



May 2, 2014

Ms. Jennifer Van Vlerah
Manager, SIP, Rule Making and Inventory Section
Ohio EPA
Division of Air Pollution Control
P.O. Box 1049
Columbus, Ohio 43216-1049

**RE: FERRO CLEVELAND FRIT PLANT
4150 EAST 56th STREET
FACILITY ID: 13-18-17-0235
PROPOSED MODIFICATIONS TO SOURCE P071 (Permit #P0110443)**

Dear Ms. Van Vlerah:

On behalf of the Ferro Corporation, located at 4150 East 56th Street, this letter is to inform you of proposed modifications to existing source P071 (E&SG Alcohol Milling Expansion). This source was included in the *June 2012 Revised Lead Standard State Implementation Plan (SIP) for Cuyahoga County*. Modifications to this source include the following:

- The addition of one (1), 5-gallon wet mill for milling of lead (Pb) containing frit with either solvent or water.
- Incorporation of the capture efficiency (99.5%) for the recently installed HEPA filter. This filter was installed as part of the SIP upgrades; however, the facility did not previously request credit for this equipment as a control device.

Proposed emissions for all regulated pollutants (PM, VOCs, Pb and Mn) are included as an attachment. These tables demonstrate that potential emissions with the additional mill remain below permitted thresholds for all pollutants. A schematic of the process is also included.

These proposed modifications have been included in a PTI Administrative Modification request (#M0002745) for source P071, and in a Title V Minor Permit Modification (MPM) (#A0050649) for the facility, which will be submitted to Cleveland Division of Air Quality (CDAQ) and OEPA via Air Services.

Ms. Jennifer Van Vlerah

May 2, 2014

Page 2 of 2

If you have any questions, or require additional information, please do not hesitate to contact me at (216) 861-1716 or jennifer.zavoda@kelly-buck.com.

Respectfully,

THE KELLY-BUCK COMPANY

A handwritten signature in cursive script that reads "Jennifer Zavoda".

By: Jennifer M. Zavoda, P.E.
Senior Engineer

cc (via email): Jim Braun & Roland Lacy – CDAQ
Brian Dully, Tom Vlach & Jason Wurster – Ferro Cleveland

Enclosures

**Process Specifications
P071 Modifications
Ferro Corporation**

No.	Existing or Proposed	Mill Size	Maximum Frit Load (kg/cycle)	Maximum Frit Load (lbs/hr)	Alcohol Load (L/cycle)	Alcohol Load (lbs/hr)	Cycle Time (hrs)	Max % Lead (Pb)	Max % Manganese (Mn)	
			A	=A/C*2.2 lbs/kg	B	=B/C*(8.34 lbs/gal*0.79) /3.78 L/gal				
1	Existing	14 gallon	12	0.37	21	0.51	72	-	15%	
2	Existing	14 gallon	22	0.67	21	0.51	72	-	-	
3	Existing	28 gallon	62	1.89	24	0.58	72	-	-	
4	Existing	28 gallon	27	0.83	15	0.36	72	-	5%	
5	Existing	28 gallon	55	1.68	17	0.41	72	-	7%	
6	Existing	52 gallon	43	1.31	48	1.16	72	-	-	
7	Existing	52 gallon	62	1.89	48	1.16	72	-	-	
8	Existing	52 gallon	92	2.81	48	1.16	72	83%	-	
9	Existing	338 gallon	323	9.87	245	5.93	72	-	-	
10	Existing	500 gallon	500	15.28	289	7.00	72	-	-	
11	Existing	500 gallon	900	41.25	0	0.00	48	83%	-	
12	Proposed	5 gallon	105	2.41	126	2.29	96	83%	7%	
Total (lbs/hr)				80.3	21.1					
Total (lbs/hr, Pb only)								39		
Total (lbs/hr, Mn only)									0.40	

Notes:

1. Cycle time is assume to be an average of 72 hours (includes mill and dry time) for a complete cycle,with the exception of the 500-gal mill with a cycle time of 48 hours, and the proposed 5 gallon mill with a cycle time of 96 hours.

**FERRO CLEVELAND FRIT PLANT
SOURCE P071 MODIFICATIONS
POTENTIAL PE EMISSIONS**

Emissions Unit ID: FEM (E&SG) Alcohol milling expansion (P071)

	Maximum Frit Usage Rate (lbs/hr)	PE Emissions Factor (lb PE/ton) ^(a)	Primary Control Fabric Filter Efficiency ^(b)	Secondary Control Fabric Filter Efficiency ^(b)	Potential <u>Uncontrolled</u> PE Allowable Emissions (lbs/hr)	Potential <u>Controlled</u> PE Allowable Emissions (lbs/hr)	Potential <u>Controlled</u> PE Allowable Emissions (tpy)	PE Allowable Permit Limit (lbs/hr)	PE Allowable Permit Limit (tpy)
Current Permitted Operations (Mills 1 thru 11)	78	0.12	99.5%	99.5%	0.93	2.34E-05	1.02E-04	0.551	2.41
Proposed Operations (Mills 1 thru 12)	80.3	0.12	99.5%	99.5%	0.96	2.41E-05	1.05E-04	0.551	2.41

Notes:

(a) PE emission factor per AP-42 Chapter 11.7 (Ceramic Products Manufacturing), Table 11.7-1, with a fabric filter

(b) As reported in AP-42 Chapter 11.7 for a typical fabric filter.

Example Calculations: Proposed Operations

Potential Uncontrolled Allowable PE Emissions

$$= 80.3 \text{ lbs product/hour} \times 0.12 \text{ lb PE/ton product} / (1 - 0.995) \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{0.96 \text{ lbs PE/hour}}$$

Potential Controlled Allowable PE Emissions

$$= 80.3 \text{ lbs product/hour} \times 0.12 \text{ lb PE/ton product} \times 1 \text{ ton}/2000 \text{ lbs} \times (1 - 0.995)$$

$$= \underline{2.40E-05 \text{ lbs PE/hour}}$$

$$= 2.40E-05 \text{ lbs PE/hour} \times 8760 \text{ hours/yr} \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{1.05E-04 \text{ tpy PE}} < 2.41 \text{ tpy allowable PE permit limit}$$

**FERRO CLEVELAND FRIT PLANT
SOURCE P071 MODIFICATIONS
POTENTIAL VOC EMISSIONS**

Emissions Unit ID: FEM (E&SG) Alcohol milling expansion (P071)

	Maximum VOC (Methanol & Isopropanol) Usage Rate (lbs/hr)	VOC Emission Rate ^(a)	Packed Bed Scrubber Efficiency ^(b)	Potential <i>Uncontrolled</i> VOC Emissions (lbs/hr)	Potential <i>Controlled</i> VOC Emissions (lbs/hr)	Potential <i>Controlled</i> VOC Emissions (tpy)	VOC Allowable Permit Limit (lbs/hr)	VOC Allowable Permit Limit (tpy)
Current Permitted Operations (Mills 1 thru 11)	18.8	100%	95%	18.79	0.94	4.11	1.15	5.03
Proposed Operations (Mills 1 thru 12)	21.1	100%	95%	21	1.05	4.62	1.15	5.03

Notes:

(a) Assumes 100% of the isopropanol/methanol volatilizes during the drying process.

(b) Based on the design control efficiency of the scrubber, as stated in the current Title V air permit for the facility.

Example Calculations: Proposed Operations

Potential Uncontrolled Allowable VOC Emissions

$$= 21.1 \text{ lbs alcohol/hour} \times 100\% \text{ VOC emission}$$

$$= \underline{21.1 \text{ lbs VOC/hour}}$$

Potential Controlled Allowable VOC Emissions

$$= 21.1 \text{ lbs alcohol/hour} \times 100\% \times (1-0.95)$$

$$= \underline{1.05 \text{ lbs VOC/hour}}$$

$$= 1.05 \text{ lbs VOC/hour} \times 8760 \text{ hours/yr} \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{4.62 \text{ tpy VOC} < 5.03 \text{ tpy allowable VOC permit limit}}$$

**FERRO CLEVELAND FRIT PLANT
SOURCE P071 MODIFICATIONS
POTENTIAL LEAD (Pb) EMISSIONS**

Emissions Unit ID: FEM (E&SG) Alcohol milling expansion (P071)

	Maximum Pb Usage Rate (lbs/hr)	Pb Emissions Factor (lb Pb/ton) ^(a)	Primary Control Fabric Filter Efficiency ^(b)	Secondary Control Fabric Filter Efficiency ^(b)	Potential <u>Uncontrolled</u> Pb Allowable Emissions (lbs/hr)	Potential <u>Controlled</u> Pb Allowable Emissions (lbs/hr)	Potential <u>Controlled</u> Pb Allowable Emissions (tpy)	Pb Allowable Permit Limit (lbs/hr)	Pb Allowable Permit Limit (tpy)
Current Permitted Operations (Mills 1 thru 11)	37	0.12	99.5%	99.5%	0.441	1.10E-05	4.83E-05	0.002	0.009
Proposed Operations (Mills 1 thru 12)	39	0.12	99.5%	99.5%	0.465	1.16E-05	5.09E-05	0.002	0.009

Notes:

(a) Pb emission factor assumed to be similar to the PE emission rate, per AP-42 Chapter 11.7 (Ceramic Products Manufacturing), Table 11.7-1, with a fabric filter.

(b) As reported in AP-42 Chapter 11.7 for a typical fabric filter.

Example Calculations: Proposed Operations

Potential Uncontrolled Allowable Pb Emissions

$$= 39 \text{ lbs product/hour} \times 0.12 \text{ lb Pb/ton product} / (1 - 0.995) \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{0.462 \text{ lbs Pb/hour}}$$

Potential Controlled Allowable Pb Emissions

$$= 39 \text{ lbs product/hour} \times 0.12 \text{ lb Pb/ton product} \times 1 \text{ ton}/2000 \text{ lbs} \times (1 - 0.995)$$

$$= \underline{1.16E-05 \text{ lbs Pb/hour}}$$

$$= 1.16E-05 \text{ lbs Pb/hour} \times 8760 \text{ hours/yr} \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{5.09E-05 \text{ tpy Pb}} < 0.009 \text{ tpy allowable Pb permit limit}$$

**FERRO CLEVELAND FRIT PLANT
SOURCE P071 MODIFICATIONS
POTENTIAL MANGANESE (Mn) EMISSIONS**

Emissions Unit ID: FEM (E&SG) Alcohol milling expansion (P071)

	Maximum Manganese (Mn) Usage Rate (lbs/hr)	Mn Emissions Factor (lb PE/ton) ^(a)	Primary Control Fabric Filter Efficiency ^(b)	Secondary Control Fabric Filter Efficiency ^(b)	Potential Uncontrolled Mn Allowable Emissions (lbs/hr)	Potential Controlled Mn Allowable Emissions (lbs/hr)	Potential Controlled Mn Allowable Emissions (tpy)	De Minimis Limitation (lbs/day)
Current Permitted Operations (Mills 1 thru 11)	0.22	0.12	99.5%	99.5%	0.0026	6.59E-08	2.89E-07	-
Proposed Operations (Mills 1 thru 12)	0.40	0.12	99.5%	99.5%	0.0048	1.19E-07	5.23E-07	10

Notes:

(a) Mn emission factor assumed to be similar to PE emission factor, per AP-42 Chapter 11.7 (Ceramic Products Manufacturing), Table 11.7-1, with a fabric filter.

(b) As reported in AP-42 Chapter 11.7 for a typical fabric filter.

Example Calculations: Proposed Operations

Potential Uncontrolled Allowable Mn Emissions

$$= 0.40 \text{ lbs product/hour} \times 0.12 \text{ lb Mn/ton product} / (1-0.995) \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{0.0048 \text{ lbs Mn/hour}}$$

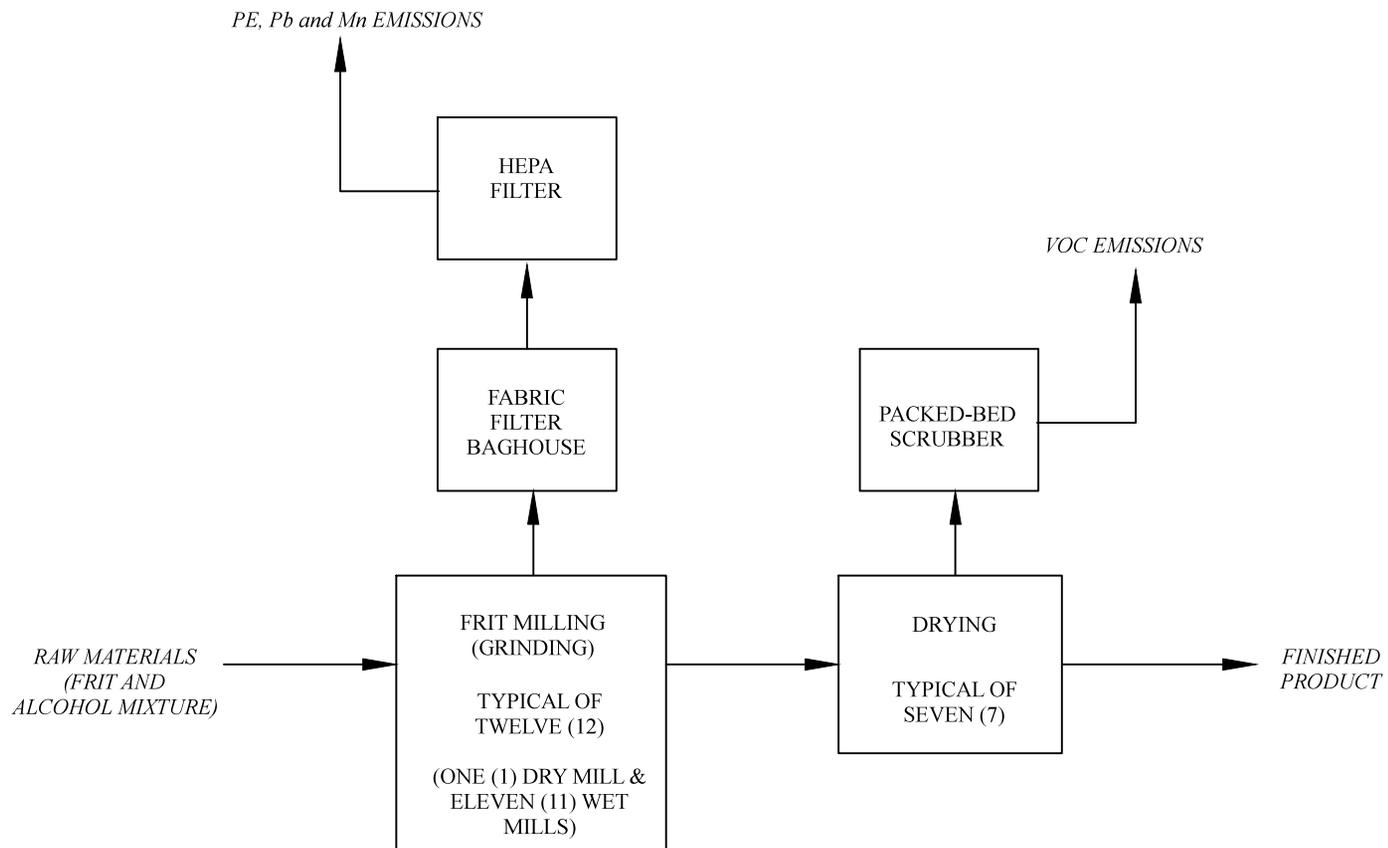
Potential Controlled Allowable Mn Emissions

$$= 0.40 \text{ lbs product/hour} \times 0.12 \text{ lb Mn/ton product} \times 1 \text{ ton}/2000 \text{ lbs} \times (1-0.995)$$

$$= \underline{1.19E-07 \text{ lbs Mn/hour}}$$

$$= 1.19E-07 \text{ lbs Mn/hour} \times 8760 \text{ hours/yr} \times 1 \text{ ton}/2000 \text{ lbs}$$

$$= \underline{5.23E-07 \text{ tpy Mn}}$$



E&SG ALCOHOL MILLING (SOURCE #P071)
FERRO CLEVELAND FACILITY, 4150 EAST 56TH STREET
APRIL, 2014

EMISSIONS ACTIVITY CATEGORY FORM GENERAL PROCESS OPERATION

This form is to be completed for each process operation when there is no specific emissions activity category (EAC) form applicable. If there is more than one end product for this process, copy and complete this form for each additional product (see instructions). Several State/Federal regulations which may apply to process operations are listed in the instructions. Note that there may be other regulations which apply to this emissions unit which are not included in this list.

1. Reason this form is being submitted (Check one)

New Permit Renewal or Modification of Air Permit Number(s) P0110443

2. Maximum Operating Schedule: 24 hours per day ; 365 days per year

If the schedule is less than 24 hours/day or 365 days/year, what limits the schedule to less than maximum? See instructions for examples. _____

3. End product of this process: Dry powdered specialty glass

4. Hourly production rates (indicate appropriate units). Please see the instructions for clarification of "Maximum" and "Average" for new versus existing operations:

Hourly	Rate	Units (e.g., widgets)
Average production	40.1	lbs/hr
Maximum production	80.3	lbs/hr

5. Annual production rates (indicate appropriate units) Please see the instructions for clarification of "Maximum" and "Actual" for new versus existing operations:

Annual	Rate	Units (e.g., widgets)
Actual production	351,714	lbs/yr
Maximum production	703,428	lbs/yr

6. Type of operation (please check one):

Continuous

Batch (please complete items below)

Minimum cycle* time (minutes): varies by mill (approx. 2880-5760 minutes, includes mill & dry time)

Minimum time between cycles (minutes): 0

Maximum number of cycles per daily 24 hour period: less than one

(Note: include cycle time and set up/clean up time.)

**"Cycle" refers to the time the equipment is in operation.

7. Materials used in process at maximum hourly production rate (add rows/pages as needed):

Material	Physical State at Standard Conditions	Principle Use	Amount**
Frit	solid	Product	80.3 lbs/hr
Alcohol (includes isopropanol/methanol mixture)	liquid	Vehicle	21.1 lbs/hr

** Please indicate the amount and rate (e.g., lbs/hr, gallons/hr, lbs/cycle, etc.).

8. Please provide a narrative description of the process below (e.g., coating of metal parts using high VOC content coatings for the manufacture of widgets; emissions controlled by thermal oxidizer...):

Glass frit flake is ground into fine particles in twelve small batch ball mills, with particulate emissions vented to a primary baghouse unit, followed by a HEPA filter. Varying amounts of solvent (methanol or isopropanol) are used as a vehicle in the mills during grinding. At the end of the milling cycles, the mixture of ground frit and solvent is manually loaded into trays. The loaded trays are placed in one of several friction heated dryers with temperature controlled air to allow the ground frit to dry. The solvent emissions from the dryer are vented through a packed-bed scrubber.