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CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU

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Applicable Certificates:

2220-30500899-01C	Ferro-Allied Kiln and Dryer
2220-30500899-05C	Swindell Dressler Kiln and Dryer
2220-30500899-06C	DE-18 Eirich Mixer
2220-30500899-07C	De-14 Eirich Mixer
2220-30500803-08C	Large and Small Storage Facility

Purpose

On August 18, 1994 an inspection was conducted at Norton Company to assess compliance as part of the renewal process for Certificates of Operation.

Process Description

The Norton Company plant produces ceramic saddles and spheres to be used in scrubbers for the chemical industry. Refined clays are mixed with water. The clay/water mixture is extruded and cut to form the desired shape. The extrusions are loaded automatically into ceramic or metal containers and placed onto metal pallets. The pallets are then conveyed through a dryer operating at 260°F, to remove excess water from the clay. After drying, the pallets are slowly transported through four zones of the kiln as the operating temperature increases from 1300°F to 2100°F. The total cure time required to transform the clay pieces into ceramic will vary from 24 hours to 37 hours. The finished product is cooled and then packaged for shipping.

Findings

2220-30500899-01C Ferro-Allied Kiln and Dryer
2220-30500899-05C Swindell Dressler Dryer and Kiln

On April 19 and 20, stack tests were conducted to evaluate emissions from the two kilns and dryers at Norton. Emissions data from the stack tests is shown in Table I. Since Norton uses clay from fields in Tennessee and Ohio, clay from both fields was tested. Emissions data from the tests are shown in Table I.

TABLE I
Kiln and Dryer Emissions in Lbs/Hr

Pollutant	Ferro-Allied Kiln and Dryer	Swindell Dressler Kiln and Dryer
Particulate	2.301	0.519
CO	4.128	0.934
NO_x	0.349	0.259
VOC	0.320	0.257
SO_2	0.861	3.488
HF	0.333	0.278

Both kilns are gas-fired and emissions are uncontrolled. The kiln exhaust flows through the dryer. The moist warm gas exits the dryer at the rear through a stack. On the date of the inspection, the Ferro Allied Kiln and dryer was operating. No visible emissions were observed. Maintenance was being performed on the Swindell Dressler Kiln and Dryer so it was not operating.

Section 4-41, Rule 3 (visible emissions), and Rule 10 (process emissions) of the Hamilton County Air Pollution Control Ordinance were used to verify the compliance of this source. Allowable particulate emissions, as limited by Rule 10 (Schedule 2) for the process weight of 2,400 lbs/hr, are 4.02 lbs/hr for the Ferro-Allied Kiln and Dryer. For the Swindell Dressler Dryer and Kiln with a process weight of 2166 lbs/hr allowable particulate emissions are 3.77 lbs/hr. The ceramic kilns and dryers were determined to be in compliance with Rule 3 and Rule 10, the Regulations.

There are no hourly Carbon Monoxide (CO) limitations in the ordinance for this source.

Section 4-41 rule 2.4 limits NO_x emissions to 300 ppm. Nox emissions from the Ferro-Allied kiln were 7.78 ppm and from the Swindell Dressler kiln were 5.10 ppm. Thus both kilns are in compliance with NO_x regulations.

VOC emissions are limited by BACT [Rule 25.3(2)]. No controls are necessary to satisfy BACT for VOC from the kilns and no quantitative VOC limit is necessary to meet BACT limits for these sources.

Sulfur Dioxide (SO_x) emissions are limited to 500 ppm by rule 13. The SO_x concentration from the test data for the Ferro-Allied Kiln was 28.84 ppm and from the Swindell Dressler Kiln was 49

ppm. The kilns are in compliance with the SOx rule.

Hydrogen fluoride (HF) emissions from the kilns regulated under certificates -01C and -05C are included in the 189 list of air toxic pollutants to be regulated under Title III of the 1990 Clean Air Act Amendments. Using AP-42 pollutant emission factors the estimated actual HF emissions are 2.28 lbs/hr. However the testing showed total emissions of HF of 0.333 lbs/hr. SCREEN modeling previously performed for HF emissions was based on the HF allowable emission rate of 1.25 lbs/hr. The SCREEN$_3$ modeling yielded a maximum one-hour concentration of 0.011 mg/m^3 (0.013 ppm) at a distance of 100 meters from the source. HF has a TLV of 3 ppm (ceiling) and an odor threshold of 10 ppm. No visible emissions, odor, or adverse health effects should result from the kiln emissions. Concerning the HF emissions, Rule 23 requires that new equipment shall utilize equipment and technology which is deemed reasonable and proper, and, due to the low emissions emitted by the kiln, the equipment has been deemed reasonable and proper. Rule 23 applies only to the Swindell Dressler Dryer and Kiln.

The kilns were determined to be in compliance with Rule 3, Rule 10, Rule 12, and Rule 23, the Ordinance.

2220-30500899-O6C DE-18 Eirich Mixer
2220-30500899-07C DE-14 Eirich Mixer

The Eirich mixers are used to mix various clays to produce the desired ceramic used as scrubber packing. The DE-18 serves Lines #3 and #4 which includes two of the three tumbler drums which create spheres of the extruded clay pieces. There are three DE-14's which serve Line #5 (the third tumbler drum) and two other saddle making lines. A temporary storage hopper is located directly above each mixer. Particulate emissions are produced when clay product is transported from the storage silos to the temporary storage hoppers. The displacement of air inside of the temporary storage hoppers is controlled by a dust collector associated with each mixer.

Transport of clay from the storage silos to the temporary storage hoppers was observed during the inspection. One of the four control devices associated with a DE-14 mixer was observed with slight visible emissions. The visible emissions observed did not constitute a violation.

Another control device, a Carter Day Baghouse serves the DE-18 and one of the three DE-14 mixers. This control device is used to control particulate emissions which are created when the various clays are dropped from the temporary storage hoppers into the mixers. This control device was operating during the inspection, with no visible emissions.

Section 4-41, Rule 3, and Rule 10, the Regulations, were used to verify compliance of the DE-18 Eirich mixer and three DE-14 Eirich mixers.

Actual particulate emissions from the DE-18 mixer, estimated using AP-42 factors and control efficiency of 98%, are 5.17 lbs/hr. Allowable particulate emissions for this source, as limited by Rule 10 (Schedule 2) for the process weight of 15,200 lbs/hr, are 12.62 lbs/hr.

Actual particulate emissions from the three DE-14 Eirich mixers, estimated using AP-42 factors and a control efficiency of 98%, are 7.75 lbs/hr. Allowable particulate emissions, from all mixers jointly as limited by Rule 10 (Schedule 2) for the combined process weight of 22,800 lbs/hr, are 16.23 lbs/hr.

The particulate emissions from the DE-18 Eirich mixer and three DE-14 Eirich mixers were determined to be in compliance with Rule 3 and Rule 10, the Regulations.

2220-30500803-08C Large and Small Bulk Storage Facility

The raw product flows from the six small storage silos to the six large storage silos then on to the mixed clay storage hopper where the chosen clays are incorporated and transported to the four Eirich mixers. During the transferring of raw product via a pneumatic transport line, each of the six small storage silos share a bin, hopper and filter assembly with an adjoining silo. Only one of the adjoining small storage silos can be filled at any given time. The six large storage silos (four 60-ton and two 100-ton) are controlled independently from one another. The manufacturer's stated control efficiency for the control equipment is 99.95%. An inspection of the six small storage silos revealed no visible emissions as these silos were idle. The small storage silos are filled with raw product by truck tanker.

During the inspection of the plant, storage silos were not being filled. Silo equipment appeared to be in good condition.

Particulate emissions are estimated to be 0.1615 lbs/hr (0.017 gr/dscf) with a filter efficiency of 99.95% as stated in the correspondence letter from the Flex Clean Corporation dated December 10, 1990.

Section 4-41, Rule 3, and Rule 10 of the ordinance were used to verify compliance of the large and small storage facilities. The allowable particulate emissions limitation of 0.02 gr/dscf [Reasonable Available Control Technology (RACT) Section 4-41, Rule 26.3 (ceramics plants)] apply to the six small storage silos and four large 60 ton storage silos. The two 100 ton storage silos are subject to Section 4-8 (e)(2)(b) Best Available Control Technology (BACT) as determined from ISCST modeling results (see annual inspection report dated November 25, 1991). The BACT limit was previously determined to be 0.02 gr/dscf.

The following tables summarize expected emissions from the plant. Emission factors for both kilns were based on emissions from the clay producing the highest emissions during the stack

test. This would be equivalent to operating both kilns to produce ceramics from the clay with the highest emissions.

Emission Status

Table II Particulate Emissions

Source	Uncontrolled Emissions		Controlled Emissions		Allowable Emissions	Potential Emissions
	lbs/hr	TPY	lbs/hr	TPY	lbs/hr	TPY
-01C	2.3	10.07	2.3	10.07	4.628	20.27
-05C	2.1	9.11	2.1	9.11	3.772	16.52
-06C	258.4	537.5	5.165	10.74	12.58	55.10
-07C	387.6	806.2	7.752	16.12	16.125	48.375
-08C	646.0	1343.7	0.162	0.088	0.194	0.850
Totals	1296.4	2,693.3	17.47	46.12	37.30	141.11

Table III CO Emissions

Source	Actual Emissions		Allowable Emissions	Potential Emissions
	lbs/hr	TPY	lbs/hr	TPY
-01C	4.124	18.06	-----	18.06
-05C	3.724	16.30	-----	16.30
TOTAL	7.848	34.36	-----	34.36

Table IV NO_x Emissions

Source	Actual Emissions		Allowable Emissions	Potential Emissions
	lbs/hr	TPY	lbs/hr[1]	TPY
-01C	0.349	1.53	----	1.53
-05C	0.315	1.13	----	1.13
TOTAL	0.664	2.66	-----	2.66

1. NO_x at 300 ppm by rule 2.4

Table V VOC Emissions

Source	Actual Emissions		Allowable Emissions	Potential Emissions
	lbs/hr	TPY	lbs/hr	TPY
-01C	0.320	1.40	-----	1.40
-05C	0.289	1.26	-----	1.26
TOTAL	0.609	2.66	-----	2.66

Table VI SO_x Emissions

Source	Actual Emissions		Allowable Emissions	Potential Emissions
	lbs/hr	TPY	lbs/hr[1]	TPY
-01C	3.487	15.27	-----	15.27
-05C	3.488	15.77	-----	15.77
TOTAL	6.975	30.99	-----	30.99

1. 500 ppm by rule 13.1.

Table VII Hydrogen Fluoride Emissions

Source	Actual Emissions		Allowable Emissions	Potential Emissions
	lbs/hr	TPY	lbs/hr	TPY
-01C	0.333	1.458	----	----
-05C	0.306	1.340	0.4	1.75
TOTAL	0.639	2.798	----	----

Note: Hydrogen Fluoride (CAS # 76-643-93) is listed as one of the 189 air toxic pollutants to be regulated under Title III of the New Clean Air Act.

Recommendations

I recommend renewing certificates of operation -01C, -05C, -06C, -07C, and -08C. These certificates should expire on September 1, 1995. The following permit conditions should be issued with the appropriate certificate:

2220-30500899-01C

1. The equipment and technology of this source has been deemed reasonable and proper by the Director, the Chattanooga-Hamilton County Air Pollution Control Bureau.

2. Emissions testing for this source, if required by the Director, shall, at a minimum, consist of and be performed in accordance with EPA Test Methods 5 and 9 from Title 40 Code of Federal Regulations Part 60, Appendix A (July 1, 1993)and method 26A from 59 FR 19306.

2220-30500899-05C

1. The maximum allowable hydrogen fluoride (HF) emission rate for this source is 0.4 lbs/hr.

2. The equipment and technology of this source has been deemed reasonable and proper by the Director, the Chattanooga-Hamilton County Air Pollution Control Bureau.

3. Emissions testing for this source, if required by the Director, shall, at a minimum, consist of and be performed in accordance with EPA Test Methods 5 and 9 from Title 40 Code of Federal Regulations Part 60, Appendix A (July 1, 1993)and method 26A from 59 FR 19306.

2220-30500803-08C

1. The maximum allowable particulate emission rate from the two 100-ton storage silos is 0.02 gr/dscf.

2. This emission limitation is Best Available Control Technology (BACT) as determined by the Director, the Chattanooga-Hamilton County Air Pollution Control Bureau.

3. Emissions testing for this source, if required by the Director, shall, at a minimum, consist of and be performed in accordance with EPA Test Methods 5 and 9, Title 40 Code of Federal Regulations Part 60, Appendix A (July 1, 1993).

Emissions Analysis

Permit -01C: No. 1 Ferro-Allied Kiln and Dryer

Particulate emissions are uncontrolled. Particulate information from stack testing showed 2.305 lbs/hr. Allowable emissions based on Process Weight (PW) and Rule 10.3 (Schedule 2), the Ordinance.

Operating Hours = (24 hr/day)(365 day/yr) = 8760 hr/yr

Uncontrolled (Actual) - (2.305)(8760)(1/2000) = *10.07 ton/yr*

Allowable - *4.628 lbs/hr* from Rule 10.2

Potential=(8760hr/yr)(4.628 lbs/hr)(1/2000lbs/ton)= 20.27 TPY

Permit -05C: Swindell Dressler Dryer and Kiln

Particulate emissions are uncontrolled. Particulate emissions from stack testing are 0.519 lbs/hr. Allowable emissions based on Process Weight (PW) and Rule 10.3 (Schedule 2), the Ordinance.

Conversion Factor = 2000 lbs/ton
Operating Hours = (24 hr/day)(365 day/yr) = 8760 hr/yr

Uncontrolled (Actual) - (2.080)(8760)(1/2000) = *9.11 ton/yr*

Allowable - *3.772 lbs/hr*

Potential=(8760)(3.772)(1/2000)=16.52TPY

Permit -06C: DE-18 Eirich Mixer (1)

Particulate emissions are controlled with a filter efficiency of 98%. Pollutant Emission Factor (PEF) used-found in AP-42 Table 8.7-1. Allowable emissions based on Process Weight (PW) and Rule 10.3 (Schedule 2), the Regulations.

PEF = 34 lbs/ton
PW = 15200.00 lbs/hr
Conversion Factor = 2000 lbs/ton
Operating Hours = (16 hr/day)(5 day/wk)(52 wk/yr) =4160hr/yr

Uncontrolled - (15200)(34)(1/2000) = *258.40 lbs/hr*

Controlled - (258.40)(1 - 0.98) = *5.168 lbs/hr*
- (5.168)(4160)(1/2000) = *10.749 ton/yr*

Allowable - 12.58 *lbs/hr*

Potential - (12.58)(8760)(1/2000) = *55.10 ton/yr*

Permit -07C: DE-14 Eirich Mixer (3)

Particulate emissions are controlled with a filter efficiency of 98%. Pollutant Emission Factor (PEF) used-found in AP-42 Table 8.7-1. Allowable emissions based on Process Weight (PW) and Rule 10.3 (Schedule 2), the Regulations.

PEF = 34 lbs/ton
PW = 7600.00 lbs/hr
Conversion Factor = 2000 lbs/ton
Operating Hours = (16 hr/day)(5 day/wk)(52 wk/yr) =4160hr/yr

Emissions calculated for one (1) DE-14 Eirich Mixer

Uncontrolled - (7600)(34)(1/2000) = *129.20 lbs/hr*

Controlled - (129.20)(1 - 0.98) = *2.584 lbs/hr*
- (2.584)(4160)(1/2000) = *5.375 ton/yr*

Allowable - 8.224 *lbs/hr*

Potential - (8.224)(8760)(1/2000) = *36.02 ton/yr*

Emissions total for three (3) DE-14 Eirich Mixers

Uncontrolled - (129.2)(3) = *387.6 lbs/hr*

Controlled - (2.584)(3) = *7.752 lbs/hr*
- (5.375)(3) = *16.125 ton/yr*

Potential - (16.125)(3)= 48.375 *ton/yr*

Permit -08C: Large and Small Bulk Storage Facility

Particulate emissions are controlled with a filter efficiency of 99.95% as stated in the correspondence letter from the Flex Clean Corporation dated December 10, 1990. The process weight is divided by two (2) as Norton Company will pull clay product from any two (2) silos each time a batch is mixed. Pollutant Emission Factor (PEF) used-found in AP-42 Table 8.7-1.

The allowable limitation for the six (6) small storage silos and four (4) storage silos which were installed prior to January 1, 1978 are subject to RACT [Section 4-41, Rule 26.3 (2) (Ceramics plants)], while the two (2) newly installed large storage silos are subject to BACT (Section 4-8, the Regulations) since these two (2) storage silos were installed after September 16, 1980. The allowable limitation shall be deemed as BACT for all of the large and small storage silos and shall be set equal to the RACT standard of 0.02 gr/dscf.

PEF = 34 lbs/ton
PW = (38000/2) = 19,000.00 lbs/hr
Conversion Factor = 2000 lbs/ton
Operating Hours = (16 hr/day)(5 day/wk)(52 wk/yr) =4160hr/yr

Uncontrolled - (19000)(34)(1/2000) = *323.00 lbs/hr*

Controlled - (323.0)(1 - 0.9995) = *0.1615 lbs/hr*
- (0.1615)(4160)(1/2000) = *0.3359 ton/yr*

Allowable - [(0.02 gr/dscf)(1 lb/7000 gr)(1200 cfm)
(60 min/hr){(70°F + 459.67)/(100°F + 459.67)}]
= *0.19395 lbs/hr*

0.19395 lbs/hr > 0.1615 lbs/hr

Potential - (0.19395)(8760)(1/2000) = *0.8495 ton/yr*

Hydrogen Fluoride (HF)
Permit -01C Ferro Allied Kiln and Dryer
Permit -05C: Swindell Dressler Kiln and Dryer

From stack testing, HF emission factor is 0.0001388 lbs/lb

-01C PW = 2400 lbs/hr
-05C PW = 2166 lbs/hr
Conversion Factor = 2000 lbs/ton
Operating Hours = (24 hr/day)(365 day/yr) = 8760 hr/yr

Actual

Hourly
01C (2400)(0.000138) = .3312 lbs/hr
05C (2166)(0.000138) = .2989 lbs/hr

Annually
01C .3312 lbs/hr*8760hr/yr*1/2000lb/ton =1.45 tpy

05C .2989 lbs/hr*8760 hr/yr*1/2000lb/ton=1.309

Allowable - *.4 pounds per hour certificate 05C. 01C was installed so long ago as to not be subject to the rule.*

Potential - (0.4)(8760)(1/2000) = *1.752 ton/yr*