AP42 Section:	11.29 Alumina Manufacturing
Title:	Contractor correspondence and old source test data for Alumina Manufacturing. Inactive section.

CONTACT REPORT--MRI Project No. 4604-02-02

From: Brian Shrager, Environmental Engineering Department

Date of Contact: February 27, 1997

Contacted by: Telephone

Company/Agency: The Aluminum Association
Washington, D. C.

Telephone Number: (202) 862-5132

Person(s) Contacted/Title

Bob Strieter

CONTACT SUMMARY: Mr. Strieter returned my call from the previous week. I had requested by phone and by an earlier letter that the Aluminum Association organize a data gathering effort for the Alumina Manufacturing AP-42 effort. There are currently four domestic alumina refining facilities, including ALCOA, Reynolds, Kaiser, and Ormet. Mr. Strieter suggested that I call Mr. Bill Vinzant of Kaiser Aluminum, at (504) 231-5116. He stated that Mr. Vinzant has been working on an emission inventory for the Kaiser facility and has test data. I mentioned that I spoke with Mr. Mike Palazollo of ALCOA and that ALCOA was also willing to supply data. Mr. Strieter stated that I should contact ALCOA directly with my request. Mr. Strieter also noted that all of the currently operating facilities use natural gas to fire the calciners; he stated that the ALCOA plant in St. Croix has oil-fired units, but the plant is currently idle.

REF 4

1994 April 11

DRAFT

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

Dear Mr. Shrager:

In response to your request for information, I have compiled some alumina calcining emissions data. Point Comfort Operations has three fluidized bed alumina calciners. Each calciner has an associated Electrostatic Precipitator to control emissions. I have taken data from the last five years, from each calciner unit, and at a variety of production (tons/hr) levels. This should give some indication of the range of emissions that may be expected from this type of process/abatement combination.

Raw stack sampling data is being sent under separate cover to protect its confidentiality.

If you require further information please contact me at 512-987-6615.

Sincerely,

Lori McCray
Environmental Engineer
Aluminum Company of America
Point Comfort Operations
State Hwy 35
Point Comfort, TX 77978

attch

TYPICAL DATA FOR PARTICULATE EMISSIONS FROM FLUIDIZED BED ALUMINA CALCINERS WITH ELECTROSTATIC PRECIPATORS AT ALCOA POINT COMFORT OPERATIONS

DATE	UNIT	LBS TSP PER TON OF ALUMINA
12/93	1	0.39
8/92	1	0.21
8/91	3	0.12
9/90	1	0.44
9/90	2	0.16
1/89	1	0.37

DRAFT

CONTACT REPORT--MRI Project No. 4603-01-05

From: Brian Shrager, Environmental Engineering Department

Date of Contact: July 10, 1996

Contacted by: Telephone

Company/Agency: ALCOA
Pittsburgh, PA

Telephone Number: (412) 553-2680

Person(s) Contacted/Title(s)

Roy Carwile, Environmental Manager

CONTACT SUMMARY: I originally left a voice mail for Mr. Carwile on July 9, and he returned my call on July 10. He was contacted to obtain information on Alumina Manufacturing (referred to as alumina refining by the industry) processes and emissions. Mr. Carwile suggested that, to do the best possible job of preparing an AP-42 section on alumina, we should contact Mr. Bob Streiter of the Aluminum Association at (202) 862-8132. He stated that he would be meeting with Mr. Strieter and several association members tomorrow, and would ask if anyone else wants to help with the AP-42 document. There are currently four domestic alumina refining facilities, including ALCOA, Reynolds, Kaiser, and Ormet. Mr. Carwile also stated that ALCOA would be willing to provide information even if the other companies are not interested. He also suggested that we contact Juan Santiago of OAQPS at 541-1084, who is apparently beginning the 10-year MACT for this source category.

DRAFT/WP
d3006-4/971130
03/30/92 1

Reference 1
(section 4)

Emission Test Report
Review Checklist

Reviewer: Brian Shrager
Review Date: 4/20/92

A. Background Information

1. Facility name: Reynolds Metals Company's Sherwin Plant
   Location: Corpus Christi, Texas
2. Source category: Metallic Minerals
3. Test date: June 23-26, 1980
4. Test sponsor: EPA/EMB
5. Testing contractor: Roy F. Weston, Inc.
6. Purpose of test: To determine the quantity of particulate emissions from each process discharge stream.
7. Pollutants measured

   (PM) PM-10 CO SO_2 NO_x VOC Pb (CO_2)

   Others (list): _____

8. Process overview: On an attached page provide a block diagram of the unit operations and associated air pollution control systems at the facility. Identify process tested with letters from the beginning of the alphabet (A, B, C, etc.) and APC systems with letters from end of alphabet (V, W, X, etc.). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from that sketch complete the table below that identifies processes or unit operations tested.

Test ID	Process	Process ID	Emissions tested		APCD (controlled emissions only)
			Uncontrolled	Controlled	
1	Ship Unloading	A	✓		
2	Ship Unloading	A		✓	Scrubber Discharge Duct (Venturi)
3	Ore Storage	B		✓	Baghouse Exhaust Duct
4	Ore Storage	B		✓	Combined Baghouse 1 & 2 OUTLET STACK

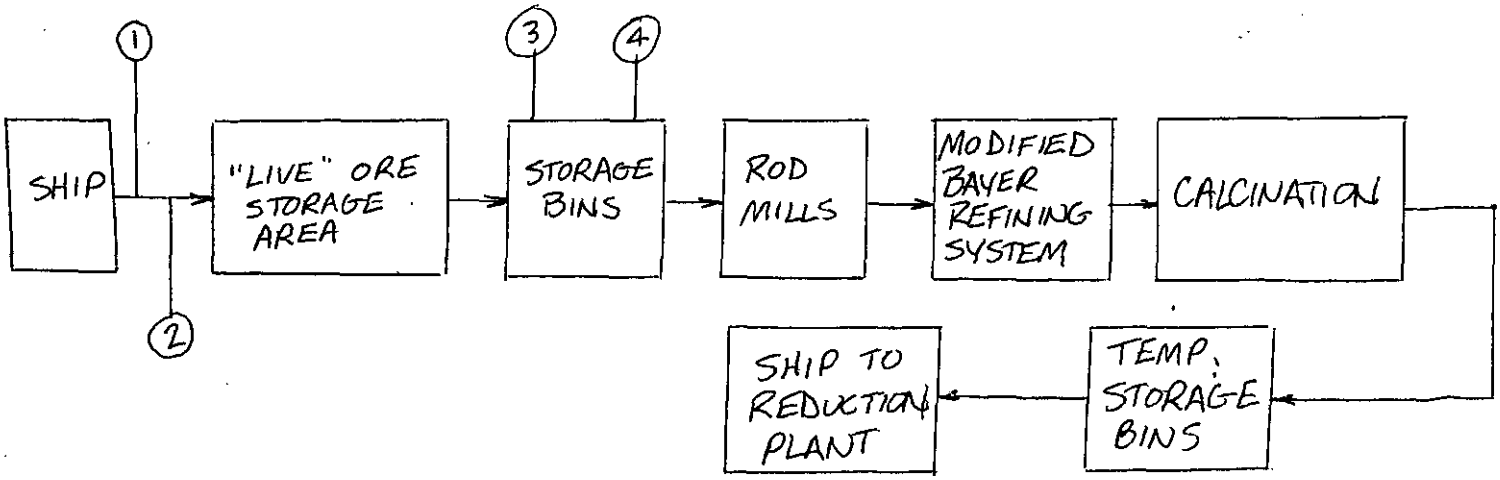
B. Process Information

1. Provide a brief narrative description of the process. With as much detail as possible, (e.g., if a furnace or conveyor system is used, identify the type of unit) describe the equipment used for those operations tested. (Note: If process description provided in test report is adequate, attach copy or reproduce here.)

The Sherwin facility is located approximately 15 miles north of Corpus Christi on the Gulf Coast of Texas. This facility processes bauxite imported from Caribbean and South American countries. Bauxite is transported to the facility in ships carrying from 15,000 to 50,000 tons.

Bauxite is unloaded from the ships by one of two mechanisms. Most ships are designated as "self-unloading." As such, they have a self-contained extendable boom conveyor that interfaces with a dockside conveyor belt via an accordian chute. Smaller ships require the services of a dockside extendable boom conveyor that is inserted into the side of the ship. Only a self-unloading ship was tested during the test sequence reported here.

From the dock, bauxite is conveyed to a covered "live" ore storage area. Bauxite is then reclaimed from the storage area and conveyed to one of four storage bins. Each storage bin feeds a rod mill, although not all rod mills are operated simultaneously. Product from the rod mill is processed through a modified Bayer refining system. All processes from the rod mill up to, but not including, the final calcination of alumina are wet processes and do not emit particulate matter. After calcination of alumina the product is transferred by railcar to the dock area where the alumina is dumped from the bottom of railcar hoppers onto a tunnel conveyor. From the railcar dump alumina can be conveyed either directly to a ship-loading tower or to one of three temporary storage bins. From the ship-loading tower alumina is dumped through an accordian chute into the hold of a ship or barge for shipment to reduction plants in various parts of the country.



2. For each process tested list feedstock materials and products. Indicate if activity factors are for feed (F) rate or product (P) rate.

Process ID	Feedstock materials	Products	Basis for activity factor	F/P
A	Bauxite ore	Alumina	Bauxite	F
B	Bauxite ore (fine)	Alumina	Bauxite	F

Basis for data: Pg. 6
(Indicate page/table Nos. in test report)

3. For each process or operation tested and each test run note process capacity and operating rate during test.

Process ID	Capacity	Units	Test run	Process rate	Units
A			1	1500-1700	tons ore/hr
			2		
			3		
			4		
B			1	425-475	tons ore/hr
			2		
			3		
			4		
			1		
			2		
			3		
			4		
			1		
			2		
			3		
			4		

Basis for data: Pg 6, 7

C. Air Pollution Control Systems Tested

1. For each air pollution control system pollution control system identified in A.8, note the following

ID	Type of APCD	Manufacturer	Model No.
Y	Venturi Scrubber		
Z	Baghouse		

Note: Be as specific as possible in identifying APCD. For example, indicate "pulse jet fabric filter" rather than simply "fabric filter."

2. For each system identified above, provide a narrative description. For fugitive systems describe capture techniques as well as the removal techniques (use a separate page if necessary)

3. Using the attached parameter list for guidance complete the table below. (Use additional pages as needed.)

APCD ID	Parameter	Units	Readings			
			Run 1	Run 2	Run 3	Run 4
Y						
Type of APCD: Venturi Scrubber						
Z	Design Flow Rate	CFM	7000			
Type of APCD: Baghouse	Air-to-Cloth	Ratio	8 to 1			
Type of APCD:						

D. Sampling and Analysis Methods

1. Complete the following table

Test location	Pollutant	S & A method	Reference/ conditional method	Deviations noted
1	PM	Method 5	(Y)/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
2	PM	Method 5	(Y)/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
3	PM	Method 5	(Y)/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
4	PM	Method 5	(Y)/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N

2. If a method used was not a reference or conditional method, provide a narrative discussion including any data manipulation needed to make results correspond to reference or conditional method results.

3. Describe any deviations identified above.

E. Emission Data Documentation

1. Tabulate the following stack gas data from the test report. (Use additional pages as needed.)

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	°F	85			
	Moisture	% BY VOL.	3.7			
	Oxygen	% BY VOL.	20.0			
	Volumetric flow, actual	ACFM	89,800			
	Volumetric flow, standard	DSCFM	82,600			
	Percent isokinetic		102.3			
	Pollutant concentration:					
	PM	G/DSCF	1.14			
	CO_2	% BY VOL	0.9			
2	Stack temperature	°F	77			
	Moisture	% BY VOL.	3.5			
	Oxygen	% BY VOL.	20.0			
	Volumetric flow, actual	ACFM	92,300			
	Volumetric flow, standard	DSCFM	84,400			
	Percent isokinetic		101.2			
	Pollutant concentration:					
	PM	G/DSCF	0.017			
	CO_2	% BY VOL	0.9			
3	Stack temperature	°F	88	88	88	
	Moisture	% BY VOL.	2.5	2.3	2.3	
	Oxygen	% BY VOL.	20.0	20.0	20.0	
	Volumetric flow, actual	ACFM	7,200	8,440	8,400	
	Volumetric flow, standard	DSCFM	6,670	7,820	7,780	
	Percent isokinetic		101.3	105.2	104.0	
	Pollutant concentration:					
	PM	G/DSCF	0.004	0.002	0.002	
	CO_2	% BY VOL.	0.9	0.9	0.9	

E. Emission Data Documentation

1. Tabulate the following stack gas data from the test report. (Use additional pages as needed.)

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
4	Stack temperature	°F	91	93	94	
	Moisture	% BY VOL.	2.9	3.2	3.8	
	Oxygen	% BY VOL.	20.0	20.0	20.0	
	Volumetric flow, actual	ACFM	15,300	15,600	15,300	
	Volumetric flow, standard	DSCFM	14,300	14,500	14,000	
	Percent isokinetic		102.3	106.4	107.7	
	Pollutant concentration:					
	PM	G/DSCF	0.002	0.002	0.002	
	CO_2	% BY VOL.	0.9	0.9	0.9	
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					

2. Tabulate pollutant mass flux rates

Test ID	Pollutant	Units	Mass flux rates			
			Run 1	Run 2	Run 3	Run 4
1	PM	lb/hr	806			
	CO_2	lb/hr	*5219			
2	PM	lb/hr	12.6			
	CO_2	lb/hr	*5332			
3	PM	lb/hr	0.218	0.135	0.113	
	CO_2	lb/hr	*421.4	*494.1	*491.5	
4	PM	lb/hr	0.388	0.392	0.482	
	CO_2	lb/hr	*903.5	916.1	884.5	

* CO_2 Density = 0.1170 lb/Ft^3

' lb/hr = % BY VOL x 0.1170 lb/Ft^3 x DSCF/M x 60 M/hr

3. Present example emission factor calculations below.

PROCESS B (TEST 3)

PM $\frac{(.218+.135+.113)}{3}$ lb/hr ÷ 425 tons/hr = 3.65 E-04 lb/ton

to

÷ 475 tons/hr = 3.27 E-04 lb/ton

4. Tabulate emission factors

Process	Pollutant	Units	Average emission factor	
			Uncontrolled	Controlled
A	PM	lb/ton	0.47 - 0.54	
	CO_2	lb/ton	3.07 - 3.48	
A	PM	lb/ton		7.41E-03 - 8.40E-03
	CO_2	lb/ton	3.14 - 3.55	
B	PM	lb/ton		3.27E-04 - 3.65E-04
	CO_2	lb/ton	0.987 - 1.10	
B	PM	lb/ton		8.86E-04 - 9.90E-04
	CO_2	lb/ton	1.90 - 2.12	

ATTACHMENT A
APCD PARAMETERS

Type of APCD	Parameters
Fabric filter	Cleaning mechanism Bag type Cleaning frequency Air to cloth ratio (A/C) Pressure drop Inlet temperature
ESP	Type (wet or dry) Number of fields Rapping cycle (if dry) Specific Collection Area (SCA) Particulate resistivity (if known) Spark rate Current and power levels
Venturi (or other high energy) scrubber	Pressure drop Liquid/gas (L/G) ratio Mist eliminator type
Packed-bed scrubber	Packing depth L/G ratio Caustic use (Y/N) pH Mist eliminator type
Carbon absorber	Bed depth Superficial gas velocity Bed temperature Desorption mechanism (media) Flue-gas moisture Cycle length Time-on-line after breakthrough

TABLE 4-1. SUMMARY OF TEST DATA FOR ALUMINA MANUFACTURING
ORE UNLOADING AND STORAGE

Ore unloading

Type of control	Pollutant	No. of test runs	Data rating	Emission factor range		Ref. No.
				kg/Mg	lb/ton	
none	PM (filterable)	1	C	0.25	0.5	1
Cyclone & venturi scrubber	PM (filterable)	1	C	0.0039	0.0079	1
Cyclone & venturi scrubber	PM-10 (filterable)	1	C	0.0028	0.0055	1

Size-specific Particulate Emission Factors

Data Rating: C Reference No. 1

Diameter, microns	Controlled (venturi scrubber)		
	Cumulative % < diameter	Emission factor	
		kg/Mg	lbs/ton
1	0.45	0.0018	0.0035
2.5	0.61	0.0024	0.0048
6	0.66	0.0026	0.0052
10	0.7	0.0028	0.0055

Ore storage

Type of control	Pollutant	No. of test runs	Data rating	Emission factor range		Ref. No.
				kg/Mg	lb/ton	
fabric	PM	3	A	.00019-.00041	.00038-.00082	1