STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 022010-001 Project Number: 2009-04-027

Parent Company: Pella Corporation

Parent Company Address: 102 Main Street, Pella, IA 50219

Installation Name: EFCO - A Pella Company

Installation Address: Bridle W & County Road, P.O. Box 609, Monett, MO 65708

Location Information: Barry County, S32, T26, R27

Application for Authority to Construct was made for:
Modification to the installation in conformance with the Settlement Agreement between the Missouri Attorney General's Office, the Missouri Department of Natural Resources and EFCO Corporation, finalized on April 5, 2009. In addition, EFCO is planning to install a manual, off-line spray booth and cure oven for rework and small parts painting which will also be controlled by the RTO. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required.*

☐ Standard Conditions (on reverse) are applicable to this permit.

☑ Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

FEB - 5 2010

EFFECTIVE DATE

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within 18 months from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within 18 months after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devises shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Departments' Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant sources(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. Also, you must notify the Department of Natural Resources Regional office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct <u>and</u> operate your air contaminant sources(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

EFCO - A Pella Company
Barry County, S32, T26, R27

1. Superseding Condition
   A. The conditions of this permit supersede Special Conditions 1, 2.a through 2.j, found in the previously issued construction permit (Permit Number 1197-023) from the Air Pollution Control Program.

2. Specifications, Operating Limits and Emission Limits for Painting Operations
   A. Painting operations for the purposes of this permit include all units being vented to the regenerative thermal oxidizer (RTO). These emission units include the following: two (2) automatic primer booths (EU12, 13), primer flash-off area (EU14), two (2) automatic topcoat booths (EU15, 16), six (6) manual topcoat booths (EU17, 18, 20, 21, 22, and 23), topcoat flash-off area (EU19), final flash-off area (EU24), paint curing oven (EU25), off-line paint booth (EU65) and off-line paint oven (EU66).

   B. The following Best Available Control Technology (BACT) requirements apply to the painting operations as described in Special Condition 2.A.
      (1) The RTO shall achieve either a minimum of 98% destruction of volatile organic compounds (VOCs) from the paint line or a concentration of less than 20 ppm by weight (ppmw) out the exhaust of the RTO, whichever is greater.
      (2) EFCO shall not exceed 5.82 pounds of VOC per gallon of paint or per gallon of primer.
      (3) EFCO shall not exceed a dilution ratio of 1 gallon of paint and primer combined to 0.45 gallons of solvent in a calendar year based on actual usage amounts.

3. Specifications, Operating Limits and Emission Limits for the Fugitive VOC Emissions
   A. EFCO - A Pella Company (EFCO) shall maintain and operate, as a BACT requirement, in accordance with the submitted Best Practices document for usage of isopropyl alcohol (IPA) for window/door cleanup.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

B. EFCO shall review and update the Best Practices document for usage of IPA for window/door cleanup at minimum once every two years from issuance date of this permit. Any updates to this document shall not lessen the requirements that are being approved as part of this permit. The most recent Best Practices document shall be submitted with each Operating Permit renewal application. This document shall also be readily available to any Missouri Department of Natural Resources' personnel upon request.

C. EFCO shall keep all solvents and cleaning solutions in sealed containers whenever the materials are not in use. EFCO - A Pella Company shall provide and maintain suitable, easily read, permanent markings on all solvent and cleaning solution containers used with this equipment.

4. Additional Specifications, Operating Limits and Emission Limits

A. EFCO shall not exceed 2,630 hours of operation for each space heater (EU55) per calendar year.

B. EFCO shall not exceed 6,130 hours of combustion of natural gas in the air makeup unit (EU64) per calendar year.

C. EFCO shall not emit more than 1.14 pounds of hexavalent chromium from the chromator (EP8 and EP10) in any consecutive 12-month period.

D. EFCO shall not emit more than 33.73 pounds of hexavalent chromium from painting operations as defined in Special Condition 2.A in any consecutive 12-month period.

5. Control Requirements

A. EFCO shall install and effectively operate a Regenerative Thermal Oxidizer (RTO) for the control of VOCs and volatile hazardous air pollutants (HAPs) from the painting operations as listed in Special Condition 2.A.

B. The natural gas-fired RTO (EP-RTO) must be in use at all times when any of the equipment listed in Special Condition 2.A are in operation. The thermal oxidizer shall be operated and maintained in accordance with the manufacturer's specifications to ensure a minimum VOC destruction efficiency as specified in Special Condition 2.B.(1) This destruction/removal efficiency shall be verified through compliance testing, as detailed in Special Condition 7 of this permit.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

C. The operating temperature of the RTO shall be continuously monitored and recorded during operation. The operating temperature of the RTO shall equal or exceed the temperature, as determined during the compliance test specified in Special Condition 7, which is needed to meet the required destruction efficiency or 20 ppmw outlet, whichever is greater. The most recent sixty (60) months of records shall be maintained on-site and shall be made immediately available to Missouri Department of Natural Resources' personnel upon request. The acceptable temperature range may be re-established by performing a new set of emission tests.

D. EFCO shall maintain an operating, maintenance and inspection log for the RTO which shall include the following:
   (1) Incidents of malfunction(s), with impact on emissions, date(s) and duration of the event, probable cause, and corrective actions;
   (2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc; and
   (3) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.

E. EFCO shall completely capture and vent all VOC emissions associated with the painting operations to the RTO.

F. EFCO shall control particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) emissions from the spray guns using paint booths equipped with paint overspray filters as specified in the permit application. The paint booths and paint overspray filters shall be maintained in accordance with the manufacturer's specifications. Replacement filters shall be kept on hand at all times.

G. EFCO shall further control PM_{10} emissions from the painting operations using RTO protection filters as specified in the permit application. The RTO protection filters shall be maintained in accordance with the manufacturer's specifications. Replacement filters shall be kept on hand at all times.

6. Spray Booth Requirements
   Spray gun(s) shall be operated in the appropriate paint booth as specified in Table 1.

Table 1: Booth and Spray Gun Configurations

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Booth	Description	Configuration	Maximum Flow (oz/min)
1	automatic primer booth	one electrostatic turbo bell	7
2	automatic primer booth	one electrostatic turbo bell	7
3	automatic topcoat booth	three electrostatic turbo bells	21
4	automatic topcoat booth	three electrostatic turbo bells	21
5	manual topcoat booth	one electrostatic manual gun	10
6	manual topcoat booth	one electrostatic manual gun	10
7	manual topcoat booth	one manual gun	10
8	manual topcoat booth	one manual gun	10
9	manual topcoat booth	one manual gun	10
10	manual topcoat booth	one manual gun	10
Off-line	manual off-line booth	one manual gun	10

7. Compliance Requirements

A. EFCO shall demonstrate 100 percent capture of VOCs associated with the painting operations using an EPA approved testing method agreed upon with the Air Pollution Control Program.

B. EFCO shall conduct stack testing of the RTO stack (EP-RTO) in order to verify compliance with Special Condition 2.B(1). Compliance testing of the RTO shall be conducted under representative production and process rates of the painting operations.

C. The compliance testing for the RTO shall be conducted within sixty (60) days of achieving normal production, but not later than 180 days after initial startup of the RTO and shall be conducted in accordance with the stack test procedures outlined in Special Condition 8.

D. EFCO shall conduct the following compliance tests once every 5 years from the date of the most recent compliance test.

(1) Demonstration of 100% capture of VOC emissions associated with the painting operations; and

(2) Demonstration of compliance of the RTO with Special Condition

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

2.B(1).

E. EFCO shall demonstrate compliance with Special Condition 2.B.(2) by maintaining a set of all Material Safety Data Sheets (MSDS) for all paints and primers used in the painting operations.

F. EFCO shall demonstrate compliance with Special Condition2.B.(3) on a quarterly basis. Purchase records from the vendor may be used in lieu of actual usage amounts.

G. Compliance with Special Conditions 4.A and 4.B shall be demonstrated through the most current Emission Inventory Questionnaire (EIQ) submittal.

H. Attachment A, Attachment B or equivalent forms approved by the Air Pollution Control Program shall be used by EFCO to demonstrate compliance with Special Conditions 4.C and 4.D.

I. In order to take credit in Attachment A for installation of hexavalent chromium control device on the chromator (EP8 & EP10), EFCO shall obtain approval of the control efficiency from the Air Pollution Control Program.

8. Proposed Test Plan and Final Test Report

A. A completed Proposed Test Plan Form (enclosed) must be submitted to the Air Pollution Control Program thirty (30) days prior to the proposed test date so that the Air Pollution Control Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. The Proposed Test Plan may serve the purpose of notification and must be approved by the Director of the Missouri Air Pollution Control Program prior to conducting the required emission testing.

B. Two (2) copies of a written report of the compliance test results shall be submitted to the Director of the Air Pollution Control Program within sixty (60) days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required EPA Method for at least one (1) sample run.

C. If the compliance testing required by Special Condition 7 of this permit

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

indicates that any control efficiency or emission limit specified in Special Condition 2.B.(1) is not met, EFCO must propose a plan to the Air Pollution Control Program with thirty (30) days of submitting the compliance test results. This plan must demonstrate how EFCO will reduce emission rates in order to show compliance. The plan shall become immediately effective upon its approval by the Director.

9. Reporting

A. EFCO shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than ten (10) days after the day in which emissions exceed the limits established by this permit.

B. EFCO shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than ten (10) days after the day in which operation of equipment at this installation is not in accordance with any operational limitation or condition established by this permit.

10. VOC Credit in Waste

In order to take credit for VOC content in material waste in the Emissions Inventory Questionnaire, EFCO shall obtain the VOC content of the material waste for each shipment of waste from the waste collector vendors or EFCO shall conduct their own VOC content analysis on every shipment of waste using an approved Environmental Protection Agency (EPA) method. Records of VOC content for each shipment shall be maintained as required by this permit for not less than five (5) years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (8) REVIEW
Project Number: 2009-04-027
Installation ID Number: 009-0003
Permit Number:

EFCO - A Pella Company
Bridle W & County Road
P.O. Box 609
Monett, MO 65708

Complete: May 11, 2009

Parent Company:
Pella Corporation
102 Main Street
Pella, IA 50219

Barry County, S32, T26, R27

REVIEW SUMMARY

- EFCO - A Pella Company (EFCO) is undergoing Prevention of Significant Deterioration (PSD) review as a result of the Settlement Agreement finalized on April 5, 2009. EFCO will modify the installation in conformance with the BACT analysis as follows: installation of a regenerative thermal oxidizer (RTO) on all existing paint line spray booths and ovens and enclosure of each flash-off area between spray booths and the curing oven in order to capture all VOC emissions from the painting operation. In addition, EFCO is planning to install a manual, off-line spray booth and cure oven for rework and small parts painting which will also be controlled by the RTO.

- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment. HAPs of concern from this process include dimethyl phthalate (CAS# 131-11-3), methyl isobutyl ketone (CAS# 108-10-1), xylene (CAS #1330-20-7), ethyl benzene (CAS# 100-41-4), toluene (CAS# 108-88-3), chromium oxide (CAS# 1308-38-9), cobalt aluminate (CAS# 1345-16-0) and strontium chromate (CAS# 7789-06-2)

- None of the New Source Performance Standards (NSPS) apply to the proposed equipment.

- The Maximum Achievable Control Technology (MACT) standard, 40 CFR Part 63, Subpart MMMM, National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts applies to the proposed equipment.

- A regenerative thermal oxidizer (RTO) is being used to control VOC and HAP emissions from the paint line, an off-line spray both and associated cure oven.

- Paint overspray filters and RTO protection filters are used to control PM_{10} emissions from the paint line.

- The Best Available Control Technology (BACT) requirements apply to VOCs.

- BACT requirements include the following:
  - Complete capture of VOC emissions associated with the painting operations;
  - Installation of an RTO to achieve a 98% destruction efficiency of VOCs or 20 ppmw outlet, whichever is greater; and
  - Application of Best Practices for IPA window/door cleaning operations.

- This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants after application of BACT controls are below major source levels.

- This installation is located in Barry County, an attainment area for all criteria air pollutants.

- This installation is not on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2].

- Air quality modeling for this project was performed to determine the ambient impact of HAPs exceeding the Screening Model Action Levels (SMALs) and impact on plants, soils and animals. Based upon the air dispersion modeling conducted by the Air Pollution Control Program staff, EFCO demonstrates compliance with all Missouri Department of Natural Resources Risk Assessment Levels (RALs) for those HAPs exceeding their respective SMALs except for cobalt and hexavalent chromium. However, EFCO demonstrates compliance with federal Risk Assessment Levels for cobalt and hexavalent chromium. The installation is also not expected to have an adverse impact on plants, soils, and animals.

- Emissions testing is required to verify complete capture of VOCs associated with the painting operation and to show compliance with VOC destruction efficiency and allowable outlet VOC concentration requirements of the RTO.

- A revision to your Part 70 Operating Permit is required for this installation within 1 year of equipment startup.

- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

EFCO is a manufacturer of custom architectural windows in Monett, Missouri. Aluminum is extruded, cut, shaped, welded, finished and painted to make window frames, and then glass is installed into the window frames to complete the window. Prior to this permit, this installation was considered a major source of VOCs and HAPs

with regards to both construction and operating permits. However, with the installation of the RTO, EFCO will no longer be a major source with regards to VOCs. EFCO was granted a renewal of their Part 70 Operating Permit on August 8, 2007.

The following construction permits have been issued to EFCO - A Pella Company from the Air Pollution Control Program.

Table 2: Previously Issued Construction Permits

Permit Number	Description
0491-003	Construction of a new paint spray facility which replaced an existing painting facility.
1197-023	Construction of architectural window production equipment.
1199-004	Temporary permit to operate a portable grizzly.
052000-018	Construction of a new adhesive spray booth to accommodate the application of adhesive to Styrofoam panels and aluminum sheet metal.
012004-004	Reconstruction of two paint booths (EP 15 and 16) that were destroyed by fire in 1998.

On January 2, 2009, the Program issued Notice of Violation #010209SF1 to EFCO for failing to comply with Missouri State Rules 10 CSR 10-6.060, *Construction Permits Required,* and 10 CSR 10-6.065, *Operating Permits*. This failure to comply was due to exceeding the 249 ton per year limit given in Permit No. 1197-023 and OP2007-039. A Settlement Agreement was finalized between the Department of Natural Resources and EFCO on April 5, 2009. Obtaining a construction permit is part of a remedial action required by the Settlement Agreement.

PROJECT DESCRIPTION

This project is being undertaken to remedy a non-compliance situation where existing limits on VOCs have been exceeded. This project has multiple aspects including the following:

1) Reconfiguration of the paint application booths to enclosed, recirculating airflow booths;
2) Installation of one additional paint booth and a 0.74 MMBtu/hr curing oven for off-line painting of small parts and re-worked parts;
3) Installation of a 2.6 MMBtu/hr natural gas-fired regenerative thermal oxidizer (RTO) on paint line booths and ovens; and
4) Removal of an existing paint booth.

Currently, the window units are coated in a paint line that consists of a series of paint booths (10 total), flash-off areas (3 total) and a curing oven. As a result of this project, the primer and paint application booths are being reconfigured such that the painting operation is completely enclosed from the front of the first booth until the exit of the oven. The air in the booths will be recirculated in order to concentrate the VOC stream going to the RTO. This technique allows reduction of airflow volume from 150,000 actual cubic feet per minute (acfm) to approximately 30,000 acfm. The reduced airflow will minimize supplemental fuel needs and the emissions associated with combustion of fuel. The emissions from the paint line will exhaust through paint overspray filters at

each booth and an RTO protection filter prior to the RTO for control of PM_{10} emissions. A maximum of ten spray guns will be operating at any one time in the main paint line and one additional spray gun in the off-line paint booth. (See Table 1 for a list of spray guns and their associated maximum hourly design rate.)

The manual off-line paint system will consist of one (1) manual off-line small parts/rework booth with one air atomized spray gun and one (1) small parts/rework oven. The off-line system will be used for running very small batches, coating small parts and quality touchup purposes. The operation of the off-line paint booth will greatly reduce the amount of paint wasted coating small parts and very small batches on the main production paint system. The emissions associated with the offline batch booth and oven will be completely captured and also vented to the RTO.

EMISSIONS/CONTROLS EVALUATION

The project's potential emissions are primarily VOCs and HAPs that are associated with the existing paint line. Potential emissions for the paint line were estimated using a mass balance approach and information obtained from the HAP Compliance Worksheet and vendor usage records supplied by the applicant. 100 percent of the VOC and non-PM_{10} HAP content of the coating mixtures is assumed to be emitted and vented to the RTO. The RTO will have a VOC destruction efficiency of a minimum of 98 percent or 20 ppmw in the outlet, whichever is greater.

PM_{10} emissions (including HAPs that are considered PM_{10}) for the application of the materials were evaluated based on the solids content of the paint and transfer efficiency from air-atomized spray application. Three different types of spray application are used in the paint line: electrostatic turbo bells, electrostatic air-atomized guns and air-atomized guns. A weighted transfer efficiency of 48.4 percent was assumed. If not specifically stated in the applicant's worksheet, the solids content of the material was estimated by taking the density of the material and subtracting out the volatile content and assuming the remainder to be PM_{10}. PM_{10} from the paint line will be controlled by paint overspray filters and RTO protection filters. The PM_{10} control efficiency equates to a minimum of 70 and 99 percent, respectively.

The potential emissions of total VOCs, combined HAPs, each individual HAPs and PM_{10} were determined for each paint and solvent used in the paint line. The highest potential emissions of each were then used to determine the worst case potential emissions for the project.

The emission factors used for estimating the emissions from natural gas combustion in the curing oven and RTO were obtained from the Environmental Protection Agency (EPA) document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Section 1.4, *Natural Gas Combustion* (07/1998).

The following table provides an emissions summary for this project. Existing actual emissions were taken from the installation's 2008 Emission Inventory Questionnaire (EIQ). The potential emissions of the application represent the emissions associated

with the emission units vented to the RTO. The installation's existing emissions were re-evaluated as a part of this project. The emissions associated with the re-configured paint line, the off-line paint booth and oven as well as all other existing emission units are combined under the New Installation Potential Emissions column. Potential emissions of the application and the installation are based on continuous operation (8,760 hours per year) and do not take into account the hourly limitations specified in the Special Conditions.

Table 3: Emissions Summary (tons per year)

Pollutant	**Regulatory *De Minimis* Levels[1]**	**Existing Actual Emissions (2008 EIQ)**	**Potential Emissions of the Application**	**New Installation Potential Emissions**
PM_{10}	15.0	5.63	1.39	12.1
SOx	40.0	0.03	0.015	0.17
NOx	40.0	5.17	2.44	28.1
VOC	40.0	407.39	20.80	194.0
CO	100.0	4.34	2.05	23.6
HAPs	10.0/25.0	N/D	13.41	19.0
Dimethyl Phthalate	10.0	N/D	3.37	3.37
Methyl Isobutyl Ketone	10.0	N/D	6.97	6.97
Xylene	10.0	N/D	10.29	10.29
Ethyl Benzene	10.0	N/D	2.89	2.89
Toluene	10.0	N/D	0.67	0.67
Chromium compounds[2]	5	N/D	0.25	0.26
Hexavalent Chromium compounds[2,3]	0.002	N/D	<0.0169	<0.0248
Cobalt compounds[2]	0.1	N/D	0.20	0.20
Formaldehyde	2.0	N/D	<<0.01	<<0.01
Cumene	10.0	N/D	0.046	0.046
Antimony compounds[2]	5.0	N/D	0.049	0.049
Nickel compounds[2]	1.0	N/D	0.20	0.20
Napthalene	10.0	N/D	<<0.01	<<0.01
Glycol ethers	5.0	N/D	7.95	7.95

N/D = Not Determined
[1] The regulatory level listed for each individual HAP is the Screen Modeling Action Level (SMAL).
[2] The emission rate for chromium, cobalt, antimony and nickel compounds represent the weight of the just the metal portion of the compound.
[3] The emissions rates for hexavalent chromium represent the conditioned emission level.

All emission limitations established in Permit No. 1197-023 have been superseded in this permit. With the installation of the RTO, EFCO no longer has the capability to exceed the installation-wide 249 ton per year limit for VOCs or the individual HAP emission limits stated in Special Conditions 1 and 2.a through 2.j of Permit No. 1197-023.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. The BACT requirements apply to VOCs. Potential emissions of all pollutants after application of BACT controls are below major source levels.

APPLICABLE REQUIREMENTS

EFCO - A Pella Company shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information,* 10 CSR 10-6.110
  The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required June 1 for the previous year's emissions.

- *Operating Permits*, 10 CSR 10-6.065

- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170

- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220

- *Restriction of Emission of Odors*, 10 CSR 10-3.090

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400

- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts,* 40 CFR Part 63, Subpart MMMM
- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260

- *Maximum Allowable Emissions of Particulate Matter From Fuel Burning Equipment Used for Indirect Heating,* 10 CSR 10-3.060

BACT ANALYSIS

Any source subject to Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, Section (8) must conduct a BACT analysis on any pollutant emitted in greater than de minimis levels. The BACT requirements are detailed in Section 165(a)(4) of the Clean Air Act, at 40 CFR 52.21 and 10 CSR 10-0.60(8)(B).

BACT analysis is required for VOCs at the EFCO - A Pella Company facility (EFCO) in order to remedy a non-compliance situation where existing limits on VOC have been exceeded. Primary VOC emissions occur in the paint line which consists of 10 paint booths, three flash-off areas, and one curing oven. Other VOC sources include an additional paint booth and oven for off-line painting of small parts and re-worked parts as well as fugitive emissions from sources such as window cleaning.

BACT for the Paint Line and Off-line Paint Booth– VOC

Potentially available VOC control options were identified for the paint line and off-line paint booth based on a comprehensive review of available information. The control options can be broken down into two categories: operational/process changes and add-on control technology. Two general operational/process options have been used to reduce VOC emissions from surface coating operations: 1) reducing or replacing the organic solvent in a coating system by usage of alternative coatings; and/or 2) improving the transfer efficiency of the coating operation by alternative application methods.1 The second control option, add-on controls, is simply equipment that is added on to the exhaust to treat emissions collected from the paint booths. The following VOC control technologies with potential application to the existing paint line are listed below.

VOC Control Options for Paint Line

- Operational/Process Changes
  - Alternative Coatings
    - Water borne coatings
    - Powder coatings
    - Low VOC/high solids coatings
    - Radiation-cured coatings
  - Alternative Application Methods
    - Dip-coating
    - Flow-coating
    - Electrostatic spray operation

References

1 "State of the Art (SOTA) Manual for Surface Coating Operations", July 1997, State of New Jersey, Department of Environmental Protection, Air Quality Permitting Program

- Add-on Control Technologies
  - Carbon sorption
  - Carbon sorption with thermal oxidizer
  - Zeolite wheel with thermal oxidizer
  - Thermal oxidizer
  - Air recirculation with thermal oxidizer
  - Condensation with recovery

Discussion of VOC Control Options for Main Paint Line

Operational/Process Changes:

Alternative Coatings:

EFCO currently uses High Performance Architectural Coatings, often referred to in industry as "kynars", which adhere to the American Architectural Manufacturers Association (AAMA) 2604 and 2605 formulation standards. AAMA is a source of finish performance standards, product certification and educational programs for the window, door, and skylight industry. The purpose of these standards is to help architects, contractors, and building owners specify factory-applied organic coatings that will provide and maintain a superior level of performance in terms of coating integrity, exterior weatherability and general appearance over a 5 or 10 year period.[2] These coatings are fluoropolymers characterized by low solids content and high VOC content. The quality of the coatings used to coat the custom architectural windows manufactured at the facility is an integral feature of their windows. EFCO has looked at the use of alternative coatings to their current High Performance Architectural Coatings that will achieve the same quality while decreasing VOC emissions. Following is a summary of their considerations.

- EFCO currently uses kynar coatings which could be considered a conventional solvent-based coating. Solvent-based coatings traditionally contain about 25% solids and a relatively high organic solvent content.

- Waterborne coatings primarily use water as the solvent to disperse the resin, and as a result, they typically have low VOC content (by regulations, this equates to a VOC content of less than 3.5 lb/gal).[3] However, waterborne coatings are currently not available in a form that will meet the quality standards of high performance architectural coatings that EFCO currently provides.

- Powder coating materials can provide a high-quality, durable, corrosion-resistant coating. They do not produce hazardous overspray wastes or wastewater sludges, and most do not release VOCs when cured. In addition, the powder overspray can be collected and reused resulting in transfer efficiencies up to 99 percent. However, powder coating systems suffer from the inability to quickly formulate and supply custom colors.[2] EFCO is heavily reliant on mix-to-order

2 :"AAMA 2605-05 Sets High Standards for Coated Aluminum Extrusions and Panels", http://ce.construction.cam/article.php?L=22&C-210,
3 "Metal Painting and Coating Operations", http://www.p2pays.org/ref/01/00777/alternat.htm.

colors as a part of their product offering; therefore, the need to quickly and efficiently change colors is vital to their operation and ultimately precludes the option of using powder coatings.

- High-solids coating have a higher percentage of paint solids and a lower percentage of solvent carriers than conventional solvent-borne coatings. Because high-solids coating contain less solvent, VOC and HAP emissions are reduced. High-solids paints also provide higher layer thicknesses per application cycle than conventional coatings, resulting in a savings in time. EPA defines high solids paints as systems with VOC content of less than 2.8 pounds per gallon.[2] Some current formulations of AAMA2605 paint are already low VOC and high solids for this paint category. However, the paint is diluted by EFCO with solvent in order to achieve coating consistency and to improve the appearance of the product High solids paint are not forgiving during application and if not diluted can cause inconsistent appearance on finished parts. Because of the custom nature of EFCO's business, there are over 12,000 profiles that must be coated and look the same. The use of diluted coatings greatly improves the ease of meeting this need for consistency. Thus, the usage of high-solid coating without dilution would jeopardize the quality of the product and thus is not further considered.

- Radiation cured coating typically do not contain any organic solvent carriers. The coatings are cured using an electron beam or ultraviolet light source. Like waterborne coatings, however, there are no known radiation cured coatings that are available in a form that will meet the AAMA 2605 specification.

In summary, although some surface coating operations have been able to convert their operations to lower VOC containing paints and coatings such as power coating, waterborne coating and radiation cured coatings, EFCO is unable to do so because of the functional requirements required to achieve the quality standards of the architectural coatings needed for their window frames. The use of waterborne, powder or radiation cured coatings are not considered technically feasible due to the reasons stated above. No other alternate coatings were identified to have lower VOCs than those currently used and also retain the architectural standards necessary for their product and ability to change colors quickly and often. EFCO will continue to use either conventional coatings or high-solids coating diluted with solvent.

<u>Alternative Application Methods:</u>
Alternative application methods may be implemented to improve transfer efficiency. Transfer efficiency is the ratio of the amounts of coating solids deposited on the surface to the amount of coating solids used. If the transfer efficiency can be increased, then the amount of coating (and the resultant VOC emissions) will be reduced. Typical technologies used to improve transfer efficiency and reduce emissions in surface coating operations include dip-coating, flow-coating and electrostatic spraying.[1]

- With dip-coating, a large main tank is filled with a mixed coating. The part is dipped into a tank and then moved to an area where excess paint drips off and is collected and returned to the main tank. Fresh paint, water and/or organic

solvent are added to the main tank to compensate for usage and evaporation and to maintain a constant solids concentration. Transfer efficiencies for dip-coating can be as high as 85%. However, due the number of color changes, the time associated with cleaning the tanks would preclude its use. For these reasons, dip-coating will not be considered any further.

- With flow-coating, the parts travel on a conveyor line that is coated from overhead nozzles. The excess coating collects in a holding tank for reuse. The transfer efficiency for flow-coating can be as high as 85%. However, like dip-coating, flow-coating would require the complete conversion of a coating line. In addition, EFCO uses over one hundred different colors on their custom windows. Thus, collecting the coating will result in a mixture of paints and primers that cannot be re-used. Flow-coating will not be considered any further in this analysis.

- With electrostatic spraying, an electrical transformer is used to create an electric potential between paint particles and the surface to be coated. Transfer efficiency is increased because the paint particles are electrically attracted to the surface. Although the transfer efficiency will vary depending on the type of surface sprayed and the operator's skills, electrostatic air atomized and airless spray guns can achieve transfer efficiencies of 65% to 80%. Use of bells or disks are another type of electrostatic spraying. A rotating bell or disk that is negatively charged atomizes the coating that is attracted to the positively grounded surface. Bell or disk electrostatic spraying can achieve efficiencies of 90% to 95%.[1] These higher control efficiencies for the electrostatic bells are typically on large flat surfaces. EFCO expects a transfer efficiency closer to 75% due to geometry of the pieces being coated. Use of electrostatic spray is considered technically viable.

<u>Add-on Control Technologies</u>:

Add-on control is typically put on the exhaust of a surface coating operation to further reduce levels beyond what can be achieved by the use of lower VOC coatings or higher transfer efficiency applications: Typical add-on control devices include oxidation, carbon adsorption and hybrid systems. The hybrid systems involve some method of VOC capture followed by oxidation.

- Oxidation – Oxidation uses heat to combust the VOCs in the gas stream. In most cases, an auxiliary fuel is required to raise the temperature of the gas stream to a point where the VOCs will be combusted. There are several types of oxidizers including thermal oxidizers (TO), recuperative thermal oxidizers, catalytic oxidizers (CO) and regenerative thermal oxidizers (RTO). The efficiencies of these oxidizers are considered to be relatively equal; however, the energy consumption is not. Destruction efficiencies range from 90 to 99 percent plus for oxidizers depending on the stream characteristics and operation of the oxidizer.

- Adsorption – Adsorption is a physical and/or chemical process whereby a contaminant in an air stream is attracted to the surface of an adsorbent. The adsorbed material is held physically, rather loosely, and can be released

(desorbed) rather easily by either heat or vacuum. Activated carbon is the most commonly used adsorbent. Others include zeolite and polymer adsorbents. The units can be either onsite regenerable or non-regenerable. The efficiency of a carbon adsorption system which can be as high as 95 to 98 percent depends upon the carbon adsorption efficiency for individual VOCs. Other factors include cycle time, the velocity, the inlet concentration of the solvent-laden air and temperature. Carbon adsorption systems can achieve the same efficiency as oxidizers.

- Carbon adsorption / thermal oxidizer – This combination of add-on controls is most commonly used with low concentrated VOC streams. Carbon adsorption is used to capture the VOCs. After the adsorbent becomes laden with VOCs, they are desorbed using steam or hot air to an oxidizer for destruction. In other words, the carbon adsorption system is used to raise the concentration of the VOCs to provide more economical treatment in either combustion or condensation devices. Since sorption/desorption is the collection mechanism even though the entire airstream is collected, the efficiency of such systems is on the order of 95%. Carbon adsorption systems have “poisoning” issues with the kynar coatings used in EFCO operations where certain constituents of the paint as well as particulate can cause active sites in the carbon to become inactive types. Since other technologies have equivalent or greater VOC control, this control option will not be further explored.

- Zeolite wheel / thermal oxidizer – The zeolite wheel is a control technology designed to economically control VOC emissions in conditions with high exhaust gas flow rates and low accompanying hydrocarbon concentrations. In this control technology, exhaust gas emissions are exhausted through a rotating zeolite wheel within the control device. Hydrocarbon emissions are adsorbed/ concentrated onto the zeolite wheel and removed from the high flow rate exhaust. As the wheel rotates, a segment of it is constantly being rotated through an isolated area where the adsorbed hydrocarbons are desorbed off the wheel to create a concentrated, low flow rate exhaust stream. The concentrated hydrocarbons are then oxidized in a catalytic oxidizer. As with the activated charcoal, the zeolite wheel also has poisoning issues with the kynar coatings. Since other technologies have equivalent or greater VOC control, this control option will not be further explored.

- Air recirculation / oxidizer – With air recirculation, a portion of the lightly contaminated air (a bleed-off stream) is vented off and the remaining exhaust air is returned to the booth after mixing with fresh air equal to the bleed-off stream volume. By recirculating the air, the VOCs contained in the air are concentrated and the exhaust volume is reduced prior to going to the add-on control which is most often an oxidizer. The destruction efficiencies for air recirculation combined with the oxidizer are the same as those with the oxidizer alone. The main difference is the amount of air treated will be much smaller when air recirculation is utilized. Its use results in energy savings for not having to condition (heat and cool) a larger amount of makeup air going to the paint line area. In addition, both the capital and operating cost of the control system are significantly reduced due to dealing with smaller air volumes.

- Condensation / recovery – Low temperature condensation is based on lowering the vapor pressure of a VOC by reducing the temperature of the process stream and condensing the VOC into the liquid phase.[4] The condensation process requires very low temperatures so that the VOCs can be condensed out. Condensation can be a viable emission control option when dealing with pure substances that have a recovery value in a controlled atmosphere. For a painting operation, the condensables are mixtures of low value solvents containing toxic compounds and the atmosphere is plant air containing humidity that will affect solvent recovery. There are no known condensing systems installed on solvent based painting systems. The only condenser / recovery system listed in the RBLC as BACT for a permitted unit in the surface coating, printing or graphic arts industry was for a degreaser.

Determination of BACT for VOC Emissions from the Paint Line

BACT for VOCs emitted from the paint line can be reduced by a combination of the following methods: using coatings that have lower VOC content, using application equipment that will increase transfer efficiency and adding on controls to remove VOCs from the exhaust of the paint line.

As described above, EFCO has specific architectural characteristics that it must meet in order to meet the required standards associated with their product. In addition, EFCO relies on its ability to provide custom windows and thus they must retain the capability to readily change colors to meet customer demand. The only type of coating that allows them to do both is a high solids coating diluted with solvents or conventional solvent-based coatings. Since there is no alternative coating that will effectively lower VOC emissions, retain quality standards, and maintain the ability to change colors efficiently and effectively, no changes to the type of coating will be required. To prevent an increase in VOCs from current potential levels, EFCO will be limited to a VOC content on their paints and primers to 5.82 pounds of VOC per gallon. This VOC content matches the highest VOC content of paint or primer that is currently used at the facility and is the basis for all potential emission calculations. EFCO will also be limited to a dilution rate of 0.45 gallons of solvent to 1 gallon of primer and paint combined. This dilute rate is a weighted average based on usage and dilution rates currently used by EFCO. EFCO currently dilutes 1 gallon of paint with approximately 0.4 gallons of solvent and 1 gallon of primer with 0.625 gallons of solvent.

With regards to improving transfer efficiency, electrostatic spraying has been identified as the only technical feasible option for EFCO. EFCO currently has automatic electrostatic bells in two primer booths and in two topcoat booths. An additional two manual topcoat booths are each equipped with an electrostatic air atomized spray gun. However, the remaining four manual topcoat booths are equipped with conventional spray guns.

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4 "VOC Control Technologies", http://www.icac.com/i4a/pages/index.cfm?pageID=3400&textonly=1
"Choosing an Adsorption System For VOC: Carbon, Zeolite, or Polymers?, EPA Technical Bulletin, EPA 456/F-99-004, May 1999

Converting the remaining conventional spray guns to electrostatic spray guns is not viewed as technically viable. As stated above, EFCO is currently using electrostatic bells and electrostatic spray guns to apply primer and the first coats of paint onto the window parts. Electrostatic spraying has higher transfer efficiencies where the surfaces to be coated are uniform and featureless. However, EFCO currently has over 12,000 shapes and profiles that require coating on a single paint line. The electrostatic guns are not good at "throwing" paint into corners or grooves or onto small features. The electrostatic charge (faraday cage) builds in corners and other small spaces and creates resistance for the charged paint droplets to enter rather than attracting the particles. The technical phrase is known as "faraday cage" effect. Conventional guns do not have this limitation and provide operational flexibility to adjust to all shapes and sizes. Thus, conventional guns are needed to apply paint for the finishing coats. Therefore, no changes to application equipment will be required as a part of this BACT analysis. To ensure that EFCO will maintain the current transfer efficiencies, the type of spray gun to be used in each paint booth has been specified in the special conditions of this permit.

There are several technically feasible add-on control technologies for controlling VOC emissions associated with the paint line and off-line paint booth. The technically feasible add-on control technologies for VOC in descending order of control efficiency are summarized in the following table. All options below assume that 100 percent of all VOCs being emitting from the painting operations are captured and vented to the control device(s).

Table 4 – Technically Feasible VOC Control Technologies

Control Technology	VOC Control Device 1	VOC Control Device 2	Overall VOC Reduction
Oxidizer	90 to 99+%[5,6,7]	-	90 to 99+%
Air Recirculation / Oxidizer	90 to 99+%	-	90 to 99+%
Carbon Adsorption	95 to 98[8]%	-	95 to 98[9]%
Carbon Adsorption / Oxidizer	95 to 98%	98%	93.1 to 96.0%
Zeolite Wheel / Oxidizer	95 to 98%	98%	93.1 to 96.0%
Condensation / Recovery	90 to 99%[10]		90 to 99%

The VOC controls that EFCO has proposed as achieving the lowest VOC emission levels, highest destruction efficiency, from the paint line are the oxidizer or air recirculation used in conjunction with an oxidizer. Both options are technologically feasible option and have been used extensively in industry. For EFCO, installation of an oxidizer alone would result in a large airstream and the need for larger amounts of supplemental fuel in order to maintain destruction temperatures. The later control option using air recirculation with the oxidizer provides significant economical savings

5 Air Pollution Control Technology Fact Sheet for Incinerator – Regenerative Type, EPA Technical Bulletin, EPA-452/F-03-021
6 Air Pollution Control Technology Fact Sheet for Thermal Incinerator, EPA Technical Bulletin, EPA-452/F-03-022
7 Air Pollution Control Technology Fact Sheet for Incinerator-Recuperative Type, EPA Technical Bulletin, EPA-452/F-03-020
8 "Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers?", EPA Technical Bulletin, EPA 456/F-99-004
9 "Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers?", EPA Technical Bulletin, EPA 456/F-99-004
10 "Refrigerated Condensers for Control of Organic Air Emissions", EPA Technical Bulletin, EPA 456/R-01-004

due to the treatment of a smaller airstream. EFCO has proposed 100 percent capture of VOC emissions and control by a regenerative thermal oxidizer with air recirculation as BACT. Through review of available technical publications and information as well as recently permitted and proposed limits contained in the RACT/BACT/LAER Clearinghouse (RBLC), the thermal oxidizer has been identified as one of the most commonly applied and effective technologies for the control of VOC emissions from the paint line. Since EFCO has proposed the highest level of control for VOC which is both technically and economically feasible, no further evaluation of other control technologies has been conducted.

As noted above, there are many different kinds of oxidizers that can achieve in excess of 98 percent control. Further analysis was conducted by EFCO to determine which type of oxidizer should be used. Whereas most types of thermal oxidizers can easily achieve 95 percent or greater destruction efficiency, the operating costs will vary significantly due to their inherent design. Using Air Compliance Advisor Version 7.5 software developed and published by the EPA, EFCO compared the energy costs and overall cost of operation for several oxidizer scenarios including the following: fixed bed catalytic oxidizer, fluidized bed catalytic oxidizer, flare, recuperative thermal oxidizer, and regenerative thermal oxidizer. When setting the destruction efficiency to 98% and a 30,000 cubic feet per minute flow rate for all control options, the regenerative thermal oxidizer had the least energy impact (operating costs) at $379,200 per year. The next control option that achieved the lowest operating costs was the fixed bed catalytic oxidizer at $1,362,900. The flare or thermal oxidizer which is known to achieve destruction efficiencies greater than 99.9% had operating costs in excess of $93,451,400 when set at a control efficiency of 98% (This is equivalent to approximately $67,000 per ton removed). Higher destruction efficiencies require hotter destruction temperatures and even more money in fuel costs. So although the flare is considered technically feasible, it not viewed as an economically feasible option.

EFCO has proposed a BACT limit of 98% control of VOCs. Under optimum conditions, thermal oxidizers in general will perform at levels at 99% or greater control. However, the acquired destruction efficiency is largely dependent on chamber temperature, residence time, inlet VOC concentration, compound type and degree of mixing. In the case of EFCO's paint line, the VOCs in the input airstream vary widely. Experiments with a hand-held gas chromatographer (GC) show VOC concentrations ranging from 0 ppm to several hundred ppm within thirty seconds depending upon operations in the spray booth. Also, according to EFCO, manufacturer performance guarantees for thermal oxidizers in the coating industry are typically in the range of 95 to 98% efficiency. Pella (EFCO's parent company) currently operates five catalytic oxidizers permitted for 95% efficiency that actually perform at destruction efficiencies greater than 99% when operating near steady state situations with consistent air flow and VOC loading. A review of the RBLC shows that there are no other permitted units in the surface coating, printing or graphic arts industry with a required removal efficiency greater than 98% for any type of VOC control.

The Department of Natural Resources has added a maximum allowable limit of 20 ppm by weight (ppmw) at the RTO outlet. The purpose of this additional limit is to allow EFCO to operate the RTO at lower destruction efficiencies than 98% at very low VOC

inlet conditions, but at the same time capping the allowable outlet VOC concentration and ensuring that EFCO will still operate the RTO optimally. The 20 ppmw is based on the manufacturer guarantee. This type of guarantee is typical for a manufacturer to have since it is nearly impossible to prevent all bypassing of VOCs. In addition, EFCO will have a highly variable inlet VOC load and so at times the VOC concentration into the RTO will be low. The lower the inlet VOC concentration, the harder it will be to achieve the driving force needed to obtain the higher percent removal of VOC.

Based on manufacturer guarantees and VOC BACT limits from other proposed and permitted units, the Department of Natural Resources proposes a BACT limit for VOC emissions from the RTO of 98% control or an outlet from the RTO of 20 ppmw, whichever is greater. This level of control equals the highest of recently permitted facilities. Control of VOC will be accomplished with air recirculation and a RTO and compliance of the destruction efficiency will be demonstrated using temperature ranges established during performance testing of the RTO.

BACT for Fugitive VOCs

There is a variety of fugitive emissions that occur throughout the plant. The source of the majority of fugitive emissions are attributed to the application of isopropyl alcohol to the windows for cleaning purposes. Currently, potential emissions of window cleaning are estimated at 145 tons per year. Other identified sources of fugitive VOCs such as lubricant usage and sealant or caulk usage account for the remaining 4.5 tons per year attributed to fugitive VOC emissions. Thus, BACT for fugitive VOCs is focused primarily on window cleaning. The following potentially available VOC control options were identified for reducing fugitive VOC emissions.

VOC Control Options for Fugitive Emissions

- Control Options
    - Enclose window cleaning operations and vent to a control device
    - Capture emissions from entire building and vent to control device
- Operational Requirements
    - Establish best work practices to minimize fugitive VOC emissions

Determination of BACT for Fugitive VOC Emissions

Control Options:
The first control identified for the control of VOCs from fugitive sources is the treatment of building air. The advantage of this approach is that it does not affect production flow since control devices can often be located outside the building. However, treatment of all building air results in a large airstream. EFCO did an analysis on the amount of air that would need to be captured and controlled in order to reduce the VOC emissions that take place throughout the plant. EFCO estimated the volume of only the assembly area where the majority of the fugitive emission occur and assumed an air change rate of 3 changes per hour. This resulted in an air stream of over 325,000 cubic feet minute. There are no known VOC control devices that could treat this amount of air and be economically feasible.

The second control option identified was enclosure of the window cleaning operations and venting to a control device. This option creates many difficulties. From a manufacturing stand point, it would create a significant amount of dead space on both sides of the wall that would likely cause the need to expand the building. Secondly, walls require doorways and travel paths that impede manufacturing flow and productivity. Third, a permanent room enclosure would not allow for continuous process improvement. Currently, processes are routinely moved or adapted to ensure the most efficient and effective manufacturing flow through the building. Lastly, because of the level of personnel needed to perform the tasks, the air in the enclosure will have to be kept fairly dilute. Ultimately, controlling these emissions with some type of enclosure and control device would have a negative effect on production throughput and result in significant economic losses due to decrease in efficiency of production. Due to these reasons, this option was not further explored.

Operational Requirements:
The last option to controlling fugitive VOC emissions is to establish best work practices which are known to minimize the VOC emissions. As mentioned above, window cleaning results in the vast majority of fugitive VOC emissions. During assembly operations, excess sealant is squeezed from between the aluminum frame and the glass. Handling to position the glass and frame properly often smears the excess sealant on both the glass and the aluminum. The excess and smear must be removed before shipments. Isopropyl alcohol (IPA) is used to soften/remove the excess, usually by a rag. IPA has been identified as an acceptable cleaning solvent by the sealant supplier. The sealant becomes a structural component of the window/door and is a critical performance characteristic. Other solvents can cause degradation of the seal and affect product warranty. Thus, the ability to change cleaning solvents to a lower VOC option is not readily available.

EFCO has proposed that BACT for fugitive VOC emissions is to use Best Practices. EFCO submitted their Best Practices document for window/door cleanup with IPA on October 7, 2009. Some of the best practices include the following:

- EFCO will identify and implement practices to reduce the amount of sealant squeeze-out of the windows.
- EFCO will dispense IPA from plunger cans to wet rags for cleaning. Plunger cans minimize the amount of IPA exposed to the atmosphere when not in use, while also being readily available for use.
- EFCO will provide secondary containment for the IPA storage container to collect spillage from the dispensing operation.
- EFCO will provide annual training to the operators regarding proper cleaning technique and the importance of minimizing IPA use.
- EFCO will maintain records of units produced and IPA used in order to identify when excessive IPA is being used.

The Department agrees with the use of Best Practices for the fugitive VOC BACT determination. EFCO will be required to maintain Best Practices for usage of IPA for window/door cleanup. EFCO will be required to reevaluate their Best Practices and update the document, as necessary. They shall also be required to submit a copy of their current Best Practices with their Operating Permit renewal application.

AMBIENT AIR QUALITY IMPACT ANALYSIS

Air quality modeling for this project was performed to determine the ambient impact of HAPs exceeding the Screening Model Action Levels (SMALs) and impact on plants, soils and animals. Based upon the air dispersion modeling conducted by the Air Pollution Control Program staff, EFCO demonstrates compliance with all Missouri Department of Natural Resources Risk Assessment Levels (RALs) for those HAPs exceeding their respective SMALs except for cobalt and hexavalent chromium. However, EFCO demonstrates compliance with federal Risk Assessment Levels for cobalt and hexavalent chromium. The installation is also not expected to adversely impact on plants, soils, and animals. For a more thorough discussion of the modeling methodology used and the results, please refer to the attached memorandum entitled, *Ambient Air Quality Impact Analysis (AAQIA) for EFCO-A Pella Company (EFCO) dated November 13, 2009.*

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

_____ _____

Susan Heckenkamp Date
Environmental Engineer

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated March 18, 2009, received April 7. 3009, designating Pella Corporation as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition
- EFCO – Best Practice, submitted by email October 7, 2009
- EFCO Paint Line Theoretical VOC Potential spreadsheet, received via email on May 26, 2009
- EFCO Fugitive BACT and Chromium Emission Rate, received via email on June 26, 2009
- Responses to MDNR comments and questions on BACT analysis, received via email on August 13, 2009, August 14, 2009, September 21, 2009 and October 19, 2009
- Paint Records – 2008, received via email on September 8, 2009
- Submittal of solvent MSDSs, received via email on September 11, 2009
- Submittal of boron nitride MSDS, received via email on September 16, 2009
- Submittal of EFCO emission points and locations, received via email on September 17, 2009
- Emission Point Map – Update, received via email on September 18, 2009
- Test report of chromium emissions testing at Pella Corp. in Sioux Center, IA, tested on October 29, 2001, October 30, 2001 and October 31, 2001, received via email on September 18, 2009
- Responses to Missouri Department of Natural Resources comments and questions on the operation of the paint line, received September 24, 2009
- Update on existing emission PTE calculations, received via email on September 30, 2009
- Update on EFCO emission points and locations, received via email on September 30, 2009
- Submittal of chromator chemical MSDSs, received via email on September 30, 2009
- Responses to MDNR comments and questions on existing emission calculations, received via email on September 16, 2009, September 21, 2009, September 30, 2009, October 21, 2009, October 5, 2009, October 6, 2009, October 13, 2009 and October 16, 2009
- Submittal of updated natural gas usage at plant, received via email on October 7, 2009
- Responses to Missouri Department of Natural Resources comments and questions on RTO release parameters and air makeup unit, received via email on October 13, 2009

Attachment A – Compliance Worksheet for Hexavalent Chromium Emissions from the Chromator (EP8 & EP10)

EFCO - A Pella Company
Barry County, S32, T26, R27
Project Number: 2009-04-027
Installation ID Number: 009-0003
Permit Number:

This sheet covers the period from _____ to _____.
(month, year) (month, year)

Copy this sheet as needed.

Column 1	Column 2 (a)	Column 3	Column 4	Column 5	Column 6
Month	Hours of Operation for the Month	Hexavalent Chromium Emission Rate (Lb/Hr)	Control Efficiency (%)	Hexavalent Chromium Emissions (Lbs./Month)	Annual Hexavalent Chromium Emissions (Lbs.)
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			
		0.00157			

Instructions:

Column 2: Total amount of hours that the chromator operated for that month.
Column 3: Hexavalent chromium emission rate.
Column 4: Control efficiency of hexavalent chromium control device on chromator.
Column 5:Multiply Column 2 by Column 3 by (100 – Column 4)/100.
Column 6: Sum of last 12-months of Column 5*.
***A 12-Month total of less than 1.14 pounds of hexavalent chromium from the chromator (EP8 & EP10) indicates compliance**.

Attachment B – Compliance Worksheet for Hexavalent Chromium Emissions from the Painting Operations

EFCO - A Pella Company
Barry County, S32, T26, R27
Project Number: 2009-04-027
Installation ID Number: 009-0003
Permit Number:

This sheet covers the period from _____ to _____.
(month, year) (month, year)

Copy this sheet as needed.

Column 1	Column 2 (a)	Column 3	Column 4	Column 5
Month	Total Amount of Hexavalent Chromium Used in Paint or Primer (Lbs.)	Combined Control Efficiency of Filters (%)	Hexavalent Chromium Emissions (Lbs./Month)	Annual Hexavalent Chromium Emissions (Lbs.)
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		
		99.7		

Instructions:

Column 2: Total amount of hexavalent chromium contained in paint and primer used in painting operations for that month. These amount of hexavalent chromium may be obtained from vendor purchasing record
Column 3: Combined control efficiency of filters.
Column 4: Multiply Column 2 by (100-99.7)/100
Column 5: Sum of last 12-months of Column 4*.
***A 12-Month total of less than 33.73 pounds of hexavalent chromium from the painting operations indicates compliance**.

Attachment C: Installation-Wide Emission Points/Emission Units

Emission Point	Emission Unit	Description	Comments
EP1	EU1	Aluminum Billet Preheat Oven	Natural gas-fired, 3 burners per oven at 1.8 MMBtu/hr each or 5.4 MMBtu/hr total for oven
EP2	EU2	Exhaust from Billet End Butt Carbonizer	Boron nitride powder
EP5	EU5	Exhaust from Aluminum Extrusion Aging Oven	Natural gas-fired, 2 burners per oven at 2.5 MMBTU/hr each or 5.0 MMBtu/hr total for oven
EP6	EU6	Extrusion Die Cleaning	Uses a NaOH solution to clean
EP7	EU7	Burner Tubes for Alkaline Cleaner	Natural gas-fired, 2 burners at 2.77 MMBtu/hr each or 5.54 MMBtu/hr total
EP8	EU8	Alkaline Spray Cleaner C75	Stage 1 wash of the paint line chromator
EP9	EU9	Burner Tubes for Chromate Phosphate Conversion Coating	Natural gas-fired, one burner at 1.55 MMBtu/hr
EP10	EU10	Spray Chromate Phosphate Conversion Coating	Stage 5 wash of the paint line chromator
EP11	EU11	Exhaust from Post-Conversion Drying Oven	Natural gas-fired, one burner at 1.55 MMBtu/hr
EP-RTO	EU12	Automatic Primer Booth	Contains one turbo bell, 7 oz/min
	EU13	Automatic Primer Booth	Contains one turbo bell, 7 oz/min
	EU14	Primer Flash-off	
	EU15	Automatic Topcoat Booth	Contains three turbo bells, 21 oz/min total
	EU16	Automatic Topcoat Booth	Contains three turbo bells, 21 oz/min total
	EU17	Manual Topcoat Booth	Contains one manual spray gun, 10 oz/min total
	EU18	Manual Topcoat Booth	Contains one manual spray gun, 10 oz/min total
	EU19	Topcoat Flash-off	
	EU20	Manual Topcoat Booth	Contains one manual spray gun
	EU21	Manual Topcoat Booth	Contains one manual spray gun
	EU22	Manual Topcoat Booth	Contains one manual spray gun
	EU23	Manual Topcoat Booth	Contains one manual spray gun
	EU24	Final Flash-off	
	EU25	Paint Curing Oven	Natural gas-fired, 6.0 MMBtu/hr
	EU27	Manual Booth	Will be removed as part of this project.
	EU65	Off-line Paint Booth (1 total)	Contains one manual spray gun, 10 oz/min total
	EU66	Off-line Paint Oven (1 burner)	Natural gas-fired, 0.74 MMBtu/hr
	EU67	Regenerative Thermal Oxidizer	Natural gas-fired, 2.6 MMBtu/hr
EP28	EU28	Paint Hanger Burnoff Oven	Natural gas-fired, 1.3 MMBtu/hr
EP32	EU32	Sulfuric Acid Anodizing of Aluminum	Sulfuric acid packed bed scrubber
EP33	EU33	Natural Gas Boiler - Anodizing Dpt. (West)	Natural gas-fired, 4.2 MMBtu/hr
EP34	EU34	Natural Gas Boiler - Anodizing Dpt. (East)	Natural gas-fired, 4.2 MMBtu/hr
EP38	EU38	Glass Pane Edge-Sander	
EP40	EU40	Heat Mirror Oven	Natural gas-fired, 0.6 MMBtu/hr
EP41&EP42	EU41	Debridger	
EP43	EU43	Aluminum Milling Machine Oil	Total of 5 CNC machines. Use light oil mist.
EP44	EU44	Aluminum Welding (Maintenance)	
Fugitive-bldg	EU45	Alum wire GMAC welding	
Fugitive-bldg	EU46	Vinyling and Sealing Operations	Includes final seal (formerly EP48)
Fugitive-bldg	EU47	Window Cleaning	
Fugitive-bldg	EU49	Alum-A-Lube	Lubricant used throughout the plant
Fugitive-bldg	EU68	Brake Cleaner	Used for general equipment cleaning
Fugitive-bldg	EU69	Aerosol Paint Usage	Used to paint repaired production equipment in place and to touch up damaged extrusion
EP50	EU50	Exhaust from Aluminum Billet Preheat Oven	Natural gas-fired, 3 burners per oven at 1.8 MMBtu/hr or 5.4 MMBtu/hr total
EP54	EU54	8" Aluminum Extrusion Again Oven Exhaust	Natural gas-fired, 2 burners per oven at 2.5 MMBTU/hr each or 5.0 MMBtu/hr total for oven
Fugitive-bldg	EU55	Space Heaters	Natural gas-fired, Estimate 100 heaters at 0.1 MMBTU/hr each or 10.0 MMBtu/hr total
EP60	EU60	Paint Lab Spray Booth	
EP61	EU61	Adhesive (glue) booth	
EP62	EU62	Exhaust from East 8" Aluminum Billet Preheat Oven	Natural gas-fired, 3 burners per oven at 1.8 MMBtu/hr or 5.4 MMBtu/hr total
EP63	EU63	East 8" Aluminum Extrusion Aging Oven Exhaust	Natural gas-fired, 2 burners per oven at 2.5 MMBTU/hr each or 5.0 MMBtu/hr total for oven
EP64	EU64	Air Makeup Unit (feeds paint kitchen)	Natural gas-fired, 2.5 MMBtu/hr

EFCO
Best Practices

Document date: October 7, 2009

Operation: Window/door cleanup with isopropyl alcohol.

Situation:

During assembly operations, excess sealant is squeezed from between the aluminum frame and the glass. Handling to position the glass and frame properly often smears the excess sealant on both the glass and the aluminum. The excess and smear must be removed before shipment.

Isopropyl alcohol (IPA) is used to soften/remove the smeared sealant. The process has several variations depending upon the amount and location of the excess. In general, the isopropyl alcohol is used on a rag to wipe up the smear.

The sealant becomes a structural component of the window/door and is a critical performance characteristic. The integrity of the sealant is of paramount importance so the supplier dictates acceptable cleaning solvents (IPA) to prevent degradation of the seal and maintain the product warranty.

Best Practices:

1. The EFCO quality group is working in conjunction with the sealant manufacturer to study alternative cleaning materials such as acetone or tertiary-butyl acetate which are not VOCs. Alternative cleaner testing is a long term solution due to the critical nature of the sealant.
2. There is a project that will be implemented by the end of the year that will reduce the amount of sealant squeeze-out of our windows- thus dramatically reducing the amount of IPA that will be required for cleaning.
3. EFCO will dispense IPA from plunger cans to wet rags for cleaning. Plunger cans minimize the amount of IPA exposed to the atmosphere when not in use, while also being immediately available for use.
4. EFCO will provide secondary containment for the IPA storage container to collect spillage from the dispensing operation.
5. EFCO will provide annual training to the operators regarding proper cleaning technique and the importance of minimizing IPA use. EFCO will maintain records of the personnel trained and the dates on which the training occurred.
6. EFCO will maintain records of units produced and IPA used. These records will be used to track normalized VOC emissions per unit produced for management to review. New factors will be calculated each monthly and compared to the previous month.
7. Assembly department managers will be responsible for continuous improvement in their department

EFCO
County-Plant No.: 009-0003
Project No.: 2009-04-027

Project Description

Booth	Configuration	Max Flow (oz/min)	Transfer Efficiency
1	one turbo bell	7	75 electostatic
2	one turbo bell	7	75 electostatic
3	three turbo bells	21	75 electostatic
4	three turbo bells	21	75 electostatic
5	one manual gun	10	65 electrostatic air-atomized
6	one manual gun	10	65 electrostatic air-atomized
7	one manual gun	10	15 air-atomized
8	one manual gun	10	15 air-atomized
9	one manual gun	10	15 air-atomized
10	one manual gun	10	15 air-atomized
11	one manual gun	10	15 air-atomized
		126 oz/min	48.413
		59.1 gal/hr	
		517,716 gal/yr	2.1319797

Off line paint booth / oven
one manual gun
one manual gun

Adjusted MHDR	38.73	gal/hr					
diluted primer	4.30	gal/hr	primer	2.65	solvent	1.65	
diluted paint	34.43	gal/hr	paint	24.59	solvent	9.84	38.73
						11.493	
			For Special Condition:	0.421875			

*These numbers are only possible with all devices operating continuously and does not in any way reflect actual painting operations.
*Booth 11 is the offline spray booth. This booth will be used only for touch ups or to fix flaws.

EFCO measured down time on line to come up with a more accurate MHDR since they are incapable of operating every minute of the day. They have provided a spreadsheet in which they accounted for downtime based on maximum production, the color time change with the normal amount of color changes per day, required filter changes (two per day, three racks gap). [Sent in e-mail, dated 5/26/09.]
Resulting utilization rate **0.555**
0.4 gallon of solvent used to dilute 1 gallon of paint, 0.625 gallon of solvent used to dilute 1 gallon of primer.\

Adjusted MHDR for diluted coating	38.73 gal/hr			
MHDR (diluted primer)	4.3 gal/hr			
MHDR (diluted paint)	34.4 gal/hr			
MHDR (primer)	2.65 gal/hr	Dilution ratio	0.625 gal solvent to 1 gallon of primer	
MHDR (paint)	**24.59 gal/hr**	Dilution ratio	0.4 gal solvent to 1 gallon of paint	
MHDR (solvent)	11.49 gal/hr			
Control Efficiency of RTO	98 %			
Transfer Efficiency of Spraygun	48.41 %			
Control Efficiency of Filters	99.70 %	99% on RTO protection filters and 70% on paint overspray filters		

Coatings	Density (lb/gal)	VOC Content (lb/gal)	Max HAP content (%)	Solids content (lb/gal)	VOC Emissions (tpy)	HAP Emissions (tpy)	Solid Emissions(tpy)	Maximum HAP Content wt%																	
								Dimethyl Phthalate (#131-11-3)	Methyl Isobutyl Ketone (#108-10-1)	Xylene, Mixed (#1330-20-7)	Ethylbenzene (#100-41-4)	Toluene (#108-88-3)	Chromium Oxide, Hex (#1308-38-9)	Cobalt Aluminate (#1345-16-0)	Strontium Chromates (#7758-97-6)	Formaldehyde	Glycol	Copper chromite (#68130-39-4)	Titanium dioxide antimony buff (#68186-90-3)	CALCINED 11 NUBEOXIDE (#8007-18-9)	Naphthalene	Co, Ti, Ni, Zn Oxides (#68186-86-4)	Chromium hydroxide (#1308-14-1)	Cobalt oxide	Dibutyltin Dioxid compound (#818-08-1)
Coatings																									
Primer								VOC	VOC	VOC	VOC	VOC	PM10	PM10	PM10	VOC	VOC	PM10	PM10	PM10	VOC	PM10	PM10	PM10	VOC
KY1C17839A	10.3833	5.612	40.22	4.77	1.30	0.87	0.09	9.7	10.65	5.03	1.15	9.15			4.43		0.111								
KA1C22454	10.08	5.82	42.53	4.26	1.35	0.90	0.08	10.9128	4.6955	9.5734	2.2134	9.5015		2.0079	3.5137		0.1079								
Paint								VOC	VOC	VOC	VOC	VOC	PM10	PM10	PM10	VOC	VOC	PM10	PM10	PM10	VOC	PM10	PM10	PM10	VOC
KB3C38495	10.89	5.22	53.53	5.67	11.24	8.48	0.95	12.15	10.15	8.77	2.03	1.51				0.0005	0.0617	18.8539							
KB3Q33163	10.94	4.73	51.36	6.21	10.19	7.70	1.04	9.52	7.04	11.4653	2.676	0.3525				0.0039	0.0266	20.2796							
KD3Q33166	9.93	4.86	47.32	5.07	10.47	7.74	0.85	10.7037	7.91	12.9428	3.0186	0.5915				0.0039	0.0349	0.2419	8.5874	3.2656	0.0234				
KG3C38503	10.50	5.15	52.22	5.35	11.10	8.74	0.89	13.1894	10.70	9.66	2.23	1.6425				0.0005	0.067					14.7339			
KG3C38506	10.24	5.23	49.87	5.01	11.26	8.63	0.84	13.66	10.79	9.8	2.27	1.7	11.65			0.0006									
KL3C38501	10.12	5.27	49.53	4.85	11.35	8.46	0.81	13.25	11.12	9.57	2.21	1.65		11.86		0.0006	0.0673								
KM2C42118	9.92	5.14	58.43	4.78	11.07	12.47	0.80	13.563	31.4144	9.86	2.263	1.1449				0.0006	0.1037						0.0799		
KM3C46252	10.22	5.21	47.72	5.01	11.23	8.47	0.84	12.87	11.85	9.32	2.15	1.41				0.0006	0.0758	6.62		3.42					
KN3C28498	10.09	5.18	48.79	4.91	11.17	8.72	0.82	14.33	10.59	10.32	2.39	1.66				0.0006	0.0695	0.1092	6.75	2.57					
KR3C38496	10.40	5.26	36.77	5.14	11.33	8.24	0.86	12.87	10.8	9.28	2.15	1.6				0.0006	0.0654								
KR3C38497	10.51	5.21	36.33	5.30	11.23	8.22	0.88	12.91	10.08	9.47	2.19	1.61				0.0006	0.0656								
KW3C38332	10.68	3.97	34.35	6.71	8.56	7.87	1.12	12.47	9.22	9.02	2.07	1.28	0.0274			0.0005	0.0996		0.1003	0.0381				0.0274	
KW3C38434	10.69	5.09	33.95	5.60	10.96	7.82	0.93	12.44	9.19	8.99	2.06	1.27				0.0005									
Solvent																									
Glycol Ether	7.90632	7.906	100.00	0.00	7.96	7.96	0.00																		100
MEK	6.7554	6.755	0.00	0.00	6.80	0.00	0.00																		
Texanol ester alcoho	7.923	7.923	0.00	0.00	7.96	0.00	0.00																		
Xylene	7.2558	7.256	100.00	0.00	7.30	7.30	0.00			100	30	1													
					20.68	19.37	1.20																		

	Individual HAP (tpy)																			
	Dimethyl Formamide (68-12-2)	Methyl Isobutyl Ketone (108-10-1)	Xylene Mixed (1330-20-7)	Ethyl Benzene (100-41-4)	Toluene (108-88-3)	Chromium Oxide, trivalent (1308-38-9)	Cobalt Aluminate (10043-67-1)	Strontium Chromate (7789-06-2) Pb	Formaldehyde	Cumene	Copper Phthalocyanine (147-14-8)	Titanium Chromic Antimony Lt* (68186-90-3)	CALCINED TINISB OXIDES (68607-08-5)	Naphthalene	Cr, Ti, Ni, Zn, Oxides (68610-56-8)	Chromium Hydroxide (1308-14-1)	Cobalt Oxide	Triethylene glycol monobutyl ether (143-22-6)		
Paints																				
KY1C1783	0.23	0.26	0.12	0.03	0.22			0.01		0.00										
KA1C22454	0.26	0.11	0.22	0.05	0.22		0.00	0.01		0.02					0.00					
Paint																				
KB3C38495	2.85	2.38	2.06	0.48	0.35				0.000	0.01	0.34									
KB3Q33163	2.24	1.66	2.70	0.63	0.08				0.001	0.01	0.37									
KD3Q33166	2.29	1.69	2.77	0.65	0.13				0.001	0.01	0.05	0.14	0.05	0.01						
KG3C38503	2.98	2.42	2.19	0.50	0.37				0.000	0.02					0.26					
KG3C38506	3.01	2.38	2.16	0.50	0.38	0.20			0.000	0.00										
KL3C38501	2.89	2.42	2.09	0.48	0.36		0.20		0.000	0.01										
KM2C42118	2.90	6.71	2.11	0.48	0.24				0.000	0.02						0.00				
KM3C46282	2.84	2.61	2.05	0.47	0.31				0.000	0.02	0.11		0.06							
KN3C28498	3.12	2.30	2.24	0.52	0.36				0.000	0.02	0.00	0.11	0.04							
KR3C38496	2.88	2.42	2.08	0.48	0.36				0.000	0.01										
KR3C38497	2.92	2.28	2.14	0.50	0.36				0.000	0.01										
KW3C38332	2.87	2.12	2.08	0.48	0.29	0.000			0.000	0.02		0.000	0.001				0.000			
KW3C38494	2.87	2.12	2.07	0.47	0.29				0.000	0.00										
Solvent																				
Glycol Ether																		7.960		
MEK																				
Texanol ester alcohol																				
Xylene			7.305	2.191	0.073															
TOTALS																				
Maximum (tpy)	3.37	6.97	10.30	2.89	0.67	0.20	0.20	0.01	0.00	0.046	0.37	0.14	0.06	0.005	0.26	0.00	0.00	7.96	0.06	0.26
Metal						Cr(III)	Co	Cr(VI)			Cr(III)	Cr(III)	Ni		Co	Cr(III)	Co		Sb	Ni
Max metal emissions (tpy)						0.0480456	0.07	0.00			0.2586667	0.0311933	0.0158236		0.203129	0.001	0.000384		0.04657984	0.20260418
SMAL (tpy)	10	10	10	10	10	5	0.1	0.002	2	10			1	10	0.1	5	0.1	5	5	1
Exceed SMAL?	no	no	YES	no	no	no	no	YES	no	no	YES	YES	no	no	YES	no	no	YES	no	no

					SMAL
Nickel Smal	1	Worst case Ni	0.203	1	
Antimony SMAL	5	Worst case Co	0.203	0.1	
Cobalt	0.1	Worst case Sb	0.049	5	
Chromium	5	Worst case Cr(III)	0.253	5	
		Worst case Cr(VI)	0.0021	0.002	
		Worst Case Cr	0.253		

Calcined Ti, Ni, Sb oxides = (Ti, Ni, Sb) O_2

Site ID 009-0003
Company EFCO Corporation

In Operating Permit	Unit ID	Description	MHDR	Units	Pollutant	Overall Eff.	Ems Factor	Potential Emissions (Lbs/Hr)	Calc. Potential Emissions (Tons/Year)	Comments
EU0010	EP1	Aluminum Billet Preheat Ovens (feeds 1 Log Furnace)	0.0051	MMCF/hr	PM10		7.600	0.039	0.171	Permitted for ~5.7 MMBTU/hr. OP says 4.5 MMBTU/hr
EU0010	EP1	Aluminum Billet Preheat Ovens (feeds 1 Log Furnace)	0.0051	MMCF/hr	Sox		0.600	0.003	0.014	Per email 10/07/09, log furnace (3 ovens/3 burners each @1.8 MMBtu/hr)
EU0010	EP1	Aluminum Billet Preheat Ovens (feeds 1 Log Furnace)	0.0051	MMCF/hr	Nox		100.000	0.514	2.253	Other two ovens are EP1b and EP1c below.
EU0010	EP1	Aluminum Billet Preheat Ovens (feeds 1 Log Furnace)	0.0051	MMCF/hr	CO		84.000	0.432	1.892	All emissions emitted out of the log furnace (EP1).
EU0010	EP1	Aluminum Billet Preheat Ovens (feeds 1 Log Furnace)	0.0051	MMCF/hr	VOC		5.500	0.028	0.124	
	EP2	Exhaust from Billet End Butt Carbonizer	1.98E-05	ton/hr	PM10		2000.000	0.040	0.174	Boron Nitride 0.0172624 lb/hr of boron
	EP3	Aluminum Extrusion Press	4.2500	ton/hr	NOx		0.000	0.000	0.000	
	EP3	Aluminum Extrusion Press	4.2500	ton/hr	VOC		0.000	0.000	0.000	
EU0020	EP5	Exhaust from Aluminum Extrusion Aging Oven	0.0048	MMCF/hr	PM10		7.600	0.036	0.159	Originially, 2.26 MMBTU/hr
EU0020	EP5	Exhaust from Aluminum Extrusion Aging Oven	0.0048	MMCF/hr	Sox		0.600	0.003	0.013	Per email 10/07/09, 3 ovens total with 2 burners each @ 2.5 MMBTU/hr)
EU0020	EP5	Exhaust from Aluminum Extrusion Aging Oven	0.0048	MMCF/hr	Nox		100.000	0.476	2.086	
EU0020	EP5	Exhaust from Aluminum Extrusion Aging Oven	0.0048	MMCF/hr	CO		84.000	0.400	1.752	
EU0020	EP5	Exhaust from Aluminum Extrusion Aging Oven	0.0048	MMCF/hr	VOC		5.500	0.026	0.115	
	EP6	Extrusion Die Cleaning.	A NaOH solution is used to clean the extrusion dies. No emissions expected from this source							
EU0030	EP7	Burner Tubes for Alkaline Cleaner	0.0053	MMCF/hr	PM10		7.600	0.040	0.176	Originially, 4.52 MMBTU/hr
EU0030	EP7	Burner Tubes for Alkaline Cleaner	0.0043	MMCF/hr	Sox		0.600	0.003	0.011	Per email 10/07/09, 2 burners at 2.77 MMBtu/hr each
EU0030	EP7	Burner Tubes for Alkaline Cleaner	0.0043	MMCF/hr	Nox		100.000	0.430	1.885	
EU0030	EP7	Burner Tubes for Alkaline Cleaner	0.0043	MMCF/hr	CO		84.000	0.362	1.584	
EU0030	EP7	Burner Tubes for Alkaline Cleaner	0.0043	MMCF/hr	VOC		5.500	0.024	0.104	
EU0110	EP8	Alkaline Spray Cleaner C75	4.0000	gal/hr	VOC		0.090	0.360	1.578	
EU0040	EP9	Burner Tubes for Chromate Phosphate Conversion Coating	0.0015	MMCF/hr	PM10		7.600	0.011	0.049	Originially, 1.27 MMBTU/hr
EU0040	EP9	Burner Tubes for Chromate Phosphate Conversion Coating	0.0015	MMCF/hr	Sox		0.600	0.001	0.004	Per email 10/07/09, 1 burners at 1.55 MMBtu/hr each
EU0040	EP9	Burner Tubes for Chromate Phosphate Conversion Coating	0.0015	MMCF/hr	Nox		100.000	0.148	0.647	
EU0040	EP9	Burner Tubes for Chromate Phosphate Conversion Coating	0.0015	MMCF/hr	CO		84.000	0.124	0.543	
EU0040	EP9	Burner Tubes for Chromate Phosphate Conversion Coating	0.0015	MMCF/hr	VOC		5.500	0.008	0.036	
	EP10	Spray Chromate Phosphate Conversion Coating	3.24	lb/hr of A-840	HF	90.000	0.300	0.097	0.426	
	EP10	Spray Chromate Phosphate Conversion Coating	23.37	lb/hr of A-830	Cr			0.0015668	0.007	Based on Iowa testing w/ a factor of 5.
EU0050	EP11	Exhaust from Post-Converstion Drying Oven	0.0015	MMCF/hr	PM10		7.600	0.011	0.049	Originially, 4.1 MMBTU/hr
EU0050	EP11	Exhaust from Post-Converstion Drying Oven	0.0015	MMCF/hr	Sox		0.600	0.001	0.004	Per email 10/07/09, 1 burners at 1.55 MMBtu/hr each
EU0050	EP11	Exhaust from Post-Converstion Drying Oven	0.0015	MMCF/hr	Nox		100.000	0.148	0.647	
EU0050	EP11	Exhaust from Post-Converstion Drying Oven	0.0015	MMCF/hr	CO		84.000	0.124	0.543	
EU0050	EP11	Exhaust from Post-Converstion Drying Oven	0.0015	MMCF/hr	VOC		5.500	0.008	0.036	
EU0200,	EP12-24, 27	Painting Operations - Booths & Flash			VOC					*
EU0120-EU0200, EU0220	EP12-24, 27	Painting Operations - Booths & Flash			PM10					*
EU0060	EP25	Paint Curing Oven	0.0057	MMCF/hr	PM10		7.600			Emitted out of the RTO included in EP-RTO emissions on Project PTE tab.
EU0060	EP25	Paint Curing Oven	0.0057	MMCF/hr	Sox		0.600			
EU0060	EP25	Paint Curing Oven	0.0057	MMCF/hr	Nox		100.000			
EU0060	EP25	Paint Curing Oven	0.0057	MMCF/hr	CO		84.000			
EU0060	EP25	Paint Curing Oven	0.0057	MMCF/hr	VOC		5.500			
EU0070	EP28	Paint Hanger Burnoff Oven	0.0012	MMCF/hr	PM10		7.600	0.009	0.041	
EU0070	EP28	Paint Hanger Burnoff Oven	0.0012	MMCF/hr	Sox		0.600	0.001	0.003	
EU0070	EP28	Paint Hanger Burnoff Oven	0.0012	MMCF/hr	Nox		100.000	0.124	0.542	
EU0070	EP28	Paint Hanger Burnoff Oven	0.0012	MMCF/hr	CO		84.000	0.104	0.456	
EU0070	EP28	Paint Hanger Burnoff Oven	0.0012	MMCF/hr	VOC		5.500	0.007	0.030	
	EP32	Sulfuric Acid Anodizing of Aluminum			SAM					YES, emissions controlled by 95% effective packed bed scrubber
EU0330	EP33	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	PM10		7.600	0.030	0.133	Originially, 4.4 & 2.8 MMBTU/hr
EU0330	EP33	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	Sox		0.600	0.002	0.011	Per email 10/07/09, 2 boiler at 4.2 MMBtu/hr, each.
EU0330	EP33	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	Nox		100.000	0.400	1.752	
EU0330	EP33	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	CO		84.000	0.336	1.472	
EU0330	EP33	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	VOC		5.500	0.022	0.096	
EU0340	EP34	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	PM10		7.600	0.030	0.133	
EU0340	EP34	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	Sox		0.600	0.002	0.011	

EU0340	EP34	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	Nox		100.000	0.400	1.752		
EU0340	EP34	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	CO		84.000	0.336	1.472		
EU0340	EP34	Natural Gas Boiler - Anodizing Dpt.	0.0040	MMCF/hr	VOC		5.500	0.022	0.096		
EU0370	EP38	Glass Pane Edge-Sander			PM10	0.810		0.034	0.147		
EU0080	EP40	Heat Mirror Oven	0.0000	MMCF/hr	PM10		7.600	0.000	0.000		
EU0080	EP40	Heat Mirror Oven	0.0000	MMCF/hr	Sox		0.600	0.000	0.000		
EU0080	EP40	Heat Mirror Oven	0.0000	MMCF/hr	Nox		100.000	0.000	0.000		
EU0080	EP40	Heat Mirror Oven	0.0000	MMCF/hr	CO		84.000	0.000	0.000		
EU0080	EP40	Heat Mirror Oven	0.0000	MMCF/hr	VOC		5.500	0.000	0.000		
	EP41 & EP42	Debridger			PM10	0.998		0.096	0.421		
EU0240	EP46	Vinyling and Sealing Operations	0.0020	ton VOC/hr	VOC		40.000	0.078	0.343	Contains toluene (41.4%???)	
EU0250	EP47	Window Cleaning	0.0165	ton VOC/hr	VOC		2000.000	33.077	144.877	IPA	
EU0260	EP48	Final Seal (added to EP46)		ton/hr	VOC		2000.000	0.000	0.000	100% methanol	
EU0270	EP49 (EPU1)	Alum-A-Lube - Lubricant used throught the plant	0.4783	ton VOC/hr	VOC		1.000	0.478	2.095		
		Brake Cleaner	0.2830	ton VOC/hr	VOC		1.000	0.283	1.240		
		Aerosol Paint Usage	0.1848	ton VOC/hr	VOC		1.000	0.185	0.810		
	EP43	Aluminum Milling Machine Oil	0.0329	gal/hr	VOC		0.170	0.006	0.024		
	EP44 and EP45	Aluminum Welding (Maintenance)	0.0002	1,000 lbs of wire/	PM10		5.200	0.001	0.005		
	EP44 and EP45	Aluminum Welding (Maintenance)	0.0002	1,000 lbs of wire/	Cr		0.001	0.000	0.000001		
	EP44 and EP45	Aluminum Welding (Maintenance)	0.0002	1,000 lbs of wire/	Mn		0.318	0.0001	0.000326		
	EP44 and EP45	Aluminum Welding (Maintenance)	0.0002	1,000 lbs of wire/	Ni		0.001	0.000	0.000001		
EU0090	EP50	Exhaust from Aluminum Billet Preheat Oven	0.0051	MMCF/hr	PM10		7.600	0.039	0.171		
EU0090	EP50	Exhaust from Aluminum Billet Preheat Oven	0.0051	MMCF/hr	Sox		0.600	0.003	0.014		
EU0090	EP50	Exhaust from Aluminum Billet Preheat Oven	0.0051	MMCF/hr	Nox		100.000	0.514	2.253		
EU0090	EP50	Exhaust from Aluminum Billet Preheat Oven	0.0051	MMCF/hr	CO		84.000	0.432	1.892		
EU0090	EP50	Exhaust from Aluminum Billet Preheat Oven	0.0051	MMCF/hr	VOC		5.500	0.028	0.124		
EU0100	EP54	8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	PM10		7.600	0.036	0.159	Originially, 10 MMBTU/hr	
EU0100	EP54	8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	Sox		0.600	0.003	0.013	See comments by EP5	
EU0100	EP54	8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	Nox		100.000	0.476	2.086		
EU0100	EP54	8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	CO		84.000	0.400	1.752		
EU0100	EP54	8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	VOC		5.500	0.026	0.115		
EU0360	EP55	Space Heaters	0.0095	MMCF/hr	PM10		7.600	0.072	0.317	Total number unknown, estimate 100 at .1 MMBTU/hr each.	
EU0360	EP55	Space Heaters	0.0095	MMCF/hr	Sox		0.600	0.006	0.025	Originally, 8.517 MMBtu/hr	
EU0360	EP55	Space Heaters	0.0095	MMCF/hr	Nox		100.000	0.952	4.171	Changed to 10 MMBtu/hr.	
EU0360	EP55	Space Heaters	0.0095	MMCF/hr	CO		84.000	0.800	3.504		
EU0360	EP55	Space Heaters	0.0095	MMCF/hr	VOC		5.500	0.052	0.229		
EU0280	EP60	Paint Lab Spray Booth	All emissions are attributed to the main paint line.								
EU0320	EP48?	Adhesive (glue) booth	0.66	gal/hr	PM10	99	0.917	0.006	0.027		
EU0320	EP48?	Adhesive (glue) booth	0.66	gal/hr	VOC		4.587	3.027	13.260		
		Alum wire GMAC welding	0.005	1000 lb/hr	PM10		24.1	0.121	0.528		
		Alum wire GMAC welding	0.005	1000 lb/hr	Cr		0.01	0.000	0.0002		
		Alum wire GMAC welding	0.005	1000 lb/hr	Mn		0.34	0.0017	0.007		
		Exhaust from East 8" Aluminum Billet Preheat Oven	0.0051	MMCF/hr	PM10		7.600	0.039	0.171		
		Exhaust from East 8" Aluminum Billet Preheat Oven	0.0051	MMCF/hr	Sox		0.600	0.003	0.014		
		Exhaust from East 8" Aluminum Billet Preheat Oven	0.0051	MMCF/hr	Nox		100.000	0.514	2.253		
		Exhaust from East 8" Aluminum Billet Preheat Oven	0.0051	MMCF/hr	CO		84.000	0.432	1.892		
		Exhaust from East 8" Aluminum Billet Preheat Oven	0.0051	MMCF/hr	VOC		5.500	0.028	0.124		
		East 8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	PM10		7.600	0.036	0.159	Originially, 10 MMBTU/hr	
		East 8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	Sox		0.600	0.003	0.013	See comments by EP5	
		East 8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	Nox		100.000	0.476	2.086		
		East 8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	CO		84.000	0.400	1.752		
		East 8" Aluminum Extrusion Aging Oven Exhaust	0.0048	MMCF/hr	VOC		5.500	0.026	0.115		
		Air Makeup Unit (feeds paint kitchen)	0.0024	MMCF/hr	PM10		7.600	0.018	0.079	Added per email 10-07-09.	
		Air Makeup Unit (feeds paint kitchen)	0.0024	MMCF/hr	Sox		0.600	0.001	0.006		
		Air Makeup Unit (feeds paint kitchen)	0.0024	MMCF/hr	Nox		100.000	0.238	1.043		
		Air Makeup Unit (feeds paint kitchen)	0.0024	MMCF/hr	CO		84.000	0.200	0.876		
		Air Makeup Unit (feeds paint kitchen)	0.0024	MMCF/hr	VOC		5.500	0.013	0.057		

Only found in OP.	EU0210	no	EP26	Paint Mix Area	No known emissions in paint mix area.
Included in EP12-24, 27?	EU0290			Painting Operations	
Included in EP12-24, 27?	EU0300			Painting Operations	

Included in EP12-24, 27? EU0310

Painting Operations

TOTAL EMISSIONS MINUS EMISSIONS OUT THE RTO (TPY)	
PM10	3.276
Sox	0.153
Nox	25.454
CO	21.381
VOC	165.627
HAP	0.9355

Questions

1. What is EP01 rated for? Permitted for ~5.7 MMBTU/hr. OP says 4.5 MMBTU/hr. Moeis says 5.5 MMBtu/hr
2. Are there any emission points that should be added or removed?
3. What is the purpose of the billet end butt carbonizer? What is the dust? Can you estimate how much is used on an hourly basis?
4. Aluminum extrusion press. Can you please verify max design rate and emission factor?
5. Alkaline spray cleaner. Can you please verify max design rate and emission factor? Can you please provide MSDS?
6. Spray Chromate Phosphate Conversion Coating. Can you please verify max design rate and emission factor? Can you please provide MSDS? ithis is the one where you had testing. Can you please provide?
7. Can you refresh my memory on what the debridger is? Is that the insert to limit thermal conduction? VOC emissions? PM10 emissions?
8. Are the MHDRs for EP46 through EP49 OK? It is OK to use maximum historical usages. If you decide to change these numbers to more accurate numbers. Please provide documentation and explanation.
9. EP43 and EP44: Do you have an estimate on alum. welding emissions? Again, it is acceptable to base the design rate on max historic usage.

Fugitive VOC emissions minus win 4.168
Adhesive glue booth

Changes"

*EP2: Exhaust from Billet End Butt Carbonizer is not VOC, may be characterized as PM10.
*9/16/09 Boron nitride powder used in EP02. 277 pounds were used on all 3 presses within the past 12 months.
*EFCO provided testing on IA facility chromator. EP8 is the front end of the chromator, EP10 is back end. Took IA results and scaled based on the # of parts being treated.

Believe that emissions are caused by impaction of spray on window pieces. According to test on Pretreatment System EP17 at Pella in Sioux Center, IA, EF for Cr = 4.096E-4 lb Cr per 1,000 pieces.
*9/30/2009 Changed EP01 to 5.5 MMBtu/hr, updated extrusion MHDR, updated Alum-A-Lube MHDR, updated EP43 welding emissions.
*10/2/09 - Removed emissions associated with EP3 - Extrusion. No know emission factors associated with the actual extrusion process. Emissions associated with the log oven and A136 and aging oven are already accounted for.
EP08: MHDR is based on makeup. EFCO approved in 9/30/09 email.
EP47: Window cleaning emissions approved by EFCO in 9/30/09 email
repaired production equipment in place and to touch up damaged extrusion.
cooling. Minimial VOC emissions are expected from the oil usage.
Updated Alum-A-Lube and adhesive numbers. Combined EP48 with EP46.A99
No known emissions for EP26, Paint Mix Area.
11/4/09 - Changed welding emissions to those based on E70S for the maintenance area.
Emission Factor for 4043 = 4.9lb Al/1000 lb: "Section 313 Reporting: Issue Paper - Clarification and Guidance for Metal Fabrication Industry", EPA, Jan 1990
Used worst case emissions which were from the 70S wire.
EP40 0.6 MMBtu/hr heat mirror oven has been removed per conversation with Terry Noteboom 11/6/09.

PROPOSED TEST PLAN – Thermal Oxidizers For VOC Control

Submitted to: MO Dept. of Natural Resources,
Air Pollution Control Program, Enforcement Section
P.O. Box 176, Jefferson City, MO 65102

Date Submitted: _____

Attention: _____

Proposed Test Date: _____

1.) FACILITY INFORMATION:		
Name:		
Address:		
City	State:	Zip:
Name & title of Contact Person:		
Phone No. of Contact Person:	Fax No.:	

2.) AIR POLLUTION SOURCE TO BE TESTED:				
Type of Facility/Source:				
Permit #	FIPS/Plant ID:		PORT #	
Address/Location:				
Directions to Source (or map attached):				
Initial Start-up Date:				
Reason for Test:		Condition of Permit		Consent Agreement
		Administrative Order		
		Other (specify)		

3.) TESTING FIRM INFORMATION:		
Name of Firm:		
Address:		
City	State:	Zip:
Name & title of Contact Person:		
Phone No. of Contact Person:	Fax No.:	
	Number of employees of firm:	
	No. of employees actually engaged in air pollution source testing:	
Organizational chart with names & title of personnel: (please attach)		

3.) TESTING FIRM INFORMATION: (cont.)

Location & description of laboratory facilities:
Subcontractor(s) utilized by firm for source testing activities:
Number of air pollution sources previously tested by firm:
Sources tested by firm in Missouri in past 3 years (source, test, date):

4.) PERFORMANCE TEST INFORMATION:

	Pollutant	No. of Sampling Points	Total Time per Test Run	No. of Test Runs	Test Method to be Used
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

PRELIMINARY METHOD 1 DATA

Duct to be Sampled:	Sketch of Stack or Duct with Port Locations & Distances Shown **[NOTE: Cyclonic flow must be measured by instrument and shown to be within allowable limits prior to initiation of sampling.]** If sampling location is downstream from an axial flow fan, installation of a flow straightening device will probably be necessary to meet cyclonic flow criterion.:
Duct Dimensions:	
From inside far wall to outside of port	
Nipple length	
Depth (or diameter) of duct	
Width (rectangular duct)	
Equivalent Diameter:	
Distance **from** Ports **to** Nearest Flow Disturbance	
	Upstream / Downstream
Distance	
Diameters	
Stack Area = IN^2	
Calculated by:	

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75	29.5	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18	16.1
8			96.8	85.4	75	63.4	37.8	29.6	25	21.5	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23
10				97.4	88.2	79.9	71.7	61.8	38.6	31.5	27.2
11					93.3	85.4	78	70.4	61.2	38.2	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.6

LOCATION OF TRAVERSE POINTS IN RECTANGULAR STACKS

	2	3	4	5	6	7	8	9	10	11	12
1	25	16.7	12.5	10	8.3	7.1	6.3	5.6	5	4.5	4.2
2	75	50	37.5	30	25	21.4	18.8	16.7	15	13.6	12.5
3		83.3	62.5	50	41.7	35.7	31.3	27.8	25	22.7	20.8
4			87.5	70	58.3	50	43.8	38.9	35	31.8	29.2
5				90	75	64.3	56.3	50	45	40.9	37.5
6					91.7	78.6	68.8	61.1	55	50	45.8
7						92.9	81.3	72.2	65	59.1	54.2
8							93.8	83.3	75	68.2	62.5
9								94.4	85	77.3	70.8
10									95	86.4	79.2
11										95.5	87.5
12											95.8

POINT	% of Stack I.D.	Stack I.D.	Distance from Outside Wall	Nipple Length	Distance from Outside of Port

6.) SPECIFIC: for Thermal Oxidizers for Volatile Organic Compound Control
Provide a full description of the source operation, including as a minimum the following:
A. Manufacturer, model, serial number, and type of oxidizer (indicate direct or catalytic):
B. Anticipated inlet and outlet VOC concentrations (ppm): Inlet: Outlet:
C. Anticipated flow rates (circle appropriate units) ACFM SCFM DSCFM Inlet: Outlet:
D. Anticipated capture and destruction efficiencies: Capture: Destruction:
E. VOC species being controlled (indicate chlorinated compounds and listed HAP's):
F. Combustion chamber temperature set-point:
H. Fume residence time:
G. Type of fuel:
H. Regeneration cycle time (if applicable):
I. Type of combustion chamber (or catalyst bed) continuous temperature recorder:
J. Is source operation located within a PTE (permanent total enclosure) or BE (building enclosure)?: If so, Method 204 date: Method 204 testing firm:
K. Parameter measured and location of warning, alarm, or concentration sensing devices:
L. Maximum design production-rate of source operation:
M. Additional comments:

Comment [trb1]: Insert only when CEM is specified in application 1/96 trb

7.) CONTINUOUS MONITORING SYSTEM
A description of continuous monitoring system(s) including the following:
A. Manufacturer of each monitor:
B. Model number and serial number of each monitor:
C. Description of interface system (for extractive monitors):
D. Description of data acquisition and handling system:
E. Number of copies of operator's manual supplied with each monitor:
F. Name of testing firm that will perform the reference method tests for sulfur dioxide and/or nitrogen oxides during the continuous monitoring system performance evaluations:
G. Name of organization that will perform the continuous monitoring system performance evaluations (Source operator, monitoring system manufacturer or representative, or testing firm):
H. Anticipated starting date of the conditioning period for the monitoring systems:
I. Drawing of the monitoring system location(s) showing stack or duct dimensions, air pollution control equipment, fans, and location(s) of disturbances which affect monitor location(s) determination (May be shown on drawing required on Preliminary Test Method Page or attach to this document).

SOURCE TESTING REPORT FORMAT

COVER
- Plant name and location
- Source sampled
- Testing company or agency, name, and address

CERTIFICATION
- Certification by team leader
- Certification by reviewer (e.g.: Professional Engineer)

INTRODUCTION
- Test purpose
- Test location, type of process
- Test dates
- Pollutants tested
- Observers' names (industry and agency)
- Any other important background information

SUMMARY OF RESULTS
- Emission results
- Process data, as related to determination of compliance
- Allowable emissions
- Description of collected samples
- Visible emissions summary
- Discussion of errors, both real and apparent

SOURCE OPERATION
- Description of process and control device
- Process and control equipment flow diagram
- Process data and results, with example calculations
- Representatives of raw materials and products
- Any specially required operation demonstrated

SAMPLING and ANALYSIS PROCEDURES
- Sampling port location and dimensioned cross section
- Sampling port description, including labeling system
- Sampling train description
- Brief description of sampling procedures, with discussion of deviations from standard methods
- Brief description of analytical procedures, with discussion of deviations from standard methods

APPENDIX
- Complete results with example calculations
- Raw field data (original, not computer printouts)
- Laboratory report, with chain of custody
- Test log
- Calibration procedures and results
- Project participants and titles
- Related correspondence

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

MEMORANDUM

DATE: November 13, 2009

TO: Susan Heckenkamp, Environmental Engineer III
New Source Review Permit Section

THROUGH: Kyra L. Moore, Section Chief
Permit Section

FROM: Dawn Froning, Environmental Specialist IV
Modeling Unit Permit Section

SUBJECT: Ambient Air Quality Impact Analysis (AAQIA) for EFCO-A Pella Company (EFCO)

I. Introduction

On October 3, 1997, the Department's Air Pollution Control Program issued a Section 6 construction permit, #1197-023, to the EFCO facility located in Barry County, Missouri. As issued, Permit #1197-023, limited the facility to 249 tons per year of volatile organic compounds (VOC) in any consecutive 12-month period. By accepting this limit, EFCO agreed to remain below the major source thresholds for VOCs.

Subsequently, on January 2, 2009, the Department's Air Pollution Control Program issued violation #010209SF1 to EFCO for failure to comply with the installation wide 249 tons per year emission limitation contained within Special Condition 1 of Permit #1197-023. In an effort to reduce emissions below the major source thresholds, EFCO proposed to install and operate a regenerative thermal oxidizer (RTO) to control the VOC emissions that are generated during the painting operations at the facility. Staff agreed and a formal compliance plan was approved on April 5, 2009.

EFCO was also required to obtain a Section 8, Prevention of Significant Deterioration (PSD), construction permit as a part of the remedial action that was taken by the Department's Air Pollution Control Program. The modification of the facility will include the installation of an RTO on the existing paint lines and their associated ovens. Two additional paint booths and a curing oven to allow off-line rework and small parts painting will also be installed at the facility. The flashoff area between the spray booths and the ovens will be enclosed in order to ensure complete capture of VOC emissions from the painting operations.

At the request of the permit engineer reviewing the project, staff completed an AAQIA for the facility in order to ensure that compliance with the Risk Assessment Levels (RALs) for chromium, cobalt, nickel, diethyl glycol monobutyl ether and xylene are maintained. Additionally, the impact of pollutant

deposition in soils and the subsequent uptake by plants and/or animals was evaluated as required by the PSD program. The following paragraphs describe the scope of the proposed project and the methodology used throughout the modeling study to show attainment of the appropriate standards. The final AAQIA and all supporting documentation can be found within the modeling files maintained by staff. It is important to note that due to the installation of the RTO all criteria pollutant emissions are below the *de minimis* emissions thresholds, and, as such, an evaluation of the criteria pollutants is not required.

II. Facility Description

EFCO is located in Monett, Missouri, and is an existing manufacturer of aluminum architectural windows, storefronts and entrance systems. During the manufacturing process, aluminum is extruded, cut, shaped and welded to create the basic structure for each window. Prior to the application of paint, the aluminum parts are pretreated in a chromate bath to extend the life of the aluminum through the prevention of oxidation and rust.

Once dry, the pretreated aluminum enters a paint spray booth via conveyor where it receives successive paint applications using mechanical coating guns. EFCO staff use hand held spray guns to paint areas that are difficult to coat through mechanical methods. The painted pieces will enter a flash-off chamber where the paint is allowed to “flow out” and release solvents prior to entering the curing oven.

EFCO’s paint line is comprised of ten spray booths, three flash-off areas and a curing oven. At the completion of the modification, the painting area will be enclosed to allow for the recirculation of the airstream in order to maximize VOC destruction by the RTO.

Once the paint is dried, the aluminum parts will enter the window assembly area where they are fitted with glass, weather stripping and adhesive. Excessive adhesive is removed using solvents prior to final window cleaning and shipment.

III. Model Selection

The modeling procedures utilized in this study follow current air quality modeling guidelines. The AERMOD modeling system, Version 07026, was used to evaluate the impact that will result from the release of Hazardous Air Pollutant (HAP) emissions from EFCO.

The AERMOD system was developed through a collaborative effort between the American Meteorological Society and the United States Environmental Protection Agency. AERMOD is a steady-state plume model that employs Gaussian and bi-Gaussian probability density functions to characterize the structure of the planetary boundary layer. AERMOD can predict the concentration distribution of pollutants from surface and elevated releases located within simple or complex terrain. The model allows for the input of multiple sources, terrain elevations, structure effects, various grid receptors, wet and dry depletion calculations, urban or rural terrain, and averaging periods ranging from one hour to one year.

IV. Source Data

HAP emissions will be emitted in significant amounts from the operation of the paint spray booths and during the pretreat, curing and cleaning operations. As noted previously, the alterations made in the design of the facility will only impact processes whose primary emissions are HAPs, as such, they were the only pollutants reviewed for compliance purposes. Other HAP emissions are also included in the following tables. The emission rates from the additional HAPs must be included in the deposition and uptake analysis that is required under the PSD program for plants, soils and animals.

Because emission releases vary in nature, they can be classified as point, area, open-pit, or volume sources, in the AERMOD dispersion model. The following paragraphs describe the emission classifications used in the AAQIA for EFCO.

Point Source Emissions

The document entitled "Users Guide for the AMS/EPA Regulatory Model-AERMOD" states that the point source algorithm should be used to model emission releases from stacks and isolated vents. Table 1, entitled "EFCO-Point Source Emission Rates and Stack Parameters" outlines the point source emissions and their associated stack parameters based upon information provided by EFCO staff and the permit engineer reviewing the project.

Several stacks at the facility vent horizontally or are equipped with rain caps. In these instances, the restriction of vertical flow was accounted for by reducing the exit velocity of the pollutant stream to 0.001 meters per second in the model input file.

Volume Source Emissions

A portion of the emission sources at the facility, such as the welding and cleaning operations, will not be vented through stacks. Because the emission releases are vented inside an enclosed structure, without a stack, they were characterized as a volume source with release parameters equivalent to the size of the openings that allow for the escape of the fugitive emissions. The scaling factors applied to the vertical and lateral dimensions were based upon the assumption that the emission releases were isolated volume sources. Table 2, entitled "EFCO-Volume Source Emission Rates and Release Parameters" outlines the volume source emission rates and their associated parameters based upon the final plant design.

Variable Emission Rates/Modeled Emission Limits

In addition to allowing the user to define sources as point, area, or volume sources, the AERMOD model will also accept variable emission rate factors. For example, the user may want to specify that emissions from a haul road only occur for eight hours during a twenty-four hour period. This can be accomplished using the hour of day statement in the model input file.

EFCO did not propose any hourly emission limitations through the use of the hour of day statement within the AERMOD input script.

Release Locations

EFCO is located on the eastern edge of Monett to the north of Highway 60 in Barry County, Missouri. All of the emission releases associated with the modification to the existing facility are displayed in Figure 1, entitled "EFCO-Source Locations."

V. Receptors

A Cartesian grid with variable spacing was implemented in order to determine the area of maximum impact from the proposed modification at the existing facility. Along the property boundary, receptors were placed at 50-meter intervals, while the remainder of the grid consisted of variable grid spacing from 100- to 1000-meters. Figure 2, entitled "EFCO-Receptor Grid" graphically displays the receptor grid utilized in the AAQIA that was executed in October 2009.

In addition to assigning locations, the receptor options within the AERMOD system allow the user to input information regarding the terrain surrounding the facility. AERMOD is capable of calculating air pollutant concentrations in terrain that can be classified as simple, flat, complex, or mountainous land. In order to calculate concentrations in complex or mountainous terrain situations, AERMOD must have

information about the surrounding terrain and its features. To aid in the definition of the terrain features, EPA developed a pre-processor, AERMAP, to search terrain data for base elevations and features that may influence the dispersion of pollutants within the modeling domain. Outstanding features are assigned an elevation that is referred to as the hill height scale; a value that must be included in the AERMOD input file.

As recommended by the EPA, the elevations for the receptors within the modeling domain for the EFCO facility were obtained using the terrain processor, AERMAP. All of the elevations were based upon data contained in 7.5-minute topographic maps obtained from the United States Geological Survey. A visual review of the region indicates that the facility is located in an area that is predominately comprised of agricultural land use types with greater amounts of commercial and urban land use types to the west of the facility. Figure 3, entitled "EFCO-Terrain Features" graphically displays the terrain within the region. Overall, elevations range from 330 meters to 470 meters.

VI. Meteorological Data

Because AERMOD does not accept raw meteorological data, it must be processed through AERMET, the meteorological data pre-processor for the AERMOD modeling system. AERMET extracts and processes meteorological data in order to calculate the boundary layer parameters that are ultimately necessary for the calculation of pollutant concentrations within the atmosphere.

To accurately calculate the boundary layer parameters, the user must input three characteristics that describe the surface surrounding the meteorological site: the surface roughness, albedo and Bowen ratio. Because these surface characteristics can influence the similarity profiles that are utilized by the dispersion model, AERMOD, the user must determine if the surface characteristics at the meteorological site are similar to those at the facility site. A direct comparison between the surface characteristics at the meteorological site and those at the surface site is necessary to determine if the differences that result will significantly impact the overall pollutant concentrations.

In order to provide a consistent method for determining surface characteristics, the EPA developed a mathematical tool, AERSURFACE, to determine surface roughness, Bowen ratio, and albedo values for input into AERMET.

AERSURFACE employs land cover data from the United States Geological Survey 1992 National Land Cover data archives. Each of the 21 land use categories contained within the land cover database are linked to a set of seasonal surface characteristics as defined in Tables A-1, A-2, A-3 and 2-2 of the AERSURFACE User's Guide. The seasonal categories represent the same categories employed by the AERMOD system for its gas deposition algorithms.

As noted in the AERSURFACE User's Guide, EPA's recommendations for determining surface characteristics in Section 3.1 of the AERMOD Implementation Guide dated, January 9, 2008, have been incorporated into the AERSURFACE tool. The Department's Air Pollution Control Program agrees with the recommendations and executed AERSURFACE using the default values described below:

- Bowen ratio
  - Ten kilometer by ten kilometer domain centered on the site.
- Albedo
  - Ten kilometer by ten kilometer domain centered on the site.
- Surface roughness length
  - Default upwind distance of one kilometer centered on the site.
  - Twelve, 30 degree meteorological sectors.

Other considerations made in the execution of the AERSURFACE tool include the site type (is the site an airport?), site climatology (arid or not?) and surface moisture (dry, average, wet). Because the surface moisture can vary based upon the meteorological period, AERSURFACE was executed for each moisture condition. The Bowen ratio characteristics applied in Stage 3 AERMET processing were determined based upon the precipitation totals from the meteorological record for the time period being processed. For example, if the meteorological period reported above average precipitation totals, the Bowen ratio values for wet surface moisture were chosen.

For this project, the surface characteristics surrounding multiple airports across the state were compared to the surface characteristics surrounding the proposed application site in Monett, Missouri. Based upon this analysis, the Springfield Regional Airport was most similar to the application site. Table 3, entitled "EFCO-Surface Characteristics" quantifies the land use within the region surrounding the meteorological measurement site and the application site.

The land use surrounding the Springfield Regional Airport has a larger density of cultivated agricultural land use categories than the application site. Given the amount of commercial and industrial land use surrounding EFCO, the surface roughness at the application site is greater than that at the meteorological site. Because surface roughness impacts the meteorological conditions at the surface, emission releases from low stack or fugitive emissions can be impacted by differences in this parameter. This results because regions with non-uniform surfaces experience greater atmospheric turbulence, which results in greater dispersion and lower predicted concentrations. Because the roughness at the meteorological measurement site is less than the roughness at the application site, the meteorological conditions input into the air quality analysis should be conservative. Figures 4 and 5, entitled "EFCO-Meteorological Domain" and "Springfield Regional Airport-Meteorological Domain" graphically display the meteorological domains used in the airport comparison that was conducted by staff of the Department's Air Pollution Control Program.

Five years of meteorological data inputs were created for the AERMOD dispersion model, 2003, 2004, 2005, 2006 and 2007. AERMET produced two files for input for each of the five years of meteorological data. The first file contains the boundary layer scaling parameters (surface friction velocity, mixing heights, and Monin-Obukhov length), reference height winds and temperature. The second file contains a vertical profile of winds, temperature, and the standard deviation of the fluctuating components of the wind.

It is important to note that the vertical profile of winds, temperature, and the standard deviation of the fluctuating components of the wind is limited to the number of levels for which meteorological parameters are measured. The profile file is intended for applications for which on-site meteorological data has been collected. For applications that use National Weather Service measurements, the information in the profile file is identical to the information contained within the surface file. AERMOD will use all of the data included in the profile file to construct vertical profiles of wind speed, direction, temperature, and turbulence (both sigma-theta and sigma-w). In the absence of profile data (i.e. NWS data only), AERMOD will construct vertical profiles of wind, temperature and turbulence based on similarity theory relationships, using the reference wind and temperature observations as one level of the profile. For multi-level on-site meteorological data, the profiles created by AERMOD are forced to follow the observed values at each measurement height. The "theoretical" profiles based on similarity theory are used to extrapolate above and below the range of measurements and to interpolate between measurement levels, preserving the shape of the theoretical profiles. The procedure of constructing these vertical profiles in AERMOD has been referred to as the "AERMOD Meteorological Interface", and is described in Sections 4 and 7.10 of the AERMOD formulation document (EPA-454/R-03-004).

VII. Building Downwash

Building downwash was calculated using the Building Profile Input Program (BPIP) with plume rise model enhancements (PRIME). BPIP PRIME was developed in order to calculate enhanced plume dispersion coefficients due to turbulent wakes and to calculate reduced plume rise caused by the combination of the descent of streamlines on the leeward side of buildings and the increased entrainment within the wake. Additionally, PRIME addresses both the near and far field wake zones produced downwind of a building or group of structures. It is important to note that unlike the Industrial Source Complex dispersion model, the use of PRIME in conjunction with AERMOD allows the user to describe building/stack configurations and to calculate concentrations within cavity wake regions.

The information needed to execute BPIP PRIME are the heights and locations of structures, which may contribute to building downwash, and the stack locations in relation to these structures. Based upon the facility configuration, the program will determine if a stack is being subjected to wake effects from a surrounding structure or structures. If structure wake effects are evident, flags are set to indicate which stacks are affected by building wake zones. Once it is determined that a stack is influenced by a structure, BPIP will calculate the building heights and widths to be included in the dispersion model so that building downwash effects can be considered.

In order to determine if the building downwash calculations were applied correctly, the coordinates of each building corner are needed. Figure 6, entitled "EFCO-Building Configuration" depicts the proposed building configuration that will exist upon the completion of the modification.

It is important to note that the facility design can impact the results obtained during the AAQIA. As such, any significant design changes that occur after the issuance of the permit must be forwarded to the permit authority. This will ensure that compliance with the air quality standards is maintained.

VIII. Good Engineering Practice Stack Height

The Clean Air Act states that a stack should be high enough to ensure that its emissions do not result in excessive ground level pollutant concentrations in the area surrounding the stack due to downwash effects caused by the source itself, nearby structures, or complex terrain. It also states that the stack shall not exceed two and one-half times the height of the obstructing source unless a demonstration can be made that this is necessary. According to 40 CFR 51,l(ii), good engineering practice (GEP) stack height is the greater of 65 meters (measured from base of the stack) or the height of the nearby structure (measured from base of stack) plus 1.5 times the lesser dimension of the nearby structure. If neither of the above approaches are used to determine GEP stack height, a fluid model study can be conducted.

None of the stacks contained within the model input file exceeds 65 meters and as such all of the proposed stacks met GEP stack height requirements.

IX. Risk Assessment

The Department's Air Pollution Control Program maintains a list of emission thresholds for HAPs as defined in 10 CSR 6.060, Appendix J. A facility is required to submit an air quality analysis for each pollutant that exceeds these thresholds (screen model action levels). Initial estimates provided by the permit engineer indicate that the proposed project will result in an increase of chromium, chromium VI, cobalt, nickel, diethyl glycol monobutyl ether and xylene in excess of the screen model action levels.

Under the Departments' Air Pollution Control Program guidelines, a facility must submit an air quality analysis for all emission points within a facility when a refined analysis for a HAP is required. This requirement was introduced to ensure that the applicable RALs are not violated near a facility when an application for a modification is submitted. The facility-wide emissions are modeled because significance levels do not exist for HAPs and the RALs are health based thresholds similar to the NAAQS. Unlike the NAAQS evaluation, however, background concentrations are not included in the assessment of risk. Currently, background concentrations are virtually unknown for most HAPs, thereby, making a background assessment impossible.

Table 4, entitled "EFCO-RAL Results," summarizes the high first high concentrations predicted by the AERMOD dispersion model for each of the pollutants noted above. The worst case 24-hour and annual chromium impacts occurred during the 2003 and 2007 meteorological periods with concentrations of 3.174E-01 $\mu g/m^3$ and 3.229E-02 $\mu g/m^3$ for the 24-hour and annual averaging periods, respectively. Each of the values are below the 24-hour and annual RALs for this pollutant.

Currently, the Departments' Air Pollution Control Program utilizes an 8-hour threshold for cobalt in order to determine compliance with the RAL. The maximum 8-hour cobalt concentration occurred during the 2006 meteorological period with a concentration of 7.230E-02 $\mu g/m^3$. This value exceeds the 8-hour RAL of 8.890E-03 $\mu g/m^3$. Under federal guidance, the RAL is based upon a 24-hour averaging period with a threshold of 0.100 $\mu g/m^3$. EFCO's maximum 24-hour concentration complies with the federal standard and occurred during the 2003 meteorological period with a value of 5.084E-02 $\mu g/m^3$. Staff has requested that the Departments' RAL be evaluated in order to determine which ambient level is appropriate. If the Departments' RAL threshold is found to be appropriate, EFCO should be required to limit the amount of cobalt that is emitted from the paint spray booth.

Additionally, it is important to note that the emission rate selected for this pollutant represents the worst case paint/solvent combination that will be employed in the paint line. The facility impacts are likely to be lower considering that EFCO typically utilizes more than 100 differing paint types with varying properties.

For nickel, the worst case 24-hour and annual impacts occurred during the 2003 and 2007 meteorological periods with concentrations of 5.104E-02 $\mu g/m^3$ and 2.170E-03 $\mu g/m^3$. Each of the values are below the 24-hour and annual RALs for this pollutant.

The worst case 24-hour and annual xylene impacts occurred during the 2003 and 2006 meteorological periods with concentrations of 2.557E+00 $\mu g/m^3$ and 8.764E-02 $\mu g/m^3$ for the 24-hour and annual averaging periods, respectively. Each of the values are below the 24-hour and annual RALs for this pollutant.

The maximum 24-hour concentration for diethyl glycol monobutyl ether occurred during the 2003 meteorological period with a maximum concentration of 1.976E+00 $\mu g/m^3$. This value is below the 24-hour RAL for this pollutant.

Finally, the worst case 24-hour and annual chromium VI impacts occurred during the 2006 and 2005 meteorological periods with concentrations of 7.120E-03 $\mu g/m^3$ and 7.900E-04 $\mu g/m^3$ for the 24-hour and annual averaging periods, respectively. Both the 24-hour and annual concentrations exceed the Department's RALs of 0.003 $\mu g/m^3$ and 0.001 $\mu g/m^3$. Under federal guidance, the RALs are based upon 24-hour and annual averaging period thresholds of 0.100 $\mu g/m^3$ and 0.0008 $\mu g/m^3$. EFCO's maximum 24-hour and annual concentrations comply with the federal standards. Staff has requested that the Department's RALs be evaluated in order to determine which ambient levels are appropriate. If the

Departments' RAL thresholds are found to be appropriate, EFCO should be required to limit the amount of chromium VI that is emitted from the facility.

X. Additional Impact Analyses

In addition to performing an ambient air quality impact analysis, all PSD applicants must evaluate the impact the new source or modification will have on growth, soils, vegetation, and visibility impairment. The following paragraphs outline the procedures that were followed in an effort to address these additional impacts.

Plants, Soils & Animals

The requirement to evaluate the impact that a new source or modification will have on local vegetative and animal species is described in 40 CFR 52.21(o). The maximum ambient concentrations emitted by a facility must be assessed in order to ensure that adverse impacts do not occur on plants, soils, and animals. The document entitled "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" outlines the procedures and screening levels that are to be used in the air quality assessment.

The screening procedure document provides a six-step process for estimating the impact from the new source or modification and begins by directly comparing pollutant concentrations to screening thresholds. The process also addresses annual soil deposition and the subsequent uptake of pollutants by plants and animals. Each step of the process is described in the following paragraphs.

Steps 1 & 2

Steps 1 and 2 of the screening procedures are designed to determine if the direct exposure of plant tissue to the pollutant stream will result in damage. The screening thresholds represent the minimum concentration at which adverse growth or tissue impacts have been reported in scientific studies. Although values for resistant, intermediate and sensitive species are presented, the guidance document suggests that the modeled outputs be compared to the thresholds for sensitive species since this will yield conservative results. Predicted concentrations in excess of the values would indicate that additional review might be necessary to ensure that damage will not occur due to the new source or modification.

It is important to note that ambient air quality modeling was not conducted in order to determine the ambient impact due to ozone. Because ozone is a photochemical process that is difficult to replicate without extensive resources, the Environmental Protection Agency has established preconstruction monitoring thresholds to determine if the air quality standard for ozone is being met. EFCO did not trigger the preconstruction ozone monitoring requirement, and as such, on-site data is not available for this pollutant.

Table 5, entitled "EFCO-Screening Concentrations for Exposure to Ambient Air Concentrations," summarizes the results obtained from the AERMOD modeling system for those pollutants that will be emitted from the processes at the EFCO facility. It should be noted that although concentrations in excess of the screening thresholds for NO_x and SO_2 were predicted, EFCO did not have a significant impact at these locations.

In addition, when conducting the direct impact screening analysis, the synergy between SO_2, NO_x and ozone should be considered. Although the applicant is required to consider synergies, the guidance document states that the screening levels should not be applied for compliance purposes. The results of the synergy review are contained in Table 6, entitled "EFCO-Synergism's of Gaseous Pollutants." The NO_x screening level is exceeded possibly indicating that the reaction of gaseous pollutants may cause tissue damage to plants. However, because the chemical reactions between pollutants are complex and

may act to help tissue growth under certain conditions, a direct screen for synergy has not been recommended to date.

Steps 3
Steps 3 and 4 in the seven step screening process address the impact air pollution has on plants and animals once the material is deposited in the soil and becomes available for uptake by plants. This screen assumes that all of the deposited material is soluble and available for uptake. For each trace element emitted by EFCO, the concentration in the soil was calculated from the maximum annual average concentration predicted by the dispersion model multiplied by the maximum lifetime of the facility and the depth of the soil through which the material is deposited. Staff used the default lifetime and soil depth recommended in the guidance document. The results of this analysis are contained in Table 7, entitled "EFCO-Deposition of Trace Elements in the Soil." The calculated soil deposition concentrations will be compared to the appropriate screening thresholds in Step 6 below.

Step 4
Current literature indicates that an increase in certain trace elements over the endogenous soil concentration may be cause for concern if the increase is greater than 10% over the lifetime of the facility. The results obtained from the calculation of the increase over the endogenous soil concentration strictly serves as a flag for concern and no action is taken if the increase is greater than 10%. Table 8, entitled "EFCO-Increase Over Endogenous Soil Concentration," displays the result obtained from the Step 4 analysis. Several of the pollutants will have an increase greater than 10%.

Step 5
After the deposition concentration in the soil has been calculated, the amount of trace element ingested by plants can be calculated through the application of the plant to soil concentration ratios. Table 9, entitled "EFCO-Potential Concentrations in Plant Tissue," summarizes the results obtained from AERMOD dispersion model. This analysis will be used in Step 6 to determine if all applicable thresholds are being met.

Step 6
The application of Step 6 requires the applicant to apply a direct comparison between the following impacts and screening levels:

1. Deposited concentration versus the soil screening level
2. Tissue concentration versus the tissue screening level
3. Tissue concentration versus the dietary screening concentration for animals.

The concentrations predicted in Step 3 and Step 5 are compared to the screening concentrations in Tables 3.4 and 3.7 in the screening document. The first table compares predicted impacts to the screening concentrations for exposure of vegetation to concentrations in the soil and plant tissues. The second table is used to evaluate the impact trace elements have on the dietary systems of animals and when dietary concentrations become toxic. Table 10, entitled "EFCO-Screen for Adverse Impacts from Trace Elements," summarizes the results of this analysis. Boron and manganese exceed the screening thresholds for trace elements.

Prior to extruding the aluminum billets, a boron nitrite powder is used in the billet end butt carbonizer. Emissions generated from this process are fugitive emissions that escape directly into the factory. As a conservative assumption, it was assumed that all of the boron was emitted as PM_{10} and available to uptake by the ventilation system, rather than total suspended particulate. It is unlikely that the annual amount of boron that escapes into the atmosphere is as great as the emissions estimate, and the impact on soil deposition should be minimal.

Likewise, manganese emissions are generated from the welding operations and the combustion of fuel at the facility for space heating. The emission rate assumed that the welding operations would occur 8,760 hours per year at maximum production. Based upon discussions with the facility, it is unlikely that the welding operations would occur at maximum production for 8,760 hours per year and, as such, the ambient impact is likely to be lower than what was predicted.

Air Quality Criteria for NO_x Vegetative Impacts

The screening procedures set forth by the EPA in the document entitled "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" indicates that no adverse impact on plants, soils and animals is likely. However, large emitters of NO_x are required to evaluate the screening thresholds contained in the document entitled "Air Quality Criteria for Oxides of Nitrogen, Summary of Vegetation Impacts."

Preliminary investigations indicate that short-term exposure to elevated NO_x concentrations alone can cause damage to some sensitive plant species and crops. The guidance goes on to cite recent studies that have indicated that synergy between two or more criteria pollutants can cause vegetative damage at lower concentrations than from a higher exposure to a single pollutant.

This assessment was not conducted for EFCO because the facility did not trigger PSD requirements for NO_x.

Class II Visibility Impacts

The PSD regulations require the applicant to provide an assessment of the plume visual impact that is likely to occur due to the proposed new source or modification. This analysis is based upon impacts within the significant impact area of the new source or modification and is separate from the Class I analysis that is required for sources within 300 kilometers of a Class I area.

NO_x and PM_{10} are the only PSD pollutants that VISCREEN considers in its determination of the potential to cause degradation of visibility within the region impacted by this proposed project. Because EFCO's NO_x and PM_{10} emissions are below the *de minimis* emissions threshold, a visibility analysis was not conducted.

Growth

Based upon draft guidance from the EPA, the growth analysis should address the growth that comes about as the result of the proposed facility. This assessment should include an evaluation of air quality impacts related to any construction, commercial, industrial, or other growth that occurs. Current growth estimates from the region indicate that both direct and indirect impacts on air quality are anticipated to be minimal based upon the analysis supplied by staff from EFCO. As such, the inclusion of secondary emissions was not considered in the AAQIA for EFCO.

XI. Class I Area Impact

Under PSD guidelines, certain scenic areas throughout the United States have been designated as regions that must be protected due to their natural, scenic, recreational, or historic value. These regions are defined as Class I areas. Because NO_x, PM_{10} and SO_2 are below the *de minimis* emissions thresholds, a Class I area evaluation was not conducted.

XII. Recommendations

The AAQIA submitted in support of the EFCO PSD application is complete. The following recommendations should be incorporated into the PSD permit as special conditions. Failure to do so may invalidate the results obtained from the AAQIA.

1. The point source emission rates contained in Table 1 should not be exceeded.
2. The volume source emission rates contained in Table 2 should not be exceeded.
3. If significant alterations are made to the facility design as proposed in the permit application, the applicant will be required to submit an updated air quality analysis in order to ensure continued compliance with the air quality standards.
4. EFCO should limit the emissions of cobalt and chromium VI to a level that demonstrates compliance with the appropriate RALs.
5. If it is determined that the Departments' Air Pollution Control Program's RALs for cobalt and chromium VI are appropriate, EFCO should be required to resubmit an AAQIA that demonstrates compliance.
6. If it is determined that the federal RALs are appropriate, no further action is necessary.

Attachments

c: Ms. Dawn Froning, Air Pollution Control Program, Permits
Mr. Richard Daye, U.S. Environmental Protection Agency Region VII