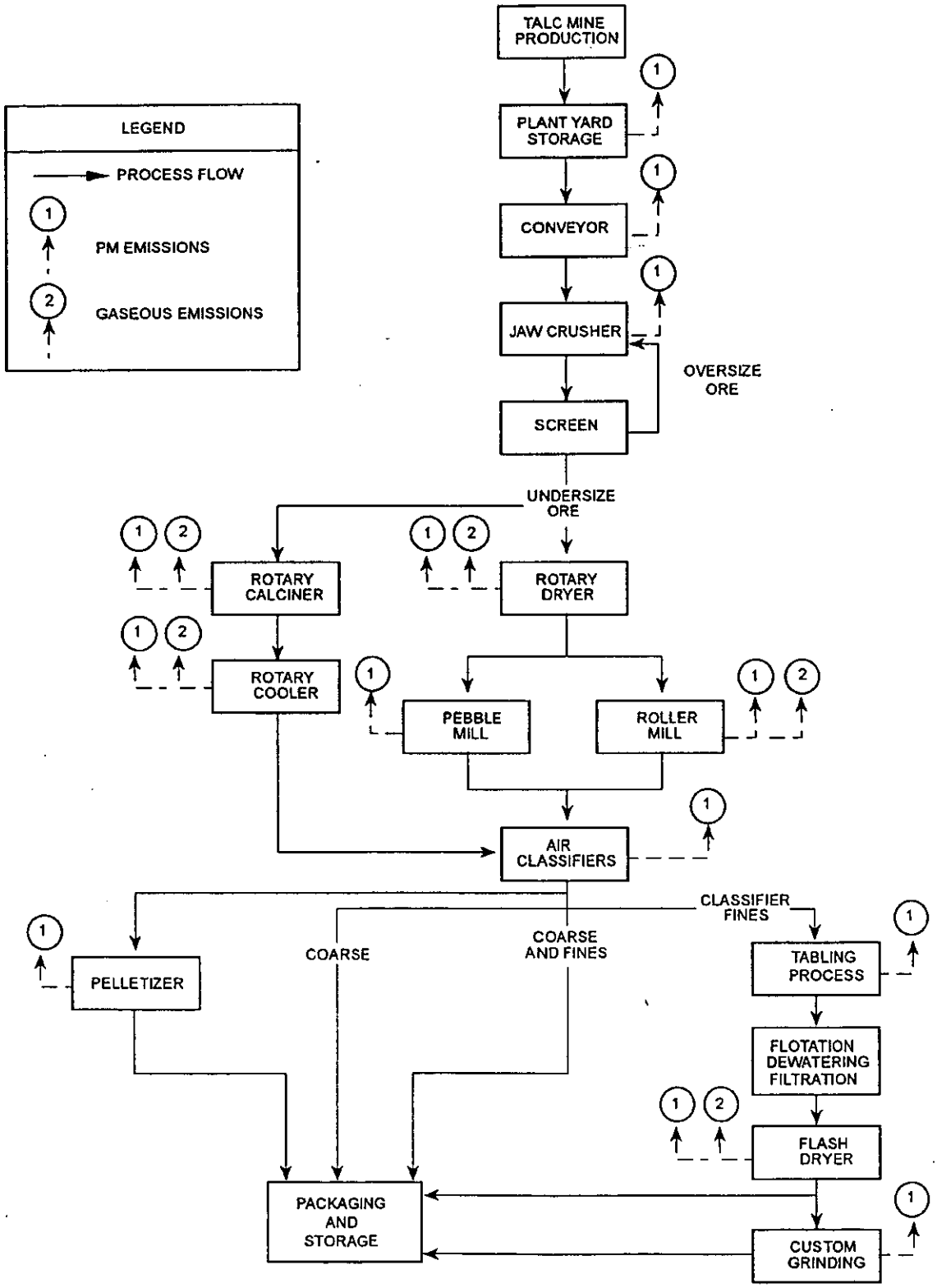

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	4.7	7.5
	3.0	2.1
	1.9	0.28
	1.0	0.04
Storage, bagging, air classification	43.9	99.9
	27.7	97.9
	17.4	86.6
	13.8	73.2
	11.0	56.8
	6.9	24.5
	4.4	7.4
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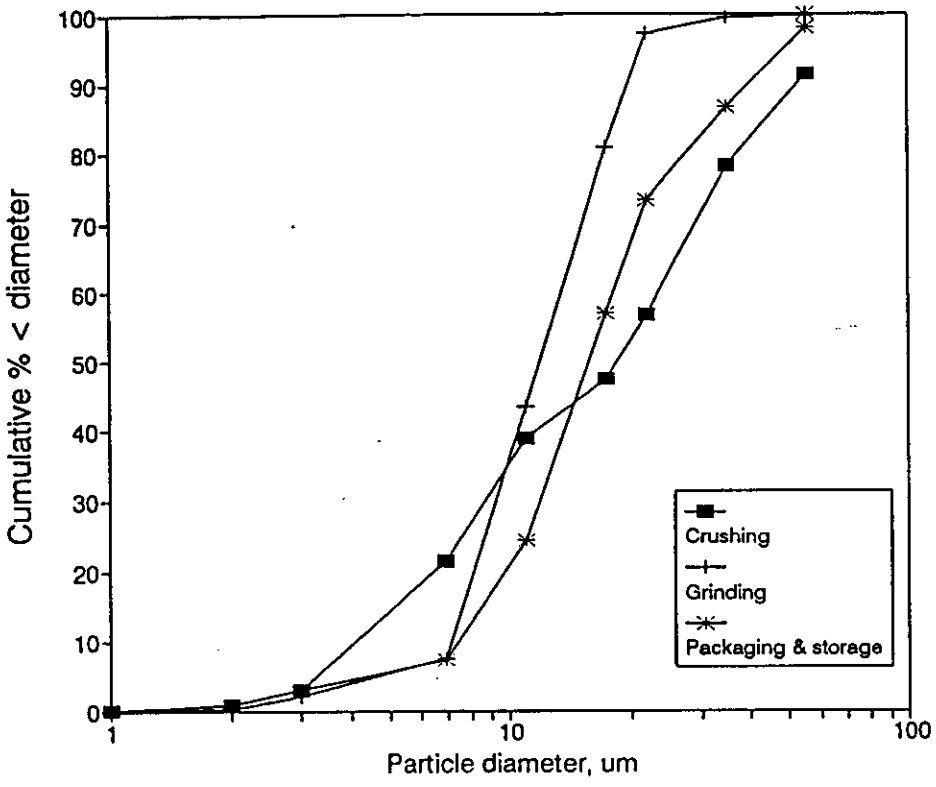

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Talc, which is a soft, hydrous magnesium silicate ($3MgO \cdot 4SiO_2 \cdot H_2O$), is used in a wide range of industries including the manufacture of ceramics, paints, paper, and asphalt roofing. The end-uses for talc are determined by variables such as chemical and mineralogical composition, particle size and shape, specific gravity, hardness, and color. There is no Source Classification Code (SCC) for the source category.

Most domestic talc is mined from open-pit operations; over 95 percent of the talc ore produced in the United States comes from open-pit mines. Mining operations usually consist of conventional drilling and blasting methods. The softness of talc makes it easier to mine and process than most other minerals.

Figure 11.26-1 is a process flow diagram for a typical domestic talc plant. Talc ore generally is hauled to the plant by truck from a nearby mine. The ore is crushed, typically in a jaw crusher, and screened. The coarse (oversize) material then is returned to the crusher. Rotary dryers may be used to dry the material. Secondary grinding is achieved with pebble mills or roller mills, producing a product that is 44 to 149 micrometers (μm) (325 to 100 mesh) in size. Some roller mills are designed to use heated air to dry the material as it is being ground. Hammer mills or jet air mills may be used to produce additional final products. Air classifiers (separators), generally in closed-circuit with the mills, separate the material into coarse, coarse-plus-fine, and fine fractions. The coarse and coarse-plus-fine fractions then are stored as products. The fines may be concentrated using a shaking table (tabling process) to separate product containing small quantities of nickel, iron, cobalt, or other minerals and then undergo a one-step flotation process. The resultant talc slurry is dewatered and filtered prior to passing through a flash dryer. The flash-dried product is then stored for shipment, or it may be further ground to meet customer specifications. The classified material also may be pelletized prior to packaging for specific applications. In the pelletizing step, processed talc is mixed with water to form a paste and then extruded as pellets.

Talc deposits mined in the southwestern United States contain organic impurities and must be calcined prior to additional processing to yield a product with uniform chemical and physical properties. Generally, a separate product will be used to produce the calcined talc. Prior to calcining, the mined ore passes through a crusher and is ground to a specified screen size. After calcining in a rotary kiln, the material passes through a rotary cooler. The cooled calcine (0 percent free water) is then stored for shipment, or it may be further processed. Calcined talc may be mixed with dried talc from other product lines and passed through a roller mill prior to bulk shipping.

11.26.2 Emissions and Controls[1-2,4-5,7-11]

The primary pollutant of concern in talc processing is particulate matter (PM) and PM less than 10 μm (PM-10). Particulate matter is emitted from drilling, blasting, crushing, screening, grinding, drying, calcining, classifying, materials handling and transfer operations, packaging, and storage. Although pelletizing is a wet process, PM may emitted from the transfer and feeding of processed talc to the pelletizer. Particulate matter emissions may include trace amounts of several inorganic compounds that are listed hazardous air pollutants (HAP), including arsenic, cadmium, chromium, cobalt, manganese, nickel, and phosphorus.

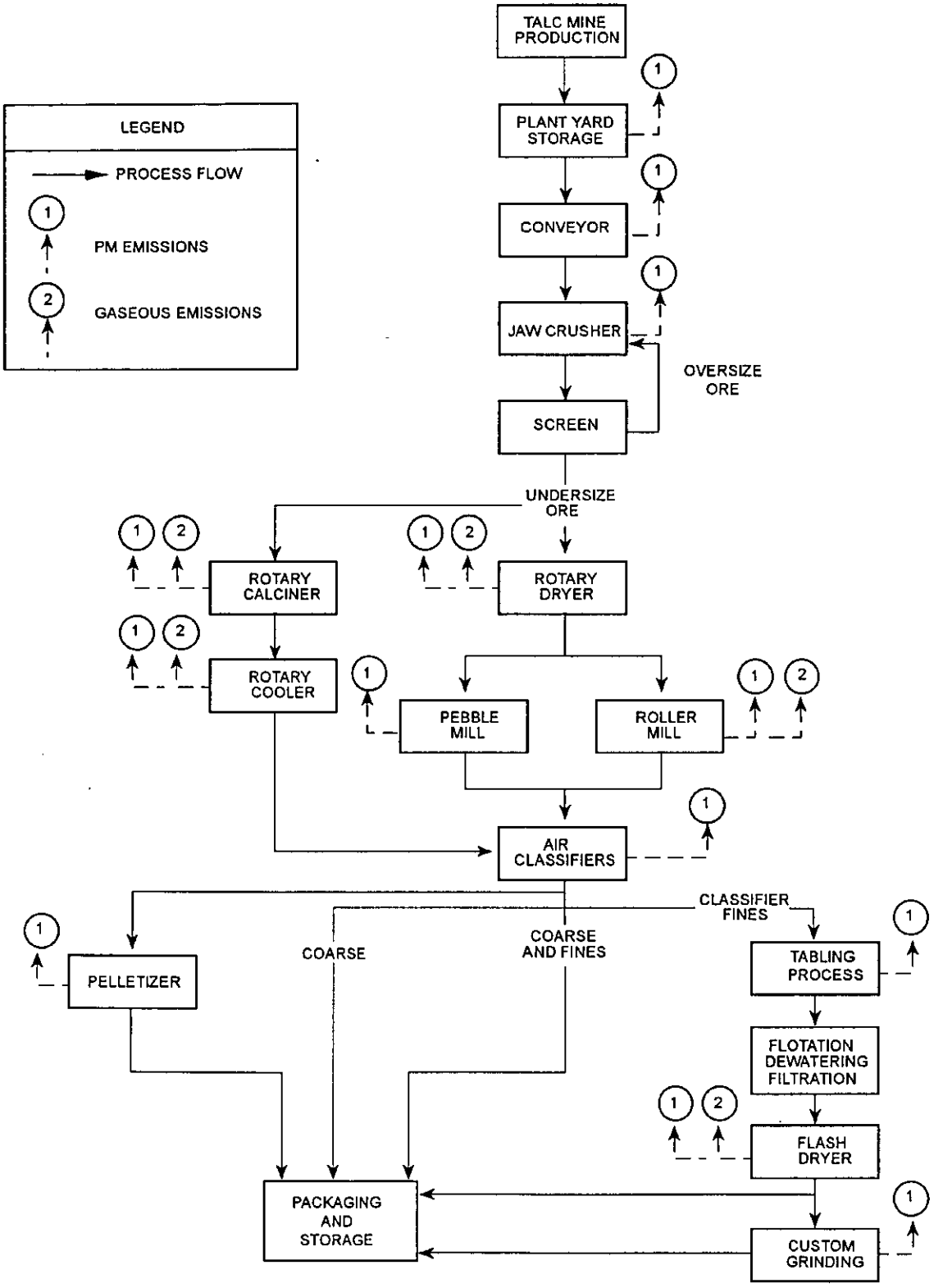

Figure 11.26-1. Process flow diagram for talc processing.[1,4,7]

The emissions from dryers and calciners include products of combustion, such as carbon monoxide, carbon dioxide, nitrogen oxides, and sulfur oxides, in addition to filterable and condensible PM. Volatile organic compounds also are emitted from the drying and calcining of southwestern United States talc deposits, which generally contain organic impurities. Products of combustion and VOC may also be emitted from roller mills that use heated air and from the furnaces that provide the heated air to the mill.

Emissions from talc dryers and calciners are typically controlled with fabric filters. Fabric filters also are used at some facilities to control emissions from mechanical processes such as crushing and grinding. Emission factors for PM emissions from talc processing are presented in Table 11.26-1 (metric and English units). Emission factors for other pollutants are presented in Table 11.26-2. Particle size distributions for talc processing are summarized in Table 11.26-3 and are depicted graphically in Figure 11.26-2.

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9. *Particulate Emission Compliance Program - Retest For Alpha Mill,* Air Quality Technical Services, Inc., South Burlington, VT, September 28, 1990.

10. *Luzenac America, Inc., Chester, Vermont, Stack Emissions Measurements,* New England Air Quality Testing, Burlington, VT, February 3, 1994.

11. *Luzenac America, Inc., Ludlow, Vermont, Stack Emissions Measurements,* New England Air Quality Testing, Burlington, VT, February 3, 1994.

Table 11.26-1 (Metric And English Units).
EMISSION FACTORS FOR TALC PROCESSING--PM[a]

EMISSION FACTOR RATING: E

Process	Filterable PM[b]	
	kg/Mg	lb/ton
Primary crushing, with fabric filter[c] (SCC 3-05-__-__)	0.00055	0.0011
Screening and transfer, with fabric filter[d] (SCC 3-05-__-__)	0.0037	0.0074
Grinding, with fabric filter[e] (SCC 3-05-__-__)	0.067	0.14
Pelletizing, with fabric filter[f] (SCC 3-05-__-__)	0.054	0.13
Packaging and storage, with fabric filter[g] (SCC 3-03-0__-__)	0.0027	0.0059

[a]SCC = Source Classification Code. Emission factors in units of kg/Mg and lb/ton of production.
[b]Filterable PM is that PM collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train.
[c]Reference 8. EMISSION FACTOR RATING: D.
[d]Reference 8. For crushed talc.
[e]References 7-11. Based on five emission tests that ranged from 0.0019 to 0.16 kg/Mg (0.0039 to 0.33 lb/ton).
[f]Reference 7.
[g]Reference 8. Based on data for packaging and storing combination of Grades 36, 85, and 100 talc, plus a specialty grade talc.

Table 11.26-2 (Metric And English Units).
EMISSION FACTORS FOR TALC PROCESSING--OTHER POLLUTANTS[a]

EMISSION FACTOR RATING: E

Process	Pollutant	Emission factor	
		kg/Mg	lb/ton
Grinding[b] (SCC 3-05-___-__)	CO_2	9.3	19
Grinding, with fabric filter (SCC 3-05-___-__)	Arsenic[c]	9.5×10^{-6}	1.9×10^{-5}
	Hexavalent chromium[d]	7.0×10^{-6}	1.4×10^{-5}
	Nickel[e]	3.9×10^{-5}	7.8×10^{-5}

[a]SCC = Source Classification Code. Emission factors in units of kg/Mg and lb/ton of production.
[b]References 8-9. For roller mill using heated makeup air.
[c]Reference 10.
[d]Reference 11.
[e]References 10-11.

Table 11.26-3. SUMMARY OF PARTICLE SIZE DISTRIBUTIONS FOR TALC PROCESSING[a]

Process	Diameter, μm	Cumulative percent less than diameter
Primary/secondary crushing	55.4	91.3
	34.9	78.2
	22.0	56.7
	17.4	47.2
	11.0	38.8
	6.9	21.4
	3.0	3.0
	2.0	0.94
	1.0	0.11
Grinding	29.0	100.0
	18.8	99.7
	14.9	99.4
	11.9	97.1
	9.4	80.8
	7.5	43.3
	4.7	7.5
	3.0	2.1
	1.9	0.28
	1.0	0.04
Storage, bagging, air classification	43.9	99.9
	27.7	97.9
	17.4	86.6
	13.8	73.2
	11.0	56.8
	6.9	24.5
	4.4	7.4
	3.0	3.1
	2.0	0.92
	1.0	0.10

[a]Reference 5. Optical procedures rather than inertial separators used to determine particle size distribution; data may be suspect.

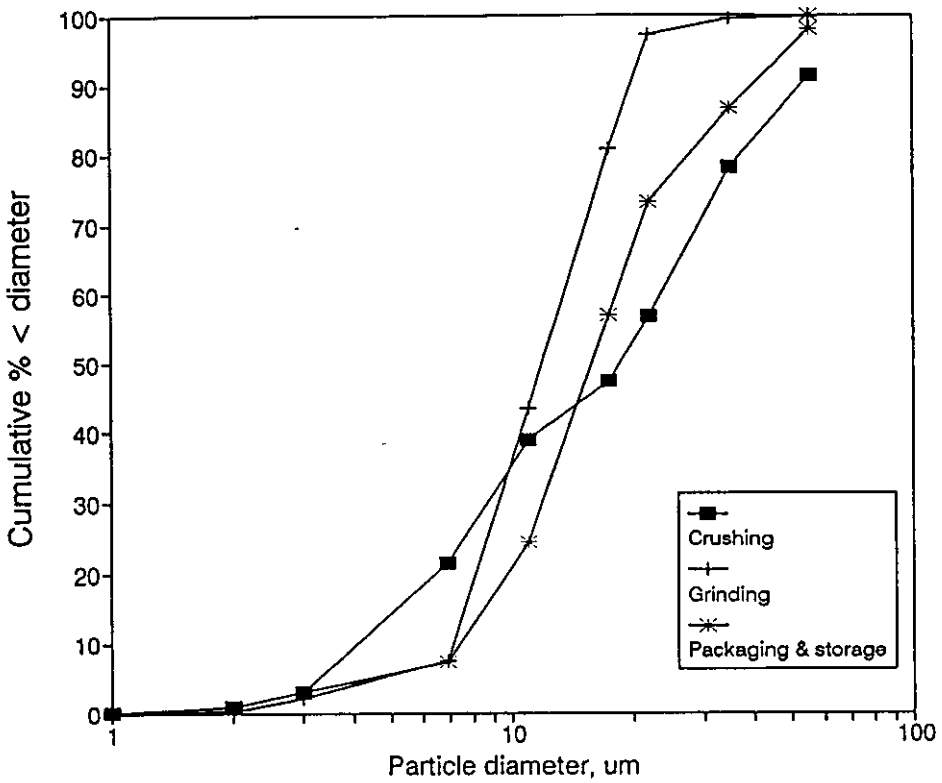

Figure 11.26-2. Particle size distribution for talc processing.[5]

Enclosure 2

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Date: February 14, 1994
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Subject: Background Information for Proposed AP-42 Section 11.26, Talc Processing
Review and Update of Mineral Products Industry and Metallurgical Industries Sections of Chapters 11 and 12 of AP-42
EPA Contract 68-D2-0159, Work Assignment 2-01
MRI Project 4602-01

From: Richard Marinshaw

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EPA/EMAD/EFIG (MD-14)
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I. Introduction

This memorandum presents the background information that was used to develop the proposed AP-42 Section 11.26 on talc processing. A description of the industry is presented first. A process description followed by a discussion of emissions and controls is then presented. A review of the available test data on talc processing is then described. Finally, the reference list is provided. The draft AP-42 section is provided as the attachment.

II. Industry Description[1-4]

Talc, which is a soft, hydrous magnesium silicate ($3MgO{\cdot}4SiO_2{\cdot}H_2O$), is used in a wide range of industries including the manufacture of ceramics, paints, paper, and asphalt roofing. The end uses for talc are determined by variables such as chemical and mineralogical composition, particle size and shape, specific gravity, hardness, and color. The Standard Industrial Classification (SIC) code for talc mining is 1499 (miscellaneous nonmetallic minerals, except fuels), and the SIC code for talc processing is 3295 (minerals and earths, ground or otherwise treated). There is no Source Classification Code (SCC) for the source category.

The word talc refers to a wide variety of rocks and rock products. Soapstone is a massive, impure, talcose rock that has a variable talc content that can exceed 50 percent. It has a slippery feeling and can be carved by hand. Steatite contains a high-purity talc suitable for making electrical insulators. These talc-containing minerals (soapstone and steatite) will be treated as talc in this section. The color of talc varies from snow-white to greenish-gray and various shades of green. The specific gravity of talc ranges from 2.6 to 2.8.

In theory, talc is composed of 63.4 percent silicon dioxide (SiO_2), 31.9 percent magnesium oxide (MgO), and 4.7 percent water (H_2O). The actual composition of commercial talc may vary widely from these levels. Talcose rocks may contain mineral impurities that are composed of one or more of

the following oxides, ranging in concentration from a trace to several percent: iron, titanium, aluminum, calcium, chromium, cobalt, manganese, nickel, phosphorus, potassium, or sodium. For most end-uses, these impurities are undesirable and are removed to the extent feasible. Tremolite, anthophylite, and actinolite, which are associated with asbestos, may be found in talc deposits, but are rarely fibrous in such deposits. Chrysotile also can be found in some talc deposits, but is extremely rare.

Talc deposits can be found in many parts of the world. In 1992, talc minerals were mined and processed at 19 mines in 8 States, and domestic production amounted to 997,000 megagrams (Mg) (1,099,000 tons). Talc mines in Montana, New York, Texas, and Vermont accounted for about 98 percent of total domestic production in 1992.

The largest use of talc-group minerals is for manufacturing of ceramics (31 percent of total 1992 U.S. production), which includes sanitary ware, floor and wall tile, dinnerware glazes, and electrical porcelains. For these end-products, adding talc to the usual clay-silica-feldspar body mixtures facilitates the firing of the ware and improves the quality. The second largest user of talc minerals is the paper industry (20 percent). The third major use of talc is as a filler or a pigment for paints (18 percent), followed by roofing applications (9 percent), plastics (5 percent), and cosmetics (5 percent). Talc also is used in the production of synthetic rubber, insecticides, and pharmaceuticals.

Grades of talc are most frequently identified with the end use. Some of the important desirable properties are softness and smoothness, color, luster, high slip tendency, moisture content, oil and grease absorption, chemical inertness, fusion point, heat and electrical conductivity, and high dielectrical strength.

III. Process Description[1-2,4-7]

Most domestic talc is mined from open-pit operations; over 95 percent of the talc ore produced in the United States comes from open-pit mines. Mining operations usually consist of conventional drilling and blasting methods. The softness of talc makes it easier to mine and process than most other minerals.

Figure 1 is a process flow diagram for a typical domestic talc plant. Talc ore generally is hauled to the plant by truck from a nearby mine. The ore is crushed, typically in a jaw crusher, and screened. The coarse (oversize) material then is returned to the crusher. Rotary dryers may be used to dry the material. Secondary grinding is achieved with pebble mills or roller mills, producing a product that is 44 to 149 micrometers (μm) (325 to 100 mesh) in size. Some roller mills are designed to use heated air to dry the material as it is being ground. Hammer mills or air jet mills may be used to produce additional fine products. Air classifiers (separators), generally in closed-circuit with the mills, separate the material into coarse, coarse-plus-fine, and fine fractions. The coarse and coarse-plus-fine fractions then are stored as products. The fines may be concentrated using a shaking table (tabling process) to separate product containing small quantities of nickel, iron, cobalt, or other minerals, and then undergo a one-step flotation process. The resultant talc slurry is dewatered and filtered prior to passing through a flash dryer. The flash-dried product is then stored for shipment, or it may be further ground to meet customer specifications. The classified material may also be pelletized prior to packaging for specific applications. In the pelletizing step, processed talc is mixed with water to form a paste and then extruded as pellets.

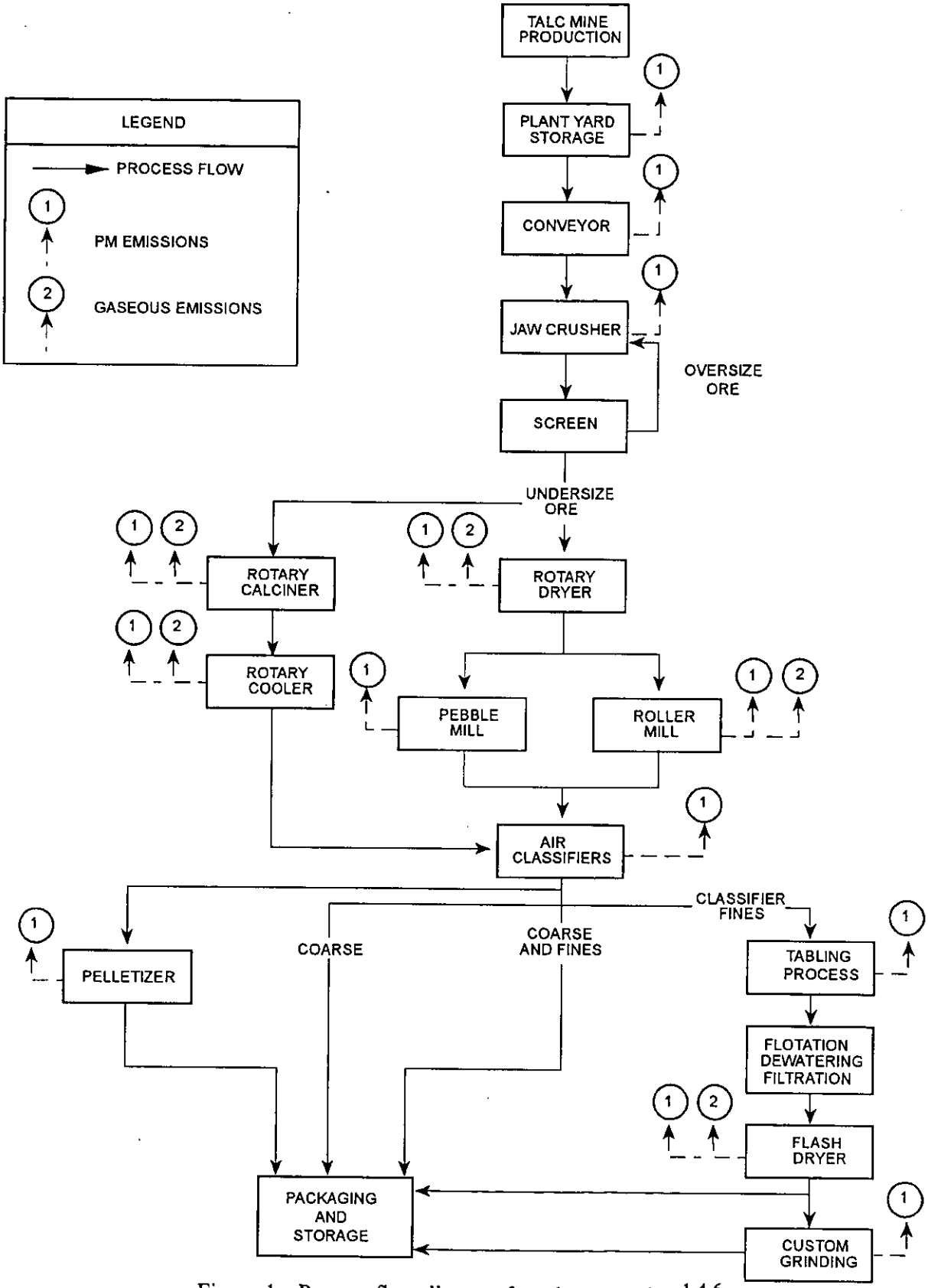

Figure 1. Process flow diagram for talc processing.[1,4,6]

Talc deposits mined in the southwestern United States contain organic impurities and must be calcined prior to additional processing to yield a product with uniform chemical and physical properties. Prior to calcining, the mined ore passes through a crusher and is ground to a specified screen size. After calcining in a rotary kiln, the material passes through a rotary cooler. The cooled calcine (0 percent free water) is then stored for shipment, or it may be further processed. Calcined talc may be mixed with dried talc from other product lines and passed through a roller mill prior to bulk shipping.

IV. Emissions and Controls[1-2,4-5,8-15]

The primary pollutant of concern in talc processing is particulate matter (PM) and PM less than 10 μm (PM-10). Particulate matter is emitted from drilling, blasting, crushing, screening, grinding, drying, calcining, classifying, materials handling and transfer operations, packaging, and storage. Although pelletizing is a wet process, PM may emitted from the transfer and feeding of processed talc to the pelletizer. Particulate matter emissions may include trace amounts of several inorganic compounds that are listed hazardous air pollutants (HAP), including arsenic, cadmium, chromium, cobalt, manganese, nickel, and phosphorus.

The emissions from dryers and calciners include products of combustion, such as carbon monoxide, carbon dioxide, nitrogen oxides, and sulfur oxides, in addition to filterable and condensible PM. Volatile organic compounds (VOC) also are emitted from the drying and calcining of southwestern United States talc deposits, which generally contain organic impurities. Products of combustion and VOC may also be emitted from roller mills that use heated air and from the furnaces that provide the heated air to the mill.

In the mid to late 1970's, the suspected presence of asbestos in the talc deposits located in upper New York State was a major controversy. The National Institute for Occupational Health and Safety (NIOSH) reported that the talc deposits in that region contained significant quantities of tremolite and anthophylite asbestos and reported elevated rates of lung cancer among those exposed to the talc. Later studies funded by the company mining the talc concluded that the material identified as asbestos in the NIOSH report was amphibole cleavage fragments rather than asbestos. The studies also concluded that the elevated cancer rates did not appear to be related to exposure to the talc dust mined from the deposits in question. Although some disagreement remains, the preponderance of evidence does not support the conclusion that the talc from those deposits contains asbestos.

Emissions from talc dryers and calciners are typically controlled with fabric filters. Fabric filters also are used at some facilities to control emissions from mechanical processes such as crushing and grinding.

V. Review of Emission Test Data

A. Reference 8

This report documents an emission test at a talc processing plant conducted in 1976. Uncontrolled and controlled filterable and condensible inorganic PM emissions and particle size distribution were measured. The PM emissions were measured using a modified Method 17. The particle size distribution was measured using an Alundum thimble connected to the nozzle by a 12-in. steel probe, followed by a 47-millimeter-type SGA filter. The particle size distribution of the portion of the sample found to be less than 45 μm was determined using electronic particle counter methods.

Table 1 summarizes the particle size distribution. Because the test report did not include process operating rates, emission factors could not be developed from the emission data. Because optical procedures rather than inertial separators were used to determine the particle size distribution, the data are rated E.

B. Reference 11

This report documents the results of emission tests conducted on a talc processing impact mill and a talc pelletizer. The tests were conducted in 1986 to demonstrate compliance with State regulations.

The sources tested were each ducted to a separate fabric filter, and only controlled emissions were measured. Filterable PM emissions were quantified using Method 5. Although three test runs were conducted, the report includes only the average production rates and filterable PM emission concentrations for the tests. In addition, due to the configuration of the stack, measurements could be made along one traverse only.

Emission factors were developed for filterable PM emissions from the grinding and the pelletizing operations. Because of the lack of adequate detail in the report and the deviation in sampling procedures described above, the emission data are assigned a rating of D.

C. Reference 12

This report documents measurement of filterable PM emissions from a talc primary crusher, crushed ore screen, roller mill, and bagging operation. The sources tested were each ducted to a separate fabric filter, and only controlled emissions were measured. The tests were conducted in 1990 to demonstrate compliance with State regulations.

The primary crusher reduces material up to 100 centimeters (cm) (40 in.) in size to less than 14.6 cm (5.75 in.). Emissions from the crusher are collected at the ore feed point, at the crushed ore discharge point, and along the skirted conveyor that transports crushed material to the screen. The emission stream is ducted to a cartridge type fabric filter. The material exiting the screen is deposited through a chute onto a conveyor. Emissions from the screen are combined with emissions collected from two pickup points along the conveyor located on the discharge side of the screen and ducted to a cartridge type fabric filter. In the roller mill, crushed talc ore is ground to a fine powder. The roller mill system includes a furnace to provide heated makeup air to entrain the fine particles, which are passed through a product recovery cyclone. The recovered product is classified by means of a pair of vibrating screens. Undersize material is pneumatically conveyed to storage and oversize material is returned to the roller mill. In the bagging operation, talc of four different grades (Grades 36, 85, and 100, and a special order) is bagged separately. Emissions from the bagging operation are ducted to two fabric filters.

Filterable PM emissions were quantified using Method 5, and three test runs were conducted. In addition, carbon dioxide (CO_2) concentrations in the exhaust stream from the roller mill were measured using fyrite. Although no problems were identified in the report, the information provided in Reference 13 indicates that the fabric filter that controlled emissions from the roller mill was malfunctioning during the test.

TABLE 1. SUMMARY OF PARTICLE SIZE DISTRIBUTION DATA FROM A TALC CRUSHING AND GRINDING FACILITY[a]

Process	Diameter, μm[b]	Cumulative weight, g	Cumulative percent less than diameter
Primary/secondary crushing	55.4	1.564	91.3
	34.9	3.932	78.2
	22.0	7.822	56.7
	17.4	9.546	47.2
	11.0	11.063	38.8
	6.9	14.197	21.4
	3.0	17.521	3.0
	2.0	17.898	0.94
	1.0	18.049	0.11
Vertical mill	29.0	0.002	100.0
	18.8	0.017	99.7
	14.9	0.031	99.4
	11.9	0.144	97.1
	9.4	0.943	80.8
	7.5	2.792	43.3
	4.7	4.554	7.5
	3.0	4.821	2.1
	1.9	4.908	0.28
	1.0	4.920	0.04
Storage, bagging, air classification	43.9	0.014	99.9
	27.7	0.339	97.9
	17.4	2.141	86.6
	13.8	4.289	73.2
	11.0	6.922	56.8
	6.9	12.108	24.5
	4.4	14.847	7.4
	3.0	15.534	3.1
	2.0	15.885	0.92
	1.0	16.016	0.10

[a]Reference 8. Data rated D.

[b]Optical procedures rather than inertial separators used to determine particle size distribution; data may be suspect.

Emission factors were developed for filterable PM emissions from all sources and for CO_2 emissions from the roller mill. The emission factors for the primary crushing, screening, and bagging operations were rated B; the test method was sound and no problems were reported but run-by-run process rates were not provided. The filterable PM data for the roller mill is rated D due to the problem with the control device. Finally, the CO_2 data for the roller mill was downrated to C because of the test method used and the lack of run-by-run process data.

D. Reference 13

This report documents the results of a retest of the roller mill subsequent to the test documented in Reference 12. Emissions from the mill were tested after repairs were made to the fabric filter that controls emissions from the mill. The test was conducted in 1990, three months after the test documented in Reference 12.

Filterable PM emissions were quantified using Method 5, and three test runs were conducted. In addition, carbon dioxide (CO_2) concentrations in the exhaust stream from the roller mill were measured using fyrite. No problems were identified in the test report.

Emission factors were developed for emissions of filterable PM and CO_2 from the roller mill. The filterable PM emission factor was rated B; the test method was sound and no problems were reported but run-by-run process rates were not provided. The CO_2 data for the roller mill was downrated to C because of the test method used and the lack of run-by-run process data.

E. Reference 14

This report documents measurements of emissions of filterable PM and four metals from a talc roller mill. Emissions from the mill are controlled with a fabric filter, and only controlled emissions were measured. The tests were conducted in 1993 to demonstrate compliance with State regulations.

Filterable PM emissions were quantified using a modified Method 17 to allow measurement of metals emissions also. The modification consisted of the stainless steel sampling train equipment being replaced with teflon coated equipment. The sample was analyzed for four metals (arsenic, cadmium, hexavalent chromium, and nickel) using National Institute for Occupational Safety and Health (NIOSH) Method 7300. Two runs were conducted. The talc product and fabric filter catch also were analyzed for the same metals. Table 2 summarizes the results of those analyses.

Emission factors were developed for emissions of filterable PM, arsenic, and nickel; hexavalent chromium and cadmium were not detected in the samples. The emission data were rated C because only two test runs were conducted and average rather than run-by-run process rates were provided in the report.

F. Reference 15

This report documents measurements of emissions of filterable PM and four metals from a talc roller mill. Emissions from the mill are controlled with a fabric filter, and only controlled emissions were measured. The tests were conducted in 1993 to demonstrate compliance with State regulations.

TABLE 2. SUMMARY OF METALS ANALYSIS OF TALC PRODUCT AND FABRIC FILTER CATCH

Analyte	Concentration, mg/kg		
Talc product			
arsenic	802	699	1.55
cadmium	<0.50	0.964	0.408
total chromium	NA	NA	6.53
hexavalent chromium	1.96	<4.03	<0.094
nickel	522	965	207
Fabric filter catch			
arsenic	55.1	658	3.32
cadmium	<0.431	0.984	0.339
total chromium	NA	NA	12.6
hexavalent chromium	4.88	<4.06	<0.100
nickel	490	960	244
Reference	14	15	16

NA = not applicable, analyte not quantified.

Filterable PM emissions were quantified using a modified Method 17 to allow measurement of metals emissions also. The modification consisted of the stainless steel sampling train equipment being replaced with teflon coated equipment. The sample was analyzed for four metals (arsenic, cadmium, hexavalent chromium, and nickel) using NIOSH Method 7300. Two runs were conducted. The talc product and fabric filter catch also were analyzed for the same metals. Table 2 includes the results of those analyses.

Emission factors were developed for emissions of filterable PM, hexavalent chromium, and nickel; arsenic and cadmium were not detected in the samples. The emission data were rated C because only two test runs were conducted and average rather than run-by-run process rates were provided in the report.

G. Reference 16

This report documents measurements of emissions of filterable PM and four metals from a talc roller mill. The roller mill was located at the same facility for the test documented in Reference 15. Emissions from the mill are controlled with a fabric filter, and only controlled emissions were measured. The tests were conducted in 1993 to demonstrate compliance with State regulations.

Filterable PM emissions were quantified using a modified Method 17 to allow measurement of metals emissions also. The modification consisted of the stainless steel sampling train equipment being replaced with teflon coated equipment. The sample was analyzed for five metal analytes (arsenic, cadmium, hexavalent chromium, total chromium, and nickel) using NIOSH Method 7300. Only one test run was conducted. The talc product and fabric filter catch also were analyzed for the same metals. Table 2 includes the results of those analyses.

Emission factors were developed for emissions of filterable PM, hexavalent chromium, and nickel; arsenic and cadmium were not detected in the samples. However, the emission data were not rated because only one test run was conducted.

VI. Development of Candidate Emission Factors

Table 3 summarizes the available data on emissions from talc processing, and Table 4 presents the candidate emission factors for the AP-42 Section 11.26, Talc Processing. The following paragraphs describe the candidate emission factors were developed from the data presented in Table 3.

For primary crushing, and for screening and transfer of crushed talc, filterable PM data from one B-rated test were available. The candidate emission factors developed from the data are assigned a rating D because they are based on a single test. These emission factors are in units of kg/Mg (lb/ton) of crushed talc production.

For filterable PM emissions from talc grinding, data were available from one B-rated test, two C-rated tests, and two D-rated tests. The average emission factor calculated from the B-rated (Reference 13) data set is between 1 and 2 orders of magnitude lower than the average factors developed from the other data sets. Based on the information provided in the test reports, there is no apparent explanation for why the Reference 13 data are so much lower in magnitude than the other data sets. Furthermore, because the emission stream sampled for Reference 13 included emissions from screening as well as grinding, the factor developed from Reference 13 data would be expected to be comparable if not higher in magnitude than the factors developed from the other references. In view of this inconsistency in the data and the lack of a reason for excluding any of the data sets, the data from all five sets were combined. The average factors developed from References 12 and 13 were first combined because they represent emissions from the same grinding mill. That average factor was then average with the factors developed from the other three data sets. The resulting candidate emission factor is 0.067 kg/Mg (0.14 lb/ton) of ground material produced; this factor is rated E because it is based primarily on C- and D-rated data.

For talc pelletizing, one D-rated data set was available. The candidate emission factor developed from the data is rated E; the units for the factor are kg/Mg (lb/ton) of talc pellets produced.

For processed talc packaging and storage, one B-rated data set was available. Because this factor is based on data for a specific combination of talc grades, it may not be representative of emissions from general packaging and storage operations. Therefore, the factor is assigned a rating of E. The units for the factor are kg/Mg (lb/ton) of talc packaged and stored.

TABLE 3. SUMMARY OF TEST DATA FOR TALC PROCESSING

Process	APCD	Pollutant	No. of runs	Data rating	Emission factor						Ref. No.
					kg/Mg			lb/ton			
					Minimum	Maximum	Average	Minimum	Maximum	Average	
Grinding (impact mill)	FF	filterable PM	3	D	NS	NS	0.054	NS	NS	0.11	11
Pelletizing	FF	filterable PM	3	D	NS	NS	0.064	NS	NS	0.13	11
Packaging and storage	FF	filterable PM	3	B	0.0013	0.0049	0.0029	0.0027	0.0098	0.0059	12
Primary crushing	FF	filterable PM	3	B	0.00039	0.00071	0.00053	0.00078	0.0014	0.0011	12
Grinding (roller mill) and screening	FF	filterable PM	3	D	0.088	0.11	0.097	0.18	0.21	0.19	12
		CO2	3	C	4.0	7.9	6.6	8.0	16	13	12
Crushed talc screening and transfer	FF	filterable PM	3	B	0.0011	0.0085	0.0037	0.0023	0.017	0.0074	12
Grinding (roller mill) and screening	FF	filterable PM	3	B	0.0014	0.0023	0.0019	0.0028	0.0047	0.0039	13
		CO2	3	C	8.3	16	12	17	33	24	13
Grinding (roller mill)	FF	filterable PM	2	C	0.13	0.20	0.16	0.26	0.39	0.33	14
		arsenic	2	C	7.3E-06	1.2E-05	9.6E-06	1.5E-05	2.4E-05	1.9E-05	14
		nickel	2	C	5.1E-05	7.7E-05	6.4E-06	0.00010	0.00015	0.00013	14
Grinding (roller mill)	FF	filterable PM	2	C	0.0046	0.0077	0.0062	0.0093	0.015	0.012	15
		Cr+6	2	C	4.1E-06	9.8E-06	6.9E-06	8.2E-06	2.0E-05	1.4E-05	15
		nickel	2	C	1.3E-05	1.3E-05	1.3E-05	2.5E-05	2.6E-05	2.6E-05	15
Grinding (roller mill)	FF	filterable PM	1	NR	NA	NA	0.010	NA	NA	0.021	16
		cadmium	1	NR	NA	NA	2.3E-07	NA	NA	4.5E-07	16
		chromium	1	NR	NA	NA	4.5E-07	NA	NA	8.9E-07	16
		nickel	1	NR	NA	NA	6.3E-06	NA	NA	1.3E-05	16

APCD = air pollution control device; FF = fabric filter; NS = not specified; NA = not applicable; NR = not rated; Cr+6 = hexavalent chromium.

TABLE 4. SUMMARY OF CANDIDATE EMISSION FACTORS FOR TALC PROCESSING

Process	Control	Pollutant	No. of tests	Average emission factor (a)			References
				kg/Mg	lb/ton	Rating	
Primary crushing	fabric filter	filterable PM	1	0.00055	0.0011	D	12
Screening and transfer (b)	fabric filter	filterable PM	1	0.0037	0.0074	E	12
Grinding	fabric filter	filterable PM	5	0.067	0.14	E	11-15
Grinding	fabric filter	arsenic	1	9.5E-06	1.9E-05	E	14
Grinding	fabric filter	hexavalent chromium	1	7.0E-06	1.4E-05	E	15
Grinding	fabric filter	nickel	3	3.9E-05	7.8E-05	E	14-15
Grinding (c)	none	CO2	2	9.3	19	E	12-13
Pelletizing	fabric filter	filterable PM	1	0.054	0.13	E	11
Packaging and storage (d)	fabric filter	filterable PM	1	0.0027	0.0059	E	12

(a) Emission factors in units kg/Mg and lb/ton of production.

(b) For crushed talc.

(c) For roller mill using heated makeup air.

(d) For combination of Grades 36, 85, 100 talc, and specialty product talc.

VII. REFERENCES

1. *Calciners and Dryers in Mineral Industries--Background Information for Proposed Standards*, EPA-450/3-025a, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1985.

2. L. A. Roe and R. H. Olson, "Talc", *Industrial Rocks and Minerals, Volume I*, Society of Mining Engineers, New York, NY, 1983.

3. R. L. Virta, "Talc in 1992", *Mineral Industry Surveys, Annual, Preliminary*, Bureau of Mines, U.S. Department of the Interior, Washington, DC, January 1993.

4. Written communication from B. Virta, Bureau of Mines, U.S. Department of the Interior, Washington, D.C., to R. Myers, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 28, 1994.

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6. Written communication from S. Harms, Montana Talc Company, Three Forks, Montana, to R. Myers, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

7. R. L. Virta, *The Talc Industry--An Overview*, Information Circular 9220, Bureau of Mines, U.S. Department of the Interior, Washington, DC, 1989.

8. *Emission Study at a Talc Crushing and Grinding Facility, Eastern Magnesia Talc Company, Johnson, Vermont, October 19-21, 1976*, Report No. 76-NMM-4, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1977.

9. *Occupational Exposure to Talc Containing Asbestos*, DHEW (NIOSH) Publication No. 80-115, National Institute for Occupational Safety and Health, U.S. Department Of Health, Education, and Welfare, Washington, DC, February 1980.

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11. R. A. James and K. Ganesan, *Particulate Emissions from Montana Talc Company, Sappington, Montana, December 1986*, Whitehall, MT, December 1986.

12. *Particulate Emission Compliance Program for the Columbia Mill, Ludlow, Vermont*, Air Quality Technical Services, Inc., South Burlington, Vermont, July 15, 1990.

13. *Particulate Emission Compliance Program - Retest for Alpha Mill*, Air Quality Technical Services, Inc., South Burlington, Vermont, September 28, 1990.

14. *Luzenac America, Inc., Chester, Vermont, Stack Emissions Measurements*, New England Air Quality Testing, Burlington, Vermont, February 3, 1994.

15. *Luzenac America, Inc., Ludlow, Vermont, Stack Emissions Measurements*, New England Air Quality Testing, Burlington, Vermont, February 3, 1994.

16. *Luzenac America, Inc., Ludlow, Vermont, Stack Emissions Measurements*, New England Air Quality Testing, Burlington, Vermont, February 21, 1994.

This is preliminary material, in draft form, for purposes of review. This material must not be quoted, cited, or in any other way considered or used as final work.

11.26 TALC PROCESSING

11.26.1 Process Description[1-7]

Talc, which is a soft, hydrous magnesium silicate ($3MgO \cdot 4SiO_2 \cdot H_2O$), is used in a wide range of industries including the manufacture of ceramics, paints, paper, and asphalt roofing. The end-uses for talc are determined by variables such as chemical and mineralogical composition, particle size and shape, specific gravity, hardness, and color. There is no Source Classification Code (SCC) for the source category.

Most domestic talc is mined from open-pit operations; over 95 percent of the talc ore produced in the United States comes from open-pit mines. Mining operations usually consist of conventional drilling and blasting methods. The softness of talc makes it easier to mine and process than most other minerals.

Figure 11.26-1 is a process flow diagram for a typical domestic talc plant. Talc ore generally is hauled to the plant by truck from a nearby mine. The ore is crushed, typically in a jaw crusher, and screened. The coarse (oversize) material then is returned to the crusher. Rotary dryers may be used to dry the material. Secondary grinding is achieved with pebble mills or roller mills, producing a product that is 44 to 149 micrometers (μm) (325 to 100 mesh) in size. Some roller mills are designed to use heated air to dry the material as it is being ground. Hammer mills or jet air mills may be used to produce additional final products. Air classifiers (separators), generally in closed-circuit with the mills, separate the material into coarse, coarse-plus-fine, and fine fractions. The coarse and coarse-plus-fine fractions then are stored as products. The fines may be concentrated using a shaking table (tabling process) to separate product containing small quantities of nickel, iron, cobalt, or other minerals and then undergo a one-step flotation process. The resultant talc slurry is dewatered and filtered prior to passing through a flash dryer. The flash-dried product is then stored for shipment, or it may be further ground to meet customer specifications. The classified material also may be pelletized prior to packaging for specific applications. In the pelletizing step, processed talc is mixed with water to form a paste and then extruded as pellets.

Talc deposits mined in the southwestern United States contain organic impurities and must be calcined prior to additional processing to yield a product with uniform chemical and physical properties. Generally, a separate product will be used to produce the calcined talc. Prior to calcining, the mined ore passes through a crusher and is ground to a specified screen size. After calcining in a rotary kiln, the material passes through a rotary cooler. The cooled calcine (0 percent free water) is then stored for shipment, or it may be further processed. Calcined talc may be mixed with dried talc from other product lines and passed through a roller mill prior to bulk shipping.

11.26.2 Emissions and Controls[1-2,4-5,7-11]

The primary pollutant of concern in talc processing is particulate matter (PM) and PM less than 10 μm (PM-10). Particulate matter is emitted from drilling, blasting, crushing, screening, grinding, drying, calcining, classifying, materials handling and transfer operations, packaging, and storage. Although pelletizing is a wet process, PM may emitted from the transfer and feeding of processed talc to the pelletizer. Particulate matter emissions may include trace amounts of several inorganic compounds that are listed hazardous air pollutants (HAP), including arsenic, cadmium, chromium, cobalt, manganese, nickel, and phosphorus.

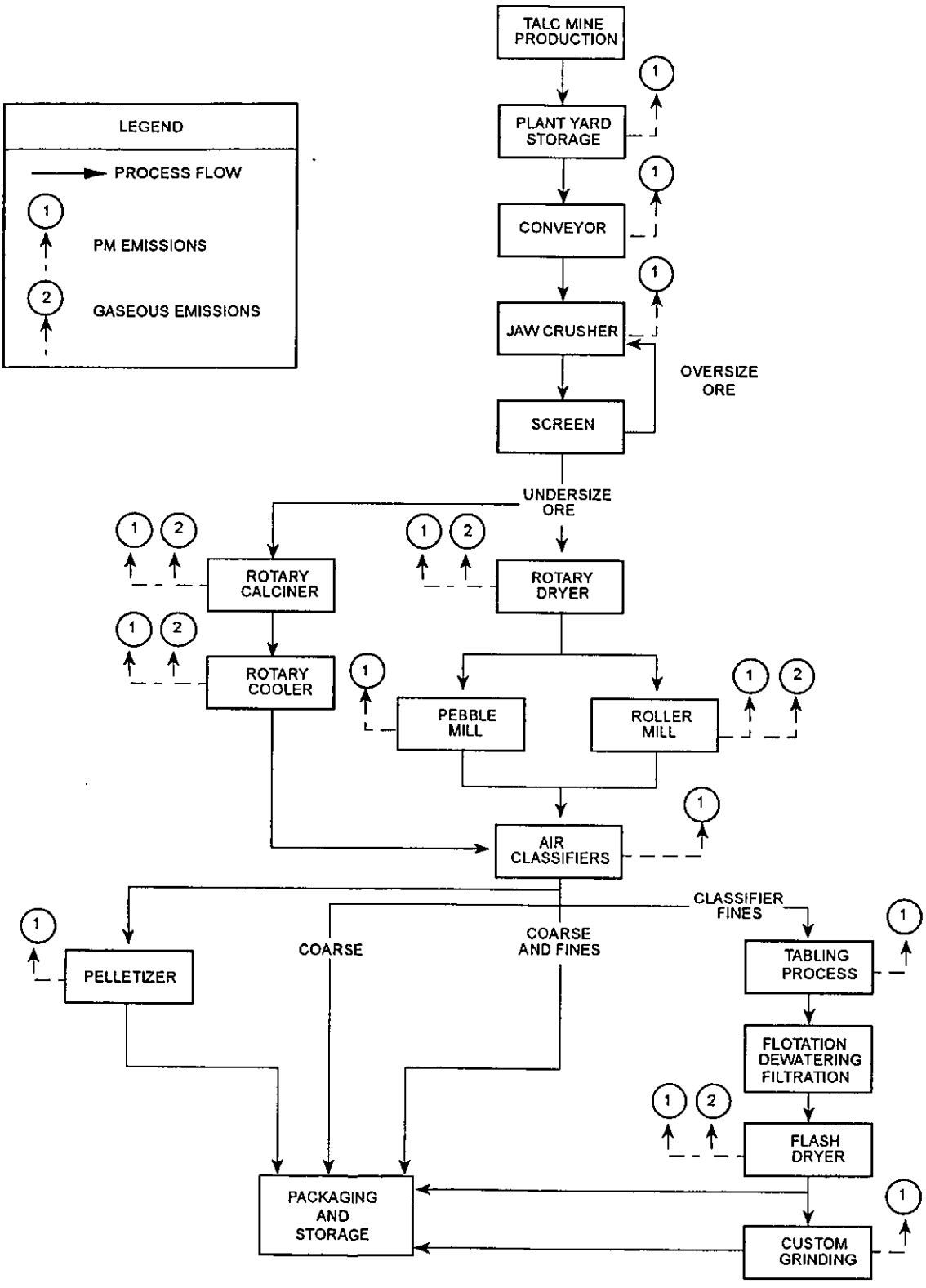

Figure 11.26-1. Process flow diagram for talc processing.[1,4,7]

The emissions from dryers and calciners include products of combustion, such as carbon monoxide, carbon dioxide, nitrogen oxides, and sulfur oxides, in addition to filterable and condensible PM. Volatile organic compounds also are emitted from the drying and calcining of southwestern United States talc deposits, which generally contain organic impurities. Products of combustion and VOC may also be emitted from roller mills that use heated air and from the furnaces that provide the heated air to the mill.

Emissions from talc dryers and calciners are typically controlled with fabric filters. Fabric filters also are used at some facilities to control emissions from mechanical processes such as crushing and grinding. Emission factors for PM emissions from talc processing are presented in Table 11.26-1 (metric and English units). Emission factors for other pollutants are presented in Table 11.26-2. Particle size distributions for talc processing are summarized in Table 11.26-3 and are depicted graphically in Figure 11.26-2.

REFERENCES FOR SECTION 11.26

1. *Calciners And Dryers In Mineral Industries--Background Information For Proposed Standards,* EPA-450/3-025a, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1985.

2. L. A. Roe and R. H. Olson, "Talc", *Industrial Rocks And Minerals, Volume I,* Society of Mining Engineers, NY, 1983.

3. R. L. Virta, *The Talc Industry-An Overview,* Information Circular 9220, Bureau of Mines, U.S. Department of the Interior, Washington, DC, 1989.

4. Written communication from B. Virta, Bureau of Mines, U.S. Department of the Interior, Washington, D.C., to R. Myers, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 28, 1994.

5. *Emission Study At A Talc Crushing And Grinding Facility, Eastern Magnesia Talc Company, Johnson, Vermont, October 19-21, 1976,* Report No. 76-NMM-4, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1977.

6. Written communication from S. Harms, Montana Talc Company, Three Forks, Montana, to R. Myers, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

7. R. A. James and K. Ganesan, *Particulate Emissions From Montana Talc Company, Sappington, Montana, December 1986,* Whitehall, MT, December 1986.

8. *Particulate Emission Compliance Program For The Columbia Mill, Ludlow, Vermont,* Air Quality Technical Services, Inc., South Burlington, VT, July 15, 1990.

9. *Particulate Emission Compliance Program - Retest For Alpha Mill,* Air Quality Technical Services, Inc., South Burlington, VT, September 28, 1990.

10. *Luzenac America, Inc., Chester, Vermont, Stack Emissions Measurements,* New England Air Quality Testing, Burlington, VT, February 3, 1994.

11. *Luzenac America, Inc., Ludlow, Vermont, Stack Emissions Measurements,* New England Air Quality Testing, Burlington, VT, February 3, 1994.

Table 11.26-1 (Metric And English Units).
EMISSION FACTORS FOR TALC PROCESSING--PM[a]

EMISSION FACTOR RATING: E

Process	Filterable PM[b]	
	kg/Mg	lb/ton
Primary crushing, with fabric filter[c] (SCC 3-05-__-__)	0.00055	0.0011
Screening and transfer, with fabric filter[d] (SCC 3-05-__-__)	0.0037	0.0074
Grinding, with fabric filter[e] (SCC 3-05-__-__)	0.067	0.14
Pelletizing, with fabric filter[f] (SCC 3-05-__-__)	0.054	0.13
Packaging and storage, with fabric filter[g] (SCC 3-03-0__-__)	0.0027	0.0059

[a]SCC = Source Classification Code. Emission factors in units of kg/Mg and lb/ton of production.
[b]Filterable PM is that PM collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train.
[c]Reference 8. EMISSION FACTOR RATING: D.
[d]Reference 8. For crushed talc.
[e]References 7-11. Based on five emission tests that ranged from 0.0019 to 0.16 kg/Mg (0.0039 to 0.33 lb/ton).
[f]Reference 7.
[g]Reference 8. Based on data for packaging and storing combination of Grades 36, 85, and 100 talc, plus a specialty grade talc.

Table 11.26-2 (Metric And English Units).
EMISSION FACTORS FOR TALC PROCESSING--OTHER POLLUTANTS[a]

EMISSION FACTOR RATING: E

Process	Pollutant	Emission factor	
		kg/Mg	lb/ton
Grinding[b] (SCC 3-05-___-__)	CO_2	9.3	19
Grinding, with fabric filter (SCC 3-05-___-__)	Arsenic[c]	9.5×10^{-6}	1.9×10^{-5}
	Hexavalent chromium[d]	7.0×10^{-6}	1.4×10^{-5}
	Nickel[e]	3.9×10^{-5}	7.8×10^{-5}

[a]SCC = Source Classification Code. Emission factors in units of kg/Mg and lb/ton of production.
[b]References 8-9. For roller mill using heated makeup air.
[c]Reference 10.
[d]Reference 11.
[e]References 10-11.

Table 11.26-3. SUMMARY OF PARTICLE SIZE DISTRIBUTIONS FOR TALC PROCESSING[a]

Process	Diameter, μm	Cumulative percent less than diameter
Primary/secondary crushing	55.4	91.3
	34.9	78.2
	22.0	56.7
	17.4	47.2
	11.0	38.8
	6.9	21.4
	3.0	3.0
	2.0	0.94
	1.0	0.11
Grinding	29.0	100.0
	18.8	99.7
	14.9	99.4
	11.9	97.1
	9.4	80.8
	7.5	43.3
	4.7	7.5
	3.0	2.1
	1.9	0.28
	1.0	0.04
Storage, bagging, air classification	43.9	99.9
	27.7	97.9
	17.4	86.6
	13.8	73.2
	11.0	56.8
	6.9	24.5
	4.4	7.4
	3.0	3.1
	2.0	0.92
	1.0	0.10

[a]Reference 5. Optical procedures rather than inertial separators used to determine particle size distribution; data may be suspect.

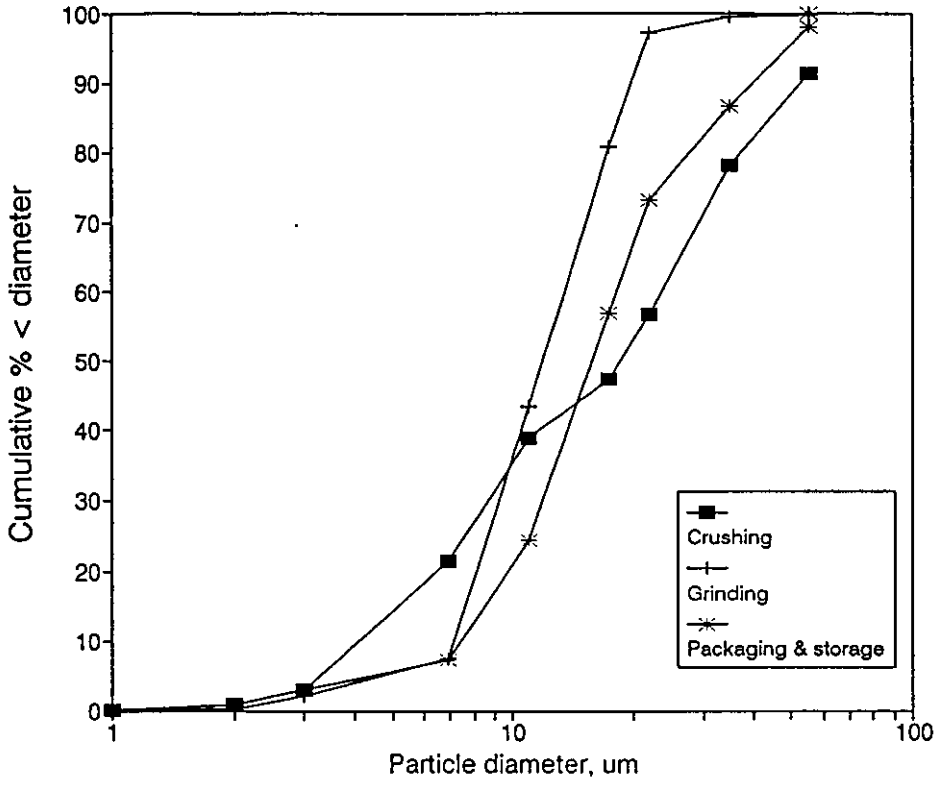

Figure 11.26-2. Particle size distribution for talc processing.[5]

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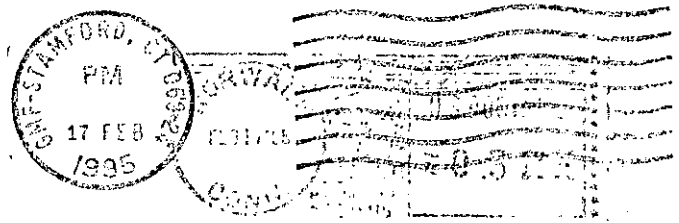

MD-14

Mr. Ronald E. Myers
Emissions Factors and Methodologies Section
Emission Inventory Branch
United States Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

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February 16, 1995

Mr. Ronald E. Myers
Emissions Factors and Methodologies Section
Emission Inventory Branch
United States Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

Subject: 2nd Draft - AP-42 Section 8.30, Talc Processing

Dear Mr. Myers:

Thank you for providing an opportunity to comment on the updated AP-42 draft dated January 25, 1995. We appreciate the revisions seen in the background memorandum and have no further comments.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

John W. Kelse
Corporate Industrial Hygienist
Manager, Occupational Health & Safety

JWK/sk

cc: Mr. Dana Putman
Vice President and General Manager
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June 27, 1995

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

Dear Mr. Myers:

I have reviewed the final draft report on emission factor documentation for AP-42, Section 11.26, Talc Processing (EPA Contract 68-D2-0159, Work Assignment No. II-01) and I would like to make the following comments.

I believe the emission factors in the draft report accurately reflect typical emissions from talc processing, with one exception. I feel the "Pelletizing, with fabric filter" emission factor of 0.064 pounds of particulate matter per 1000 pounds of material processed does not accurately reflect the process typically used in the talc industry. Based on the emission factor listed in the final draft, the pelletizing process would appear to be a significant source of plant emissions. In actuality, this process should generate substantially less particulate matter than activities involving dry final product handling, such as packaging or storage bin loading.

The typical pellet mill system consists of a feed bin (with baghouse) with an enclosed discharge to an enclosed turbulizer where water is added to moisten the talc. The turbulizer discharges moistened talc through an enclosed discharge system into an enclosed homogenizing conveyor (paddle mixer) for uniform mixing. The talc, now containing 15-20% water, is discharged through an enclosed feed system into the pelletizer where the material is extruded through dies.

After the feed bin, the pelletizing process is typically a damp, closed system involving mechanical mixing and conveying processes which do not generate enough particulate matter to require a separate dust collector. Because minor amounts of dust may be generated during startup, the mixing process may be vented to the dryer dust collector to maintain a slight negative pressure within the mixing system.

Due to the processes involved, pelletizing should generate substantially less particulate matter than activities involving dry final product handling, such as packaging or storage bin loading.

Also, as the pelletizing emission factor was derived from one "E - Poor" rated test, I do not feel this is an accurate standard to portray industry wide emissions from the pelletizing process. I hope this information is useful in your work developing AP-42, Section 11.26. If you have any questions or require any additional information, please contact me at (406) 285-5312.

Sincerely,

William R. Kraemer
Environmental Coordinator
Western Operations

cc: R. J. Buettner
R. F. Goff

FAX TRANSMISSION

TO: Bill Kraemer
Luzenac America
Three Forks, MT

FROM: Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, North Carolina 27513
(919) 677-0249, Ext. 5359

DATE: May 2, 1995

RECEIVING FAX NUMBER: 406-285-3323

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF 8 PAGES (INCLUDING THIS PAGE)

Here are the calculation sheets for the emission test on Source DC-1 at the Sappington Mill. There are two sheets for each test run; the first of the two is a summary of all of the keyed in and calculated data, and the second sheet in each set shows the equations used to calculate the date. The last sheet I am sending is the first page of a summary of the emission rates and emission factors for the Sappington Mill. As you can see from that page, the emission rates for Runs 3 and 4 (Source DC-1) are 0.054 and 0.052 lb/hr, respectively.

Please give me a call if you have any questions about these calculations.

Thanks again for all of your help.

EMISSION TEST CALCULATIONS

Reference: Luzenac America-Sappington, Stack DC-1, Run 1 (1/6/95)

A	=	233.7048	= stack area, in sq. in.
A(nz)	=	0.000349	= area of nozzle, in sq. ft.
Cp	=	0.84	= pitot tube coefficient
Delta H	=	1.92	= average pressure differential of orifice meter, in inch
Delta P	=	0.72	= average velocity head, in inches water
Dia	=	0.253	= nozzle diameter, in inches
mc	=	1.65	= percent moisture, by volume, measured in stack ga
Md	=	28.84	= estimated dry molecular weight, in lb/lb-mole
Mfd	=	0.983	= dry mole fraction of stack gas
Ms	=	28.66	= wet molecular weight of stack gas, in lb/lb-mole
P(std)	=	29.92	= standard pressure, in inches Hg
Pbar	=	25.90	= barometric pressure, in inches Hg
Pg	=	-10.00	= stack gas static pressure, in inches water
Ps	=	25.16	= absolute stack pressure, in inches Hg.
Qaw	=	5,090.9	= wet volumeteric stack flow at stack conditions, in A
Qsd	=	4,356.1	= volumetric stack flow, in DSCFM.
Theta	=	96	= sampling time, in min.
tm	=	67.3	= dry gas meter temperature, in degrees F.
ts	=	50.4	= stack temperature in degree F.
T(std)	=	528	= standard temperature, in degrees Rankine
Vlc	=	31.9	= volume of liquid collected in impingers, in ml
Vm	=	102.231	= volume of gas sampled, in dry ACF
Vm(std)	=	89.238	= volume of dry gas sampled at standard conditions, i
vs	=	52.28	= stack gas velocity, in ft/sec.
Vw(std)	=	1.502	= volume of water vapor at standard conditions, in SC
Y	=	1.002	= dry gas meter calibration factor
%I	=	99.2	= percent isokinetic of sampling rate

Volume of dry gas sampled at standard conditions

Vm(std) = 17.64*Y*Vm*(Pbar+Delta H/13.6)/(460+tm)
= 89.238

Volume of water vapor at standard conditions

Vw(std) = 0.04707*Vlc
= 1.502

Percent moisture, by volume, measured in stack gas

mc = 100*Vw(std)/(Vw(std)+Vm(std))
= 1.65

Dry mole fraction of stack gas

Mfd = 1-(mc/100)
= 0.983

Wet molecular weight of stack gas

Ms = (Md*Mfd)+(0.18*mc)
= 28.66

Absolute stack gas pressure

Ps = Pbar+(Pg/13.6)
= 25.16

Average stack gas velocity

vs = 85.49*Cp*SQRT((Delta p*(460+ts)/(Ps*ms))
= 51.26

Volumetric flowrate at standard conditions

Qsd = 60/144*Mfd*vs*A*(Tstd/(ts+460))*(Ps/Pstd)
= 4,356.1

Wet volumetric flowrate at stack gas conditions

Qaw = 60/144*vs*A
= 5,090.9

Percent isokinetic of sampling rate

%I = Pstd/Tsdt*100/60*((ts+460*Vm(std))/(Ps*vs*Mfd*Theta*A(nz))
= 99.2

Reference: Luzenac America-Sappington, Stack DC-1, Run 3 (1/6/95)

A	=	233.7048	= stack area, in sq. in.
A(nz)	=	0.000349	= area of nozzle, in sq. ft.
Cp	=	0.84	= pitot tube coefficient
Delta H	=	3.15	= average pressure differential of orifice meter, in inch
Delta P	=	0.64	= average velocity head, in inches water
Dia	=	0.253	= nozzle diameter, in inches
mc	=	1.10	= percent moisture, by volume, measured in stack ga
Md	=	28.84	= estimated dry molecular weight, in lb/lb-mole
Mfd	=	0.989	= dry mole fraction of stack gas
Ms	=	28.72	= wet molecular weight of stack gas, in lb/lb-mole
P(std)	=	29.92	= standard pressure, in inches Hg
Pbar	=	25.90	= barometric pressure, in inches Hg
Pg	=	-10.00	= stack gas static pressure, in inches water
Ps	=	25.16	= absolute stack pressure, in inches Hg.
Qaw	=	3,860.0	= wet volumeteric stack flow at stack conditions, in A
Qsd	=	3,139.4	= volumetric stack flow, in DSCFM.
Theta	=	96	= sampling time, in min.
tm	=	87.7	= dry gas meter temperature, in degrees F.
ts	=	80	= stack temperature in degree F.
T(std)	=	528	= standard temperature, in degrees Rankine
Vlc	=	18.93	= volume of liquid collected in impingers, in ml
Vm	=	94.840	= volume of gas sampled, in dry ACF
Vm(std)	=	79.980	= volume of dry gas sampled at standard conditions, i
vs	=	39.64	= stack gas velocity, in ft/sec.
Vw(std)	=	0.891	= volume of water vapor at standard conditions, in SC
Y	=	1.002	= dry gas meter calibration factor
%I	=	123.4	= percent isokinetic of sampling rate

Volume of dry gas sampled at standard conditions

Vm(std) = 17.64*Y*Vm*(Pbar+Delta H/13.6)/(460+tm)
= 79.980

Volume of water vapor at standard conditions

Vw(std) = 0.04707*Vlc
= 0.891

Percent moisture, by volume, measured in stack gas

mc = 100*Vw(std)/(Vw(std)+Vm(std))
= 1.10

Dry mole fraction of stack gas

Mfd = 1-(mc/100)
= 0.989

Wet molecular weight of stack gas

Ms = (Md*Mfd)+(0.18*mc)
= 28.72

Absolute stack gas pressure

Ps = Pbar+(Pg/13.6)
= 25.16

Average stack gas velocity

vs = 85.49*Cp*SQRT((Delta p*(460+ts)/(Ps*ms))
= 49.66

Volumetric flowrate at standard conditions

Qsd = 60/144*Mfd*vs*A*(Tstd/(ts+460))*(Ps/Pstd)
= 3,139.4

Wet volumetric flowrate at stack gas conditions

Qaw = 60/144*vs*A
= 3,860.0

Percent isokinetic of sampling rate

%I = Pstd/Tsdt*100/60*((ts+460*Vm(std))/(Ps*vs*Mfd*Theta*A(nz))
= 123.4

Reference: Luzenac America-Sappington, Stack DC-1, Run 4 (1/6/95)

A	=	233.7048	= stack area, in sq. in.
A(nz)	=	0.000349	= area of nozzle, in sq. ft.
Cp	=	0.84	= pitot tube coefficient
Delta H	=	3.758	= average pressure differential of orifice meter, in inch
Delta P	=	0.8	= average velocity head, in inches water
Dia	=	0.253	= nozzle diameter, in inches
mc	=	1.21	= percent moisture, by volume, measured in stack ga
Md	=	28.84	= estimated dry molecular weight, in lb/lb-mole
Mfd	=	0.988	= dry mole fraction of stack gas
Ms	=	28.71	= wet molecular weight of stack gas, in lb/lb-mole
P(std)	=	29.92	= standard pressure, in inches Hg
Pbar	=	25.90	= barometric pressure, in inches Hg
Pg	=	-10.00	= stack gas static pressure, in inches water
Ps	=	25.16	= absolute stack pressure, in inches Hg.
Qaw	=	4,261.2	= wet volumeteric stack flow at stack conditions, in A
Qsd	=	3,474.7	= volumetric stack flow, in DSCFM.
Theta	=	96	= sampling time, in min.
tm	=	92	= dry gas meter temperature, in degrees F.
ts	=	78	= stack temperature in degree F.
T(std)	=	528	= standard temperature, in degrees Rankine
Vlc	=	22.92	= volume of liquid collected in impingers, in ml
Vm	=	104.770	= volume of gas sampled, in dry ACF
Vm(std)	=	87.816	= volume of dry gas sampled at standard conditions, i
vs	=	43.76	= stack gas velocity, in ft/sec.
Vw(std)	=	1.079	= volume of water vapor at standard conditions, in SC
Y	=	1.002	= dry gas meter calibration factor
%I	=	122.4	= percent isokinetic of sampling rate

Volume of dry gas sampled at standard conditions

Vm(std) = 17.64*Y*Vm*(Pbar+Delta H/13.6)/(460+tm)
= 87.816

Volume of water vapor at standard conditions

Vw(std) = 0.04707*Vlc
= 1.079

Percent moisture, by volume, measured in stack gas

mc = 100*Vw(std)/(Vw(std)+Vm(std))
= 1.21

Dry mole fraction of stack gas

Mfd = 1-(mc/100)
= 0.988

Wet molecular weight of stack gas

Ms = (Md*Mfd)+(0.18*mc)
= 28.71

Absolute stack gas pressure

Ps = Pbar+(Pg/13.6)
= 25.16

Average stack gas velocity

vs = 85.49*Cp*SQRT((Delta p*(460+ts)/(Ps*ms))
= 55.43

Volumetric flowrate at standard conditions

Qsd = 60/144*Mfd*vs*A*(Tstd/(ts+460))*(Ps/Pstd)
= 3,474.7

Wet volumetric flowrate at stack gas conditions

Qaw = 60/144*vs*A
= 4,261.2

Percent isokinetic of sampling rate

%I = Pstd/Tsdt*100/60*((ts+460*Vm(std))/(Ps*vs*Mfd*Theta*A(nz))
= 122.4

Source category: Talc processing
Plant name: Luzenac America
Process: ?

Filename: TALC_R18.WQ1
Location: Sappington, MT
Test date: December 1994 - March 1995

Date: 05/02/95
Ref. No.: 4-18
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.
Screen and Transfers DC-1	FF	filterable PM	1	EPA 5	100.2	89.24	4,356	0.0586	0.01013	0.38	20	0.0095	0.019	
		filterable PM	2		103.8	79.98	3,139	0.0103	0.00199	0.0535	20	0.0013	0.0027	
		filterable PM	3		101.8	87.82	3,475	0.0100	0.00176	0.0523	20	0.0013	0.0026	
									gr/DSCF		Average	0.0040	0.008	
		cond. inorganic PM	1	EPA 5	100.2	42.81	4,356	0.0044	0.00159	0.0592	20	0.0015	0.0030	
		cond. inorganic PM	2		103.8	79.83	3,139	0.0030	0.00058	0.0156	20	0.00039	0.00078	
		cond. inorganic PM	3		101.8	88.04	3,475	0.0028	0.00049	0.0146	20	0.00037	0.00073	
									gr/DSCF		Average	0.00075	0.0015	
Impactor and Impactor Conveyor DC-2	FF	filterable PM	1	EPA 5	102.1	68.39	2,763	0.0099	0.00223	0.0529	20	0.0013	0.0026	
		filterable PM	2		101.6	66.13	2,701	0.0078	0.00182	0.0421	20	0.0011	0.0021	
		filterable PM	3		100.5	62.37	2,570	0.0070	0.00173	0.0382	20	0.0010	0.0019	
									gr/DSCF		Average	0.0011	0.0022	
		cond. inorganic PM	1	EPA 5	102.1	68.39	2,763	0.0016	0.00036	0.0086	20	0.00021	0.00043	
		cond. inorganic PM	2		101.6	66.13	2,701	0.0019	0.00044	0.0103	20	0.00026	0.00051	
		cond. inorganic PM	3		100.5	62.37	2,570	0.0015	0.00037	0.0082	20	0.00020	0.00041	
											Average	0.00022	0.00045	
Coarse Ore Bin #1 DC-3	FF	filterable PM	1	EPA 5	99.0	72.79	547	0.0083	0.00176	0.0083	20	0.00021	0.00041	
		filterable PM	2		101.4	67.38	550	0.0067	0.00153	0.0072	20	0.00018	0.00036	
		filterable PM	3		100.5	78.17	664	0.0079	0.00156	0.0089	20	0.00022	0.00044	
									gr/DSCF		Average	0.00020	0.00041	
		cond. inorganic PM	1	EPA 5	99.0	72.79	547	0.0013	0.00028	0.0013	20	3.2E-05	6.5E-05	
		cond. inorganic PM	2		101.4	67.38	550	0.0003	0.00007	0.0003	20	8.1E-06	1.6E-05	
		cond. inorganic PM	3		100.5	78.17	664	0.0030	0.00059	0.0034	20	8.4E-05	1.7E-04	
											Average	4.2E-05	8.3E-05	

Luzenac AMERICA
Western Talc Operations • 767 Old Yellowstone Trail • Three Forks, MT 59752-9313 • (406) 285-3271 • Fax:(406) 285-3323

June 30, 1995

Mr. Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, NC 27513

Dear Mr. Marinshaw:

Enclosed are two more reports on NSPS compliance stack testing recently completed for Luzenac America, Inc. One report covers stack tests for particulate emissions from a primary crushing system and a crude ore dryer. The second report covers a stack test for particulate emissions from a crude ore rail loadout system. All tests were conducted at Luzenac America's Three Forks Mill, in Three Forks, Montana.

I hope this information is useful in your work on developing AP-42 Section 11.26. If you have any questions or require any additional information, please contact me at (406) 285-5312.

Sincerely,

William R. Kraemer
Environmental Coordinator
Western Operations

Enclosures

cc: R. J. Buettner
R. F. Goff

To: Brian Shrager, MRI
From: Ron Ryan, OAQPS/EMAD/EFIG
RE: SCCs for TALC PROCESSING

Attached are proposed codes for Talc Processing, per your request. Please check the changes I have made to the wording for the Units in many cases, hopefully for clarity. Biggest concern is if thruputs for dried or calcined material is for (wet) inlet weight or (dry) outlet weights. I have also changed most Produceds to Processed, indicating that the thruput should be for the amount processed in that step (e.g., Custom Grinding), as opposed to the amount produced for the entire plant. I will have these added to AIRS this Thursday (July 13) if I do not hear from you otherwise.

SCC	Name	Units
3-05-089-06	Storage of Raw Mined Talc Before Processing	1000 Lbs Talc Stored
3-05-089-08	Conveyor Transfer of Raw Talc to Primary Crusher	1000 Lbs Talc Conveyed
3-05-089-11	Primary crusher	1000 Lbs Talc Produced
3-05-089-14	Crushed Talc Storage Bin Loading	1000 Lbs Talc Loaded
3-05-089-17	Screening Oversize Ore to Return to Primary Crusher	1000 Lbs Talc Screened
3-05-089-21	Natural Gas-fired Rotary Dryer	1000 Lbs Dried Talc Produced
3-05-089-23	Fuel Oil-fired Rotary Dryer	1000 Lbs Dried Talc Produced
3-05-089-31	Natural Gas-fired Rotary Calciner	1000 Lbs Talc Calcined
3-05-089-33	Fuel Oil-fired Rotary Calciner	1000 Lbs Talc Calcined
3-05-089-41	Rotary Cooler Following Calciner	1000 Lbs Talc Cooled
3-05-089-45	Grinding of Dried Talc	1000 Lbs Talc Processed
3-05-089-47	Grinding/Drying of Talc with Heated Makeup Air	1000 Lbs Talc Processed
3-05-089-49	Ground Talc Storage Bin Loading	1000 Lbs Talc Loaded
3-05-089-50	Air Classifier - Size Classification of Ground Talc	1000 Lbs Talc Processed
3-05-089-53	Pelletizer	1000 Lbs Talc Processed
3-05-089-55	Pellet Dryer	1000 Lbs Talc Processed
3-05-089-58	Pneumatic Conveyor Vents	1000 Lbs Talc Conveyed
3-05-089-61	Concentration of Talc Fines Using Shaking Table	1000 Lbs Talc Processed
3-05-089-71	Natural Gas-fired Flash Drying of Slurry after Flotation	1000 Lbs Dried Talc Produced
3-05-089-73	Fuel Oil-fired Flash Drying of Slurry after Flotation	1000 Lbs Dried Talc Produced
3-05-089-82	Custom Grinding - Additional Size Reduction	1000 Lbs Talc Processed
3-05-089-85	Final Product Storage Bin Loading	1000 Lbs Talc Loaded
3-05-089-88	Packaging	1000 Lbs Talc Processed

NEED TO TALK TO RON RYAN ABOUT ADDING THESE CODES. HE WILL BE OUT UNTIL 8/01/95

-09	Crude ore dryer, natural gas-fired rotary dryer	1000 Lbs Dried Talc Produced
-10	" " " , fuel oil - " " "	" " " " "
-12	Crushed talc rail car loading	1000 Lbs Talc Loaded

NEW SOURCE CLASSIFICATION CODES FOR TALC PROCESSING

RON, PLEASE WAIT TO REQUEST SCCs FROM AIRS UNTIL I TALK WITH RON MYERS ABOUT THE LB/1000 LB ISSUE. THANKS.

Proposed SCC	Name	Units
3-05-	Raw talc storage--storage of mined talc prior to processing	1000 lb stored
3-05-	Conveyor--conveyor transfer of raw talc to the primary crusher	1000 lb conveyed
3-05-	Primary crusher--initial size reduction of raw talc	1000 lb crushed material produced
3-05-	Crushed talc storage bin loading	1000 lb loaded
3-05-	Screening--oversize ore removed and returned to the primary crusher	1000 lb screened
3-05-	Natural gas-fired rotary dryer	1000 lb produced
3-05-	Fuel oil-fired rotary dryer	1000 lb produced
3-05-	Natural gas-fired rotary calciner	1000 lb produced
3-05-	Fuel oil-fired rotary calciner	1000 lb produced
3-05-	Rotary cooler--cooler following calciner	1000 lb produced
3-05-	Grinding--grinding of dried talc	1000 lb produced
3-05-	Grinding with heated makeup air--grinding/drying of talc	1000 lb produced
3-05-	Ground talc storage bin loading	1000 lb loaded
3-05-	Air classifier--size classification of ground talc	1000 lb produced
3-05-	Pelletizer--formation of talc pellets from ground talc	1000 lb produced
3-05-	Pellet dryer--drying following pelletization	1000 lb produced
3-05-	Pneumatic conveyor venting--venting of product conveyors	1000 lb conveyed
3-05-	Tabling process--concentration of talc fines with a "shaking table"	1000 lb produced
3-05-	Natural gas-fired flash dryer--drying of slurry following flotation	1000 lb produced
3-05-	Fuel oil-fired flash dryer--drying of slurry following flotation	1000 lb produced
3-05-	Custom grinding--additional size reduction	1000 lb produced
3-05-	Final product storage bin loading	1000 lb loaded

3-05-	Packaging	1000 lb produced

Luzenac AMERICA
Western Talc Operations • 767 Old Yellowstone Trail • Three Forks, MT 59752-9313 • (406) 285-3271 • Fax:(406) 285-3323

April 25, 1995

Mr. Richard Marinshaw
Midwest Research Institute
401 Harrison Oaks Boulevard, Suite 350
Cary, NC 27513

Dear Mr. Marinshaw:

Enclosed are two reports on NSPS compliance stack testing recently completed for Luzenac America, Inc. The reports cover 15 stack tests for particulate emissions recently completed at two talc milling facilities located in Three Forks, Montana. Both facilities utilize dry grinding processes, exclusively.

I hope this information is useful in your work on developing AP-42 Section 11.26. If you have any questions or require any additional information, please contact me at (406) 285-5312.

Sincerely,

William R. Kraemer
Environmental Coordinator
Western Operations

Enclosures

cc: R. J. Buettner
J. P. Close
J. Godla
R. F. Goff

TULIKIVI

The New Alberene Stone Co., Inc.

FROM: THE NEW ALBERENE STONE CO., INC
P. O. BOX 300, SCHUYLER, VA 22969

TEL: 1-804-831-2228
FAX: 1-804-831-2732

SENDER: JAMES AMOS

DATE: 3/11/94

TO: RONALD MYERS

TIME: 9:00

THIS COMPANY MANUFACTURE SOAPSTONE COUNTER TOPS, FIREPLACES + LABITORY STONE

2 PAGES TO INC. THIS

ITS NOT CLEAR IF WE HAVE THE INFO- YOU NEED. WE ARE SENDING YOU A LIST OF WHAT THE STONES MINERAL CONSISTS OF,

FIREPLACE APPLICATIONS

ARCHITECTURAL APPLICATIONS

CHEMICAL LABORATORY APPLICATIONS

PLEASE CALL IF THIS IS NOT WHAT YOO NEED.

Rick - This person said that they take slabs of soapstone (see attached) and make into counter tops they do not produce powder.

Ron

PHYSICAL PROPERTIES

Density, Average Specific Gravity	2.86
Moisture Absorption Average %	0.2
Fusion Temperature - Fahrenheit	2370.
Compressive Strenght PSI	4873.
Modules of Rupture Average PSI	1317.
Flexural Strength, Average PSI	959.
Modulus of Elasticity Average PSI	107.217

Data is based on testing completed by Froeling & Robertson, Independent testing lab.

MINERAL COMPOSITION

Talc	30%-50%
Magnesite	5%-15%
Dolomite	10%-25%
Chlorite	25%-35%

HOW TO SPECIFY

The following description refers to Alberene Stone and should be used when preparing specifications:

Alberene Stone, regular grade, gray
Standard thicknesses: ⅜", ¾", 1¼", up to 6"
Finishes: Ganged, diamond surfaced or honed
Edges: Honed or Bullnose

We will submit samples for approval on request.

TO:		FOR:	
Architects	Builders	Residential	Industrial
Designers	Contractors	Commercial	Institutional
Consumers'			

COMMITMENT TO EXCELLENCE

The New Alberene Stone Company, Inc. is committed to quality and customer satisfaction. It is a member of the American Society of Testing Materials (ASTM), Marble Institute of America, Building Stone Institute and National Home Builders Association.

The New Alberene Stone Co., Inc.
P.O. Box 300, Schuyler, VA 22969
Tele: 804-831-2228
Fax: 804-831-2732
Outside VA: 1-800-962-3692

Printed in U.S.A.

7ALC

Luzenac AMERICA

Luzenac America, Inc. • P.O. Box 680 • Windsor, VT 05089 • (802) 484-7763 • Fax: (802) 484-3621

March 29, 1994

Mr. Ronald E. Myers
United States Environmental Protection Agency
Emissions Factors & Methodologies Section
Emission Inventory Branch
Air Quality Planning And Standards
Research Triangle Park, North Carolina 27711

SUBJECT: AIR POLLUTANT EMISSION FACTORS - AP-42
Letter Of March 3, 1994

Dear Mr. Myers:

We have reviewed the available test results from our newer mill and the data is inconclusive. We feel the mineral products information requested in your letter of March 3, 1994, is not properly researched now.

Two of our Vermont facilities are being permanently closed, while we consolidate some of the product and processes at two other existing mill sites in Ludlow, Vermont, and West Windsor, Vermont. At this time we are unable to provide recent emission information that can be supported by valid testing and known operating circumstances.

We are relocating a Mill to the Ludlow site by late Spring and will perform emission testing over the following six months. Using a qualified air quality testing service for this work, we should be able to submit proper data along with confirming process operating rates. I'm sorry that we can't meet your AP-42 target of March 30, 1994.

Sincerely,

R. F. Goff
Environmental Manager

RFG/cs

cc: Tim Hicks
R. J. Buettner

R.T. Vanderbilt Company, Inc.
INDUSTRIAL MINERALS AND CHEMICALS

30 WINFIELD STREET, P.O. BOX 5150, NORWALK, CONNECTICUT 06856-5150 • (203) 853-1400
FAX (203) 853-1452 • CABLE: "BILTVAN", NORWALK, CONNECTICUT • TWX 710-468-2940

March 31, 1994

Mr. Ronald E. Myers
Emissions Factors & Methodologies Section
Emission Inventory Branch
U. S. EPA
Office of Air Quality & Planning Standards
Research Triangle Park, NC 27711

Subject: Draft AP-42 Section 8.30, Talc Processing & Background Memorandum

Dear Mr. Myers:

In my communication of March 21, 1994 on the captioned draft, I neglected to enclose a list of experts familiar with the issues discussed. I have enclosed this list with this letter.

I am sorry for this oversight.

Very truly yours,

R. T. VANDERBILT COMPANY, INC.

John W. Kelse
Corporate Industrial Hygienist

JWK/sk
enclosure

* = most versed on analytical issues

RECOMMENDED CONTACTS

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