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|---|---|
| AP42 Section: | 11.22 |
| Title: | *Comments and correspondence for 1995* |

# FAX TRANSMISSION

TO: Ron Myers, EFIG

FROM: Rick Marinshaw, MRI

DATE: July 27, 1995

RECEIVING FAX NUMBER: 541-0684

SENDING FAX NUMBER: 919-677-0065

THIS FAX CONSISTS OF 2 PAGES (INCLUDING THIS PAGE)

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As I mentioned in the voicemail message I just left for you, the STIRS data base includes five test reports on diatomite processing sources. The following page lists the information on those reports. We do not have copies of the reports. Do you want us to finalize the section as is or wait until we can get the test reports and incorporate the test data into the section? As it stands now, the section does not include any emission factors. Also, the test summary that we do have in our files is for a diatomite kiln being fired with waste oil. Do you want us to do anything with that data? Finally, we came across another test report for frit. Should we try to incorporate that report into the section now or hold it for a later revision? Please let me or Brian know.

Thanks.

STIRS DATABASE PRINTOUT

| Scan number | Facility name | SCC | Agency | Test date | City | Sta | Zip | Process |
|---|---|---|---|---|---|---|---|---|
| 1112SB23/2 | Celite Corp. | 305xxxxx | SB | 06-Aug-92 | Lompac | | 93436 | Diatomaceous earth calcining |
| 1116SB04 | Celite Corp. | 305xxxxx | SB | 25-Nov-92 | Lompac | | 93436 | Diatomaceous earth calcining |
| 1112SB15 | Grefco, Inc. | 305xxxxx | SB | 17-May-90 | Torrance | | 90509 | Diatomaceous earth - rotary dryer |
| 1112SB11 | Grefco, Inc. | 305xxxxx | SB | 24-Nov-92 | Torrance | | 90509 | Diatomaceous earth - rotary dryer |
| 1116SB02 | Grefco, Inc. | 305xxxxx | SB | 22-Feb-93 | Lompac | | | Diatomaceous earth dryer |

**UNITED STATES DEPARTMENT OF THE INTERIOR**

BUREAU OF MINES
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*DIVISION OF MINERAL COMMODITIES*
**Branch of Industrial Minerals— fax number (202) 501-3751**
FACSIMILE TRANSMISSION COVER SHEET

Date: 4/27/93

FAX No: 919 541-0684

Number of pages (including cover sheet) 8

TO: Ronald Myers, EPA (Name and company)

FROM: Lawrence Davis 202 501-9386 (Name and telephone number)

**MESSAGE:**

I reviewed your Draft AP-42 Section 8.29 on diatomite and have no comments. It looks OK to me.

In response to your question on emissions, the only data I've seen is in an old report (1958) by the U.S. Public Health Service. Attached are the title page + table of contents.

# Pneumoconiosis IN DIATOMITE MINING AND PROCESSING

W. Clark Cooper, M. D.
Medical Director

Lewis J. Cralley, Ph. D.
Scientist Director

With the Assistance of

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Prepared under Direction of
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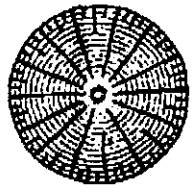

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Bureau of State Services
Division of Special Health Services
Occupational Health Program

Public Health Service Publication No. 601

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1958

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 55 cents

# Contents

## Photographs and Figures

## Tables

Rick,

Roy recently gave me a copy of your AP-42 section 8.29 to use as a guide or template for sections I'm writing in Chapter 8.

I realized the Diatomite process is one I performed a series of tests at for CARB a couple (or more) years ago. The objective of our study was to characterize the contribution of organic & metallic pollutants from facilities using waste oil as fuel. ~~in different processes~~ We attribute the bulk of chlorinated species to chlorinated compounds in the fuel. Other organics & metals could be from the fuel or from the raw materials. We only have limited constituent data from the fuel (supplied by the facility).

If we have this contract later, perhaps this will be of use.

March

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Date: April 6, 1993

Subject: Background Information for Proposed AP-42 Section 8.29, Diatomite Processing
Review and Update Remaining Sections of Chapter 8 (Mineral Products Industry) of AP-42
EPA Contract 68-D2-0159, Work Assignment 012
MRI Project 3612

From: Richard Marinshaw

To: Ron Myers
EPA/EIB/EFMS (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 8.29 on diatomite processing. A description of the industry is presented first. A process description followed by a discussion of emissions and controls are then presented. Finally, the reference list is provided. The draft AP-42 section is provided as the attachment.

## II. INDUSTRY DESCRIPTION[1-3]

Diatomite is a chalky, sedimentary rock consisting mainly of an accumulation of skeletons formed by diatoms, which are single-celled microscopic aquatic plants. The skeletons are essentially amorphous hydrated or opaline silica but occasionally include some alumina. The Standard Industrial Classification (SIC) code for diatomite mining is 1499 (miscellaneous nonmetallic minerals, except fuels), and the SIC code for diatomite processing is 3295 (minerals and earths, ground or otherwise treated). The six-digit Source Classification Code (SCC) for diatomite processing is 3-05-026.

The unique physical properties of diatomite derive from the size, shape, and structure of individual diatom skeletons and the packing characteristics of a mass of the particles. Diatoms range in diameter from about 10 micrometers ($\mu$m) ($4 \times 10^{-4}$ inch [in.]) to over 500 $\mu$m (0.02 in.) and generally have a spiny structure with intricately pitted surfaces. Contact between

MRI REPORT

# Assessment of Combustion Sources That Emit Polychlorinated Dioxins and Furans, Polycyclic Aromatic Hydrocarbons, and Other Toxic Compounds

## Final Report

For California Air Resources Board
Research Division

ARB Agreement No. A832-124
MRI Project No. 9420-M

January 31, 1992

MIDWEST RESEARCH INSTITUTE 425 Volker Boulevard, Kansas City, MO 64110-2299 • (816) 753-7600

## 4.2 RECYCLED WASTE OIL FACILITIES

### 4.2.1 Site A

#### 4.2.1.1 Process Description

Site A produces high purity filtration materials from diatomaceous earth. A surface mine located on property adjacent to the plant supplies raw material for the process. The facility uses diesel fuel to fire its dryers and kiln. The use of recycled waste oil as a fuel had been discontinued just prior to conducting sampling for this test program. However, the facility graciously offered to use recycled waste oil as a fuel during the test program.

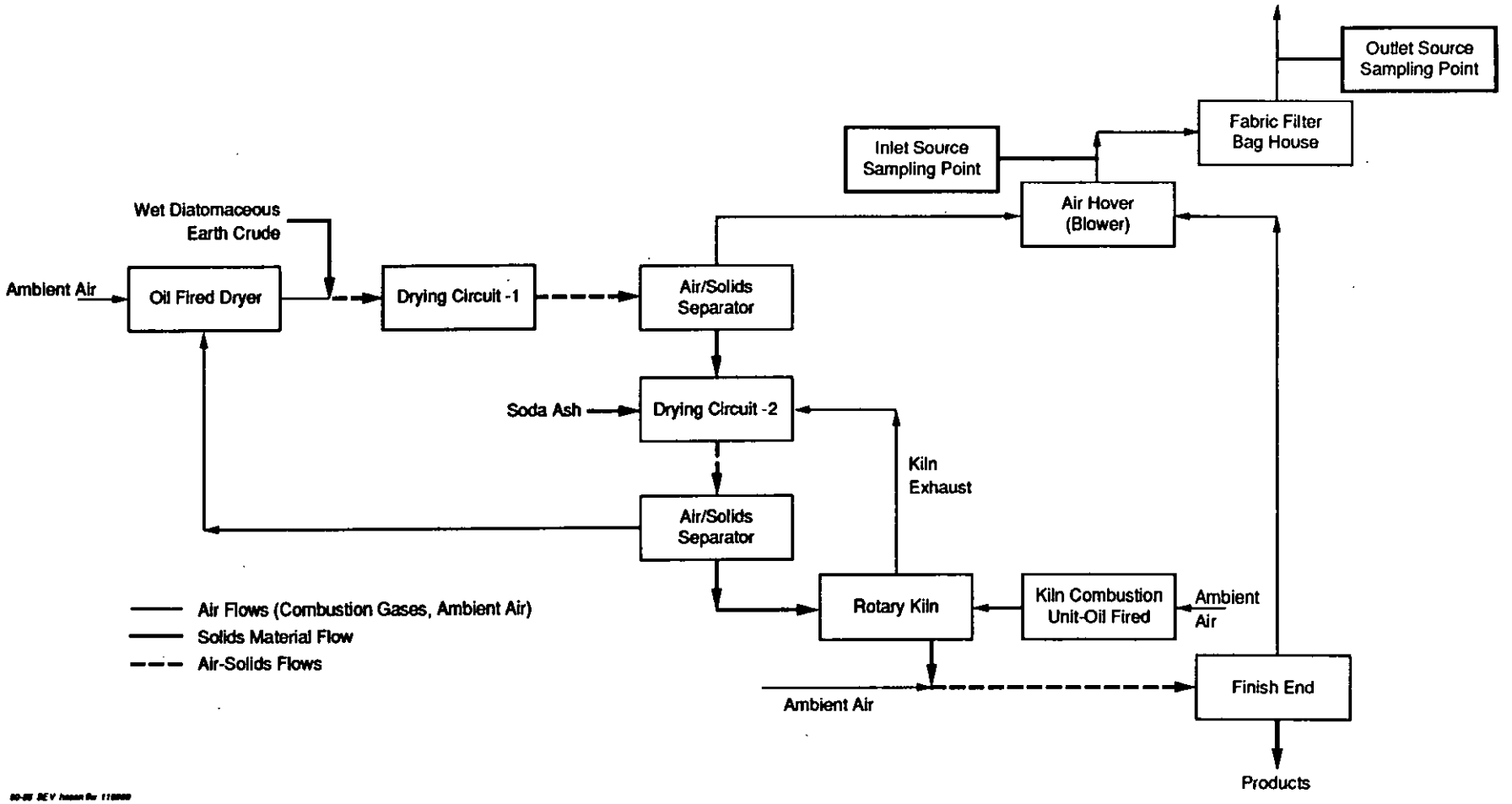
This facility operates on a schedule of 10 days of operation followed by 4 days of maintenance. The facility operates three 8-hr shifts per day during manufacturing periods and one shift during maintenance periods. This schedule is kept throughout the year.

Wet diatomaceous earth is introduced to an oil-fired dryer which heats the diatomaceous earth to remove all moisture. The dried earth is air-separated, and material of designated mesh size for the specific product line is directed to the waste oil-fired rotary kiln. Processed materials from the kiln are air-separated by size and weight, and then are directed to the shipping department where they are packaged in 50-lb bags. Outsized materials are directed to the combustion gas baghouse. A schematic of Site A is included as Figure 4-1.

Combustion gases from the rotary kiln and particulate separation of the dried diatomaceous earth are directed to an eight cell fabric filter baghouse. The exhaust was sampled from an 8-ft high, 17-in x 24.5-in rectangular vertical stack located on top of the baghouse with the top of the stack 36 ft from the ground. Gases entering the baghouse are at approximately +200°F, and never greater than 250°F. Materials captured in the baghouse are recycled back through the process.

#### 4.2.1.2 Sampling

Test program samples were collected before the entrance to the baghouse and from one of the exit stacks of the eight-cell baghouse. Operating conditions for Site A are presented in Table 4-2. Inlet samples were collected between the induced draft (i.d.) fan and the baghouse. The inlet sample location was in a curved duct section directly above and after the fan. This location was not consistent with sampling procedures specified by ARB Method 1, but there was no alternative location. The exit stack of Baghouse Cell No. 1 was the outlet sample location. This site was an acceptable sampling location based on ARB Method 1.






## Site A Process Diagram

**Figure 4-1**

TABLE 4-2. SITE A - PROCESS OPERATING CONDITIONS

| Parameter | Units | Run 1 | Run 2 | Run 3 |
|---|---|---|---|---|
| Waste oil feed rate to kiln | gal/min | 2.5 | 2.4 | 2.5 |
| Waste oil feed rate to furnace | gal/min | 1.5 | 1.8 | 1.9 |
| Kiln temperature | °F | 1,581 | 1,492 | 1,625 |
| Combustion air flowrate | $ft^3$/min | 5,100 | 4,900 | 5,300 |
| Process feed rate | tons/hr | 7.25 | 7.00 | 6.75 |
| Baghouse temperature | °F | 207 | 220 | 224 |
| Baghouse pressure drop | inWC | 3.1 | 3.4 | 3.8 |

Sampling at Site A was conducted at the beginning of a 10-day operation schedule. During Run 1 and part of Run 2, the facility was having minor start-up problems. The main problem was the temperature of the rotary kiln. The kiln temperature fluctuated enough that product from the kiln was of a size less uniform than usual. This caused some clogging of the air separation systems. When clogging occurred, an access door to the product exit tubes was opened and excess material was removed. This was an infrequent occurrence, and only once was the upset enough to case a disruption in sampling. All other problems were considered minor enough that sampling was continued on the premise that these were normal occurrences which produced normal emissions.

Sampling at the inlet to and outlet from the baghouse was performed by a combination of ARB Methods 428 and 429. This combination of methods was approved by CARB before this test program began. Basically, the difference is in the recovery of the sample from the trains and how the sample was split for analysis. Analytical deviations are presented in Appendix A. Sampling Methods 428 and 429 were combined into one train. The trains were washed using acetone, then methylene chloride, and then toluene to recover samples. This was the only sample recovery method deviation. Metal samples were collected using ARB Method 436.

The inlet sampling train experienced a severe sample loading problem on the filter which resulted in a sampling method deviation. Particulate matter loading in the gas stream to the baghouse was so concentrated that the particulate filter became clogged to the point that an excessive vacuum built up in the sampling system. The vacuum was so great that isokinetic sampling could not be maintained, and sampling was halted. All three tests conducted at Site A experienced this problem. Sample times ranged from 36 to 60 min for the three tests. Samples that were collected are representative of conditions in the duct for those time periods. The volume of material collected was so great that no analytical minimum volume limit was exceeded. This problem is typical of inlet sampling, i.e., prior to air pollution control devices. No other sampling deviations occurred.

#### 4.2.1.3 Analysis Results—Site A

Data on inlet and outlet measurements of moisture content, duct/stack temperature, and velocity are provided in Table 4-3. The average flow rates, measured by the trains, identified by run number and location are also given. These rates were used to calculate PCDDs and PCDFs, PAHs, and metals emissions. It should be emphasized that the stack sampled was the No. 1 cell of an eight-cell baghouse.

TABLE 4-3. SITE A - INLET AND OUTLET SUMMARY DATA

| | Sampling time (min) | Gas volume sampled (dscm) | Moisture content (% vol) | Average stack temp ( C) | Stack velocity (m/sec) | Stack flow rate (dscm/min) |
|---|---|---|---|---|---|---|
| Run 1 | | | | | | |
| MM-Inlet | 60 | 1.118 | 11.8 | 97 | 25.2 | 1,268 |
| SV-Inlet | 42 | 0.656 | 17.5 | 100 | 24.4 | 1,138 |
| MM-Outlet | 180 | 2.705 | 13.3 | 89 | 19.0 | 200 |
| SV-Outlet | 180 | 3.623 | 13.7 | 89 | 17.9 | 188 |
| Run 2 | | | | | | |
| MM-Inlet | 36 | 0.649 | 15.0 | 105 | 26.1 | 1,230 |
| SV-Inlet | 36 | 0.609 | 17.9 | 105 | 26.3 | 1,197 |
| MM-Outlet | 180 | 2.444 | 16.5 | 91 | 17.8 | 178 |
| SV-Outlet | 180 | 4.169 | 11.1 | 91 | 18.8 | 201 |
| Run 3 | | | | | | |
| MM-Inlet | 36 | 0.649 | 15.2 | 104 | 25.8 | 1,223 |
| SV-Inlet | 36 | 0.599 | 15.9 | 104 | 26.1 | 1,223 |
| MM-Outlet | 180 | 2.421 | 13.9 | 94 | 18.8 | 193 |
| SV-Outlet | 180 | 3.763 | 13.7 | 94 | 16.2 | 167 |

MM = Multiple metals sampling train, ie. method 436 train.
SV = Semivolatile sampling train, ie. combined method 428 and 429 train.
Note: Outlet samples were collected from the stack of number 1 cell of an 8-cell baghouse. The emissions calculated are only from this one stack.

Dioxin and Furan Emissions. Table 4-4 presents the dioxin and furan results by homologs, while Table 4-5 presents the 2,3,7,8-substituted data. In conjunction with the gas sample volumes, the concentrations and emission rates of dioxins and furans in the stack gas were calculated and are provided in these tables.

In Table 4-6, using ARB's 2,3,7,8-TCDD/TCDF toxic equivalency factors, each 2,3,7,8-substituted TCDD/TCDF congener was converted to its 2,3,7,8-TCDD/TCDF equivalent, and the total 2,3,7,8-TCDD/TCDF equivalent concentration and emission rate were determined.

Polycyclic Aromatic Hydrocarbon Emissions. Table 4-7 presents the concentrations found for 17 PAHs and their calculated emission rates.

Metals Emissions. Table 4-8 presents the concentrations and emission rates for the 12 metals of interest.

Continuous Emission Measurements. During the semivolatile and metals emission sampling, continuous measurements were conducted at the inlet and outlet locations for CO, $SO_2$, $NO_x$, $O_2$, and $CO_2$. Summary data for those measurements are presented in Table 4-9. Computer-generated graphs of the real-time measurements are included in Appendix B.

Additional Information. Although it was not a requirement of the survey, analysis results of the waste oil were obtained from the facility in order to provide some perspective on the waste fuel composition. Analysis summary is provided in Appendix C.

### 4.2.2 Site B

#### 4.2.2.1 Process Description

Site B produces magnesium oxide which is used in the manufacturing of refractory firebrick and related materials. Ore is excavated from nearby mines and processed in high-temperature reducing kilns to form magnesium oxide. Recycled waste oil is used to fire the rotary kilns.

Raw magnesium ore is combined with water and mixed in a pug mill prior to introduction to the oil-fired kiln. The material is in a wet paste form when it enters the kiln. Processed material falls out the exit end of the kiln into cooling trays and then onto a belt which conveys it to a storage bin. A schematic of Site B is included as Figure 4-2.

TABLE 4-4. SITE A - DIOXIN/FURAN RESULTS FOR MM5-SV SAMPLES

| Analyte | Blank Inlet | Blank Outlet | Run 1 Inlet | Run 1 Outlet | Run 2 Inlet | Run 2 Outlet | Run 3 Inlet | Run 3 Outlet |
|---|---|---|---|---|---|---|---|---|
| Sample volume (dscm) | | | 0.656 | 3.623 | 0.609 | 4.169 | 0.599 | 3.763 |
| Stack flow rate (dscm/m) | | | 1,138 | 188 | 1,197 | 201 | 1,223 | 167 |
| Concentration CO2 (%) | | | 1.8 | 2.2 | 3.2 | 2.3 | 3.4 | 2.3 |
| Dioxins (pg) | | | | | | | | |
| TCDD | | 564 | 302 | 409 | 320 | 355 | 354 | 283 |
| PeCDD | | 270 | 241 | 330 | 243 | 103 | 194 | 54.1 |
| HxCDD | | 281 | 338 | 769 | 312 | 271 | 336 | 116 |
| HpCDD | | 181 | 249 | 495 | 272 | 235 | 181 | 135 |
| OCDD | | 715 | 324 | 483 | 391 | 283 | 295 | 238 |
| Total (pg) | | 2,011 | 1,454 | 2,486 | 1,538 | 1,247 | 1,360 | 826 |
| Total (ng/dscm) | 3.24[b] | 0.522[b] | 2.22 | 0.686 | 2.53 | 0.299 | 2.27 | 0.220 |
| Total (ng/dscm @ 12% CO2) | 13.9 | 2.76 | 14.8 | 3.74 | 9.47 | 1.56 | 8.01 | 1.15 |
| Total (lb/hr) | 5.08E-07 | 1.28E-08 | 3.34E-07 | 1.71E-08 | 4.00E-07 | 7.95E-09 | 3.67E-07 | 4.85E-09 |
| Furans (pg) | | | | | | | | |
| TCDF | | 2,110 | 6,540 | 3,460 | 3,900 | 1,560 | 1,880 | 1,260 |
| PeCDF | | 1,800 | 559 | 1,040 | 888 | 653 | 492 | 421 |
| HxCDF | | 431 | 411 | 966 | 314 | 335 | 144 | 187 |
| HpCDF | | 69.8 | 192 | 612 | 204 | 184 | 127 | 95.4 |
| OCDF | | 58.4 | 61.1 | 130 | 50.3 | 2.93 a | 2.9 a | 37.2 |
| Total (pg) | | 4,469 | 7,763 | 6,208 | 5,356 | 2,735 | 2,646 | 2,001 |
| Total (ng/dscm) | 7.19[b] | 1.16[b] | 11.8 | 1.71 | 8.80 | 0.656 | 4.42 | 0.532 |
| Total (ng/dscm @ 12% CO2) | 30.8 | 6.14 | 78.9 | 9.35 | 33.0 | 3.42 | 15.6 | 2.77 |
| Total (lb/hr) | 1.13E-06 | 2.84E-08 | 1.78E-06 | 4.26E-08 | 1.39E-06 | 1.74E-08 | 7.15E-07 | 1.17E-08 |
| *Total Dioxins and Furans* | | | | | | | | |
| Conc. (ng/dscm @ 12% CO2) | 44.7 | 8.91 | 93.7 | 13.1 | 42.5 | 4.98 | 23.6 | 3.92 |
| Emission rate (lb/hr) | 1.64E-06 | 4.12E-08 | 2.12E-06 | 5.97E-08 | 1.79E-06 | 2.54E-08 | 1.08E-06 | 1.66E-08 |
| Surrogate recovery (%) | | | | | | | | |
| 13C-2,3,7,8-TCDF | | 106 | 97 | 101 | 121 | 100 | 109 | 125 |
| 13C-2,3,7,8-TCDD | | 103 | 97 | 96 | 111 | 97 | 92 | 124 |
| 13C-1,2,3,7,8-PeCDF | | 100 | 113 | 110 | 117 | 94 | 93 | 124 |
| 13C-1,2,3,7,8-PeCDD | | 97 | 102 | 100 | 119 | 95 | 97 | 129 |
| 13C-1,2,3,4,7,8-HxCDF | | 128 | 139 | 149 | 142 | 120 | 129 | 152 |
| 13C-1,2,3,6,7,8-HxCDD | | 114 | 105 | 98 | 114 | 108 | 101 | 127 |
| 13C-1,2,3,4,6,7,8-HpCDF | | 114 | 141 | 128 | 145 | 124 | 122 | 152 |
| 13C-1,2,3,4,6,7,8-HpCDD | | 98 | 118 | 125 | 120 | 121 | 127 | 162 |
| 13C-12-OCDD | | 98 | 101 | 117 | 118 | 111 | 118 | 144 |
| 37Cl-2,3,7,8- TCDD[c] | | 95 | 94 | 98 | 94 | 93 | 94 | 92 |
| 13C-2,3,4,7,8- PeCDF[c] | | 94 | 90 | 93 | 95 | 95 | 97 | 99 |
| 13C-1,2,3,6,7,8- HxCDF[c] | | 77 | 71 | 71 | 75 | 81 | 72 | 75 |
| 13C-1,2,3,4,7,8- HxCDD[c] | | 93 | 91 | 108 | 101 | 96 | 103 | 101 |
| 13C-1,2,3,4,7,8,9- HpCDF[c] | | 85 | 94 | 93 | 86 | 88 | 91 | 99 |

a. None detected. value shown is the detection limit. "Totals" calculated using half the detection limit.
b. Blank train "emissions" calculated using average flow rates from each location.
c. Field surrogates spiked into XAD prior to sample collection.

Note: Outlet samples were collected from the stack of number 1 cell of an 8-cell baghouse. The emissions calculated are only from this one stack.

TABLE 4-7. SITE A - PAHs EMISSIONS RESULTS FOR MM5-SV SAMPLES

| | Run 1 | | Run 2 | | Run 3 | | Blank | Blank |
|---|---|---|---|---|---|---|---|---|
| | Inlet | Outlet | Inlet | Outlet | Inlet | Outlet | Inlet | Outlet |
| Sample volume (dscm) | 0.656 | 3.623 | 0.609 | 4.169 | 0.599 | 3.763 | | |
| Stack flow rate (dscm/m) | 1138 | 188 | 1197 | 201 | 1223 | 167 | | |
| Concentration CO2 (%) | 1.8 | 2.2 | 3.2 | 2.3 | 3.4 | 2.3 | | |
| PAHs (ug) | | | | | | | | |
| Naphthalene | 173 | 457 | 149 | 446 | 241 | 555 | | 20.5 |
| Acenaphthylene | 14.3 | 61 | 18.9 | 53.5 | 15.7 | 70.7 | | 0.1 a |
| Acenaphthene | 5.61 | 28.9 | 8.62 | 27.9 | 9.03 | 35.4 | | 0.102 |
| Fluorene | 17.5 | 66.1 | 22.4 | 62.3 | 23.5 | 77.2 | | 0.278 |
| Phenanthrene | 22.2 | 59.7 | 27.7 | 50.4 | 31.2 | 66.3 | | 0.342 |
| Anthracene | 25.6 | 70.9 | 2.03 | 4.16 | 4.38 | 7.94 | | 0.381 |
| Fluoranthene | 3.49 | 3.65 | 4.48 | 2.65 | 7.05 | 7.52 | | 0.173 |
| Pyrene | 3.49 | 2.97 | 4.11 | 2.53 | 6.32 | 6.67 | | 0.179 |
| Retene | 0.1 a | 0.389 | 0.538 | 0.272 | 0.664 | 0.63 | | 0.1 a |
| Benz(a)anthracene | 1.7 | 0.218 | 1.96 | 0.216 | 2.74 | 0.23 | | 0.175 |
| Chrysene | 1.65 | 0.306 | 1.89 | 0.268 | 2.69 | 0.161 | | 0.172 |
| Benzo(b)fluoranthene | 0.352 | 0.164 | 0.544 | 0.1 a | 0.84 | 0.1 a | | 0.1 a |
| Benzo(k)fluoranthene | 0.352 | 0.164 | 0.508 | 0.1 a | 0.679 | 0.1 a | | 0.1 a |
| Benzo(a)pyrene | 0.45 | 0.381 | 0.497 | 0.245 | 0.769 | 0.256 | | 0.229 |
| Indeno(1,2,3-cd)pyrene | 0.1 a | 0.1 a | 0.187 | 0.1 a | 0.305 | 0.1 a | | 0.1 a |
| Dibenz(a,h)anthracene | 0.1 a | 0.1 a | 0.1 a | 0.1 a | 0.1 | 0.1 a | | 0.1 a |
| Benzo(ghi)perylene | 0.473 | 0.1 a | 1.18 | 0.1 a | 1.01 | 0.1 a | | 0.1 a |
| Total PAHs (ug) | 270 | 752 | 245 | 651 | 348 | 829 | 23.2 | 23.2 |
| Total PAHs (ug/dscm) | 412 | 208 | 402 | 156 | 581 | 220 | 37.4 | 6.03 |
| Total PAHs (ug/dscm @ 12% | 2,749 | 1,132 | 1,506 | 815 | 2,050 | 1,149 | 160 | 31.9 |
| Total PAHs (lb/hr) | 0.0621 | 0.00516 | 0.0636 | 0.00415 | 0.0940 | 0.00486 | 0.00587 | 0.000148 |
| FIELD SURROGATES RECOVERY | | | | | | | | |
| D10-1-Methylnapthalene | 55% | 70% | 73% | 60% | 38% | 66% | | 56% |
| D12-Perylene | 72% | 80% | 91% | 91% | 86% | 86% | | 96% |
| LAB SURROGATES RECOVERY | | | | | | | | |
| D8-Naphthalene | 34% | 42% | 51% | 27% | 8% | 37% | | 29% |
| D10-Acenaphthene | 69% | 70% | 77% | 69% | 66% | 71% | | 72% |
| D10-Fluorene | 77% | 75% | 82% | 76% | 77% | 78% | | 80% |
| D10-Phenanthrene | 84% | 88% | 89% | 92% | 88% | 95% | | 85% |
| D10-Anthracene | 79% | 81% | 83% | 85% | 79% | 82% | | 83% |
| D10-Fluoranthene | 87% | 86% | 88% | 94% | 86% | 95% | | 86% |
| D10-Pyrene | 86% | 92% | 87% | 93% | 85% | 95% | | 89% |
| D12-Benz(a)anthracene | 72% | 91% | 90% | 97% | 88% | 98% | | 90% |
| D12-Chrysene | 76% | 94% | 90% | 98% | 90% | 100% | | 92% |
| D12-Benzo(a)pyrene | 69% | 88% | 94% | 96% | 88% | 96% | | 98% |

Note: Outlet samples were collected from the stack of number 1-cell of an 8-cell baghouse. The emissions calculated are only from this one stack.

(a): Values shown are the detection limits which were calculated as 2.5 times the baseline noise level.

TABLE 4-8. SITE A - ANALYSIS RESULTS FOR MM5-MM (METALS) TRAIN

| | Ag | As | Ba | Cd | Cr | Cu | Hg | Mn | Ni | Pb | Se | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Run 1** | | | | | | | | | | | | |
| **Inlet** | | | | | | | | | | | | |
| Rinses and filter, ug | 243 | <181 | 1153 | <15.7 | 554 | <38.2 | <1.29 | 246 | 94.7 | 1,349 | 795 | 1,655 |
| Nitric acid impingers, ug | <1.63 | <8.29 | 3.94 | 1.46 | 12.1 | <1.54 | <1.08 | 24.9 | 4.48 | 6.12 | 3.00 | 33.1 |
| KMnO4 impingers, ug | NA | NA | NA | NA | NA | NA | 2.38 | NA | NA | NA | NA | NA |
| Total, ug | 243 | <189 | 1,157 | <17.2 | 566 | <39.7 | <4.75 | 271 | 99.1 | 1,355 | 798 | 1,688 |
| Concentration, ug/dscm | 217 | <169 | 1,035 | <15.4 | 507 | <35.5 | <4.25 | 242 | 88.7 | 1,212 | 714 | 1,510 |
| Emissions, lb/hr | 0.0365 | <0.0284 | 0.174 | <0.00258 | 0.0850 | <0.00596 | <0.000713 | 0.0406 | 0.0149 | 0.203 | 0.120 | 0.253 |
| **Outlet** | | | | | | | | | | | | |
| Rinses and filter, ug | <1.24 | 37.8 | 2.50 | 52.9 | 16.7 | 15.1 | 0.120 | 16.0 | 95.0 | 56.5 | 65.1 | <8.29 |
| Nitric acid impingers, ug | | <8.29 | 2.14 | 4.60 | 29.6 | <1.54 | <1.21 | 12488 | 5.24 | 9.69 | 27.1 | 41.8 |
| KMnO4 impingers, ug | NA | NA | NA | NA | NA | NA | 1.71 | NA | NA | NA | NA | NA |
| Total, ug | 0 | 37.8 | 4.64 | 57.5 | 46.3 | 15.1 | <3.04 | 12,504 | 100.2 | 66.2 | 92.2 | <48.1 |
| Concentration, ug/dscm | 0 | 14.0 | 1.72 | 21.3 | 17.1 | 5.59 | <1.12 | 4,622 | 37.0 | 24.5 | 34.1 | <17.8 |
| Emissions, lb/hr | 0 | 0.000370 | 0.0000454 | 0.000562 | 0.000000 | 0.000148 | <0.0000297 | 0.122 | 0.000980 | 0.000647 | 0.000902 | <0.000471 |
| **Run 2** | | | | | | | | | | | | |
| **Inlet** | | | | | | | | | | | | |
| Rinses and filter, ug | 122 | <163 | 1151 | 21.6 | 527 | <34.2 | <1.21 | 257 | 137 | 1329 | 825 | 1686 |
| Nitric acid impingers, ug | <1.63 | <8.29 | 2.16 | 6.98 | 3.76 | 3.02 | <0.918 | 25.5 | 2.84 | 6.73 | <2.24 | 46.5 |
| KMnO4 impingers, ug | NA | NA | NA | NA | NA | NA | <0.612 | NA | NA | NA | NA | NA |
| Total, ug | 122 | <171 | 1,153 | 28.5 | 531 | <37.2 | <2.74 | 283 | 140 | 1,336 | 825 | 1,733 |
| Concentration, ug/dscm | 188 | <263 | 1,776 | 44.0 | 818 | <57.4 | <1.01 | 436 | 216 | 2,059 | 1,272 | 2,670 |
| Emissions, lb/hr | 0.0306 | <0.0429 | 0.289 | 0.00716 | 0.133 | <0.00933 | <0.0000267 | 0.0709 | 0.0351 | 0.335 | 0.207 | 0.434 |
| **Outlet** | | | | | | | | | | | | |
| Rinses and filter, ug | 33.3 | 95.6 | 2.04 | 43.5 | <1.32 | 32.6 | 0.168 | 13.1 | 58.1 | 42.3 | 55.3 | <62.9 |
| Nitric acid impingers, ug | <1.63 | <8.29 | 1.50 | 3.68 | 3.22 | 6.31 | <1.53 | 316 | 11.7 | 15.3 | 5.94 | 111 |
| KMnO4 impingers, ug | NA | NA | NA | NA | NA | NA | 0.531 | NA | NA | NA | NA | NA |
| Total, ug | 33.3 | 95.6 | 3.54 | 47.20 | <4.64 | 38.9 | <2.23 | 329 | 69.8 | 57.6 | 61.2 | <174 |
| Concentration, ug/dscm | 13.6 | 39.1 | 1.45 | 19.31 | <1.86 | 15.9 | <0.912 | 135 | 28.5 | 23.6 | 25.1 | <71.2 |
| Emissions, lb/hr | 0.000321 | 0.000921 | 0.0000341 | 0.000455 | <0.0000437 | 0.000375 | <0.0000215 | 0.00317 | 0.000672 | 0.000555 | 0.000590 | <0.00168 |
| **Run 3** | | | | | | | | | | | | |
| **Inlet** | | | | | | | | | | | | |
| Rinses and filter, ug | 145 | <157 | 1162 | 29.0 | 563 | <33.1 | 2.91 | 265 | 138 | 1467 | 814 | 2788 |
| Nitric acid impingers, ug | <1.63 | <8.29 | 1.05 | 1.18 | 2.70 | <1.54 | <0.966 | 13.8 | 7.25 | 3.47 | <2.24 | 10.1 |
| KMnO4 impingers, ug | NA | NA | NA | NA | NA | NA | <0.482 | NA | NA | NA | NA | NA |
| Total, ug | 145 | <165 | 1,163 | 30.2 | 565 | <34.6 | <4.36 | 279 | 145 | 1,470 | 814 | 2,799 |
| Concentration, ug/dscm | 224 | <254 | 1,793 | 46.5 | 871 | <53.3 | <6.71 | 429 | 224 | 2,265 | 1,255 | 4,312 |
| Emissions, lb/hr | 0.0362 | <0.0411 | 0.290 | 0.00752 | 0.141 | <0.00862 | <0.00109 | 0.0694 | 0.0363 | 0.366 | 0.203 | 0.698 |
| **Outlet** | | | | | | | | | | | | |
| Rinses and filter, ug | <1.23 | 33.3 | 2.68 | 12.5 | <1.32 | 9.13 | 0.0862 | 4.55 | 91.4 | 55.2 | 45.4 | <6.29 |
| Nitric acid impingers, ug | 2.49 | <8.29 | 1.83 | 3.89 | 71.0 | <1.54 | <1.99 | 53333 | 3.47 | 21.7 | 65.1 | 24.1 |
| KMnO4 impingers, ug | NA | NA | NA | NA | NA | NA | <0.202 | NA | NA | NA | NA | NA |
| Total, ug | <3.72 | <41.6 | 4.51 | 16.4 | 71.0 | <10.7 | <2.28 | 53,337 | 94.9 | 76.9 | 111 | <30.4 |
| Concentration, ug/dscm | <1.54 | <17.2 | 1.86 | 6.78 | 29.3 | <4.42 | <0.941 | 22,031 | 39.2 | 31.8 | 45.6 | <12.6 |
| Emissions, lb/hr | <0.0000392 | <0.000438 | 0.0000475 | 0.000173 | 0.000748 | <0.000113 | <0.0000240 | 0.562 | 0.00100 | 0.000811 | 0.00117 | <0.000322 |
| **Blank train** | | | | | | | | | | | | |
| Rinses and filter, ug | <1.24 | 29.0 | 1.29 | 7.43 | <1.32 | 1.96 | 0.0838 | 0.842 | 86.3 | 55.0 | 21.6 | <6.29 |
| Impingers 1-6, ug | <1.63 | <8.29 | 0.371 | 0.332 | 1.02 | <1.54 | <0.259 | 12.1 | <0.542 | 2.14 | <2.24 | 11.0 |
| Total, ug | <2.87 | <37.3 | 1.66 | 7.76 | <2.34 | <3.50 | <0.343 | 12.9 | 86.3 | 57.1 | <23.8 | <17.3 |

NA = Not applicable.

Note: The outlet samples were collected from the stack of cell-1 of an 8-cell baghouse. The emissions calculated are only from this one stack.

TABLE 4-9. SITE A -- CONTINUOUS EMISSION MEASUREMENTS

| | | | | | | | | 12% $CO_2$ | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Run 1 | Inlet | | $O_2$ | $CO_2$ | CO | $SO_2$ | $NO_x$ | CO | $SO_2$ | $NO_x$ |
| | | Avg | 19.0 | 1.8 | 196.1 | 3.3 | 30.5 | 1421.6 | 21.3 | 197.4 |
| | | Max | 20.4 | 2.6 | 216.7 | 3.9 | 35.0 | 2798.6 | 29.1 | 271.5 |
| | | Min | .0 | .8 | 169.0 | 2.7 | 27.0 | 956.4 | 17.0 | 147.6 |
| | | | | | | | | | | |
| | Outlet | | | | | | | | | |
| | | Avg | 17.9 | 2.2 | 173.9 | 32.1 | 19.3 | 959.1 | 171.0 | 106.2 |
| | | Max | 19.6 | 2.8 | 200.5 | 136.8 | 22.0 | 1244.1 | 608.0 | 119.4 |
| | | Min | 16.3 | 1.7 | 150.1 | 14.8 | 15.6 | 724.7 | 87.5 | 75.6 |
| | | | | | | | | | | |
| Run 2 | Inlet | | $O_2$ | $CO_2$ | CO | $SO_2$ | $NO_x$ | CO | $SO_2$ | $NO_x$ |
| | | Avg | 17.3 | 3.2 | 247.3 | 5.1 | 27.0 | 947.1 | 20.1 | 103.2 |
| | | Max | 18.2 | 3.8 | 282.0 | 9.4 | 32.0 | 1656.3 | 59.0 | 169.5 |
| | | Min | 16.5 | 1.8 | 216.7 | .4 | 24.0 | 724.4 | 1.4 | 83.9 |
| | | | | | | | | | | |
| | Outlet | | | | | | | | | |
| | | Avg | 20.8 | 2.3 | 198.2 | 62.3 | 21.1 | 1025.8 | 311.8 | 109.3 |
| | | Max | 21.4 | 3.0 | 234.4 | 166.5 | 25.3 | 1256.5 | 688.2 | 130.9 |
| | | Min | 19.5 | 1.9 | 167.5 | 21.2 | 19.1 | 788.2 | 120.0 | 88.4 |
| | | | | | | | | | | |
| Run 3 | Inlet | | $O_2$ | $CO_2$ | CO | $SO_2$ | $NO_x$ | CO | $SO_2$ | $NO_x$ |
| | | Avg | 17.1 | 3.4 | 269.0 | 9.1 | 25.0 | 965.5 | 32.7 | 90.0 |
| | | Max | 17.6 | 4.5 | 332.4 | 22.9 | 27.0 | 1590.1 | 78.0 | 113.2 |
| | | Min | 16.0 | 2.1 | 223.6 | 3.8 | 11.0 | 728.9 | 11.9 | 57.8 |
| | | | | | | | | | | |
| | Outlet | | | | | | | | | |
| | | Avg | 20.1 | 2.3 | 226.7 | 55.7 | 22.0 | 1185.6 | 271.5 | 115.3 |
| | | Max | 22.6 | 3.1 | 279.9 | 252.7 | 24.1 | 1503.2 | 981.4 | 132.4 |
| | | Min | 17.4 | 1.9 | 184.1 | 20.4 | 15.3 | 851.8 | 118.8 | 76.5 |

SITE A: WASTE OIL COMPOSITION (Obtained from Facility)

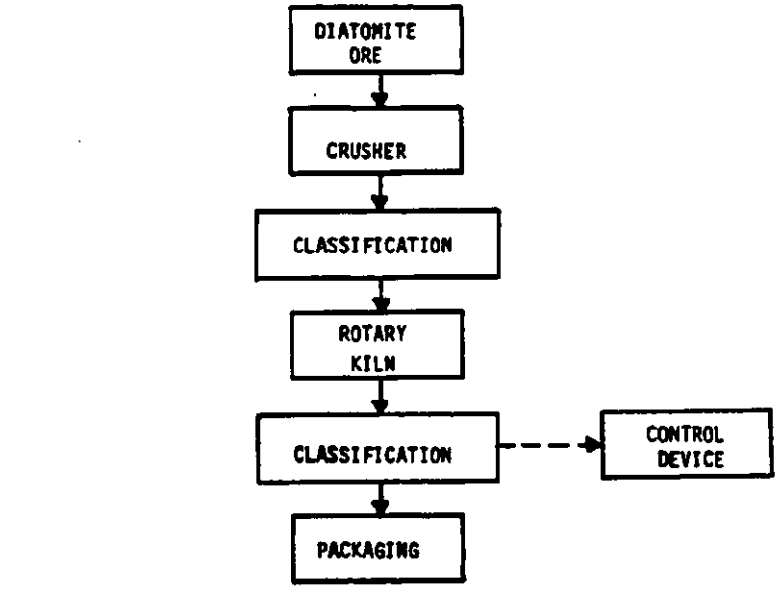
| Analyte | Concentration (ppm)[a] |
|---|---|
| As | 0.2 |
| Cd | 0.2 -2 |
| Cr | 0.5 - 2 |
| Pb | 1.5 - 25 |

[a] Data provided by plant for waste oil analysis conducted during February - April 1990.

SITE B: WASTE OIL COMPOSITION (Obtained from Facility)

| Analyte | Result (mg/Kg)[a] | Reporting Limit (mg/Kg) | EPA Method |
|---|---|---|---|
| Antimony | ND | 2.5 | 6010 |
| Arsenic | ND | 1.3 | 6010 |
| Barium | 0.90 | 0.25 | 6010 |
| Beryllium | ND | 0.35 | 6010 |
| Cadmium | ND | 0.25 | 6010 |
| Chromium (total) | 0.26 | 0.25 | 6010 |
| Cobalt | ND | 0.25 | 6010 |
| Copper | 5.7 | 0.5 | 6010 |
| Lead | 4.7 | 1.3 | 7420 |
| Mercury | ND | 0.1 | 7471 |
| Molybdenum | 2.3 | 0.25 | 6010 |
| Nickel | 6.8 | 0.25 | 6010 |
| Selenium | ND | 1.3 | 6010 |
| Silver | ND | 0.5 | 6010 |
| Thallium | ND | 2.5 | 6010 |
| Vanadium | 11 | 0.5 | 6010 |
| Zinc | 73 | 0.25 | 6010 |

[a] Data provided by plant for waste oil analysis on sample submitted on 9/5/90.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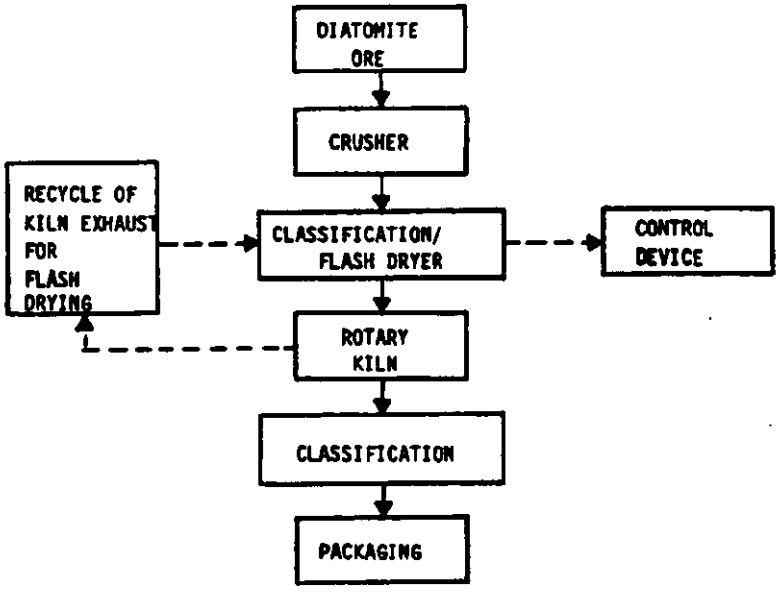
CRUSHER
CLASSIFICATION
ROTARY KILN
CLASSIFICATION
CONTROL DEVICE
PACKAGING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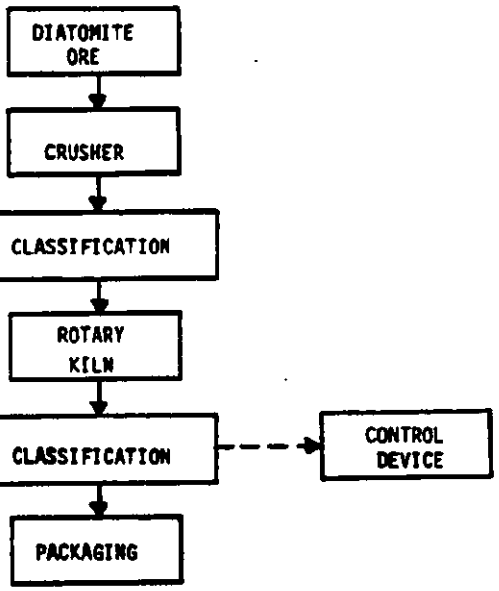
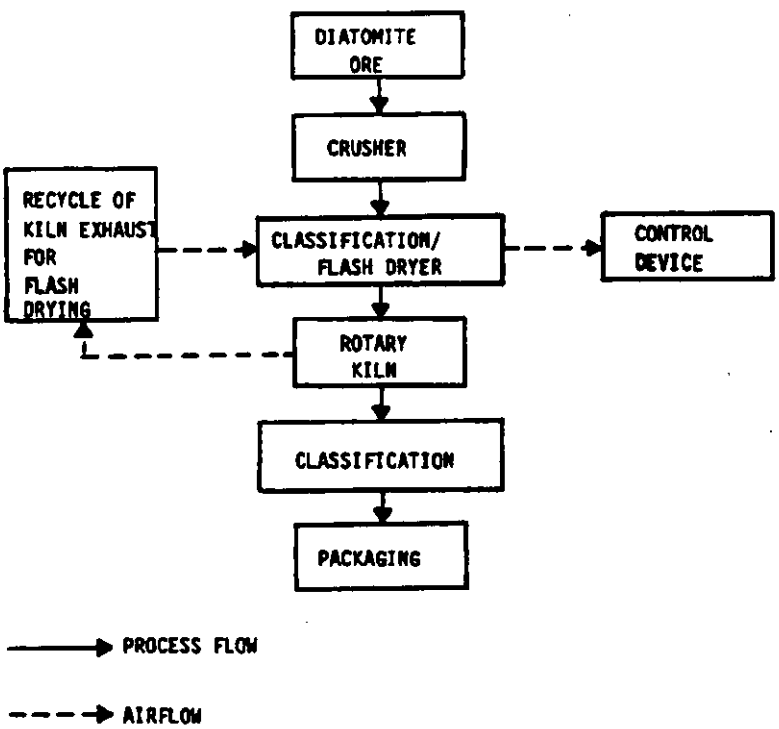
CRUSHER
RECYCLE OF KILN EXHAUST FOR FLASH DRYING
CLASSIFICATION/ FLASH DRYER
CONTROL DEVICE
ROTARY KILN
CLASSIFICATION
PACKAGING
PROCESS FLOW
AIRFLOW


DIATOMITE ORE
CRUSHER
CLASSIFICATION
ROTARY KILN
CLASSIFICATION
CONTROL DEVICE
PACKAGING


DIATOMITE ORE
CRUSHER
RECYCLE OF KILN EXHAUST FOR FLASH DRYING
CLASSIFICATION/ FLASH DRYER
CONTROL DEVICE
ROTARY KILN
CLASSIFICATION
PACKAGING
PROCESS FLOW
AIRFLOW