Electronic Filing - Received, Clerk's Office, January 24, 2011
* * * * * AS 2011-001 * * * * *

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
PETITION OF GREIF PACKAGING, LLC	)	AS ______________
FOR AN ADJUSTED STANDARD FROM	)	
35 ILL ADM. CODE PART 218	)	(Adjusted Standard – Air)
SUBPART TT	)	

NOTICE OF ELECTRONIC FILING

TO:

John Therriault, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph Street, Suite 11-500
Chicago, IL 60601

Division of Legal Counsel
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

PLEASE TAKE NOTICE that I have today electronically filed with the Office of the Clerk of the Illinois Pollution Control Board, Petitioner's **NOTICE OF ELECTRONIC FILING, NOTICE OF APPEARANCE, PETITION FOR AN ADJUSTED STANDARD** and **CERTIFICATE OF SERVICE**, copies of which are attached herewith served upon you.

Respectfully submitted,

ICE MILLER, LLP

By: /s/ Susan Charles
One of its Attorneys

Date: January 24, 2011

Thomas W. Dimond
Susan Charles
ICE MILLER LLP
200 West Madison Street
Suite 3500
Chicago, Illinois 60606

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

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FOR AN ADJUSTED STANDARD FROM	)	
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NOTICE OF APPEARANCE

PLEASE TAKE NOTICE THAT, pursuant to 35 Ill. Adm. Code Section 101.400(A)(4), the law firm of ICE MILLER, LLP hereby files its Appearance in this proceeding on behalf of petitioner, GRIEF PACKAGING, LLC.

Respectfully submitted,

ICE MILLER, LLP

By: /s/ Susan Charles
One of its Attorneys

Date: January 24, 2011

Thomas W. Dimond
Susan Charles
ICE MILLER LLP
200 West Madison Street
Suite 3500
Chicago, Illinois 60606

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 24th day of January, 2011, I have served electronically the attached NOTICE OF ELECTRONIC FILING, NOTICE OF APPEARANCE, and PETITION FOR AN ADJUSTED STANDARD upon the following person:

John Therriault, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph Street, Suite 11-500
Chicago, IL 60601

and by U.S. Mail, first class postage prepaid, to the following persons:

Division of Legal Counsel
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

/s/ Susan Charles
Susan Charles

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
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PETITION OF GREIF, INC. AND	)	AS ________
GREIF PACKAGING, LLC	)	
FOR AN ADJUSTED STANDARD FROM	)	(Adjusted Standard – Air)
35 ILL ADM. CODE PART 218	)	
SUBPART TT	)	

PETITION FOR AN ADJUSTED STANDARD

GREIF, INC. and GREIF PACKAGING LLC ("Greif"), through its counsel and pursuant to 35 Ill. Adm. Code § 104.400, *et seq.*, submits this Petition for an Adjusted Standard ("Petition") to the Illinois Pollution Control Board ("Board"), seeking an adjusted standard from 35 Ill. Adm. Code § 218.986(a) as it applies to control requirements for emissions of volatile organic material ("VOM") at Greif's Naperville, Illinois fiber drum manufacturing facility.

I. INTRODUCTION AND SUMMARY OF PROPOSED ADJUSTED STANDARD

Greif operates a fiber (paper) drum container manufacturing facility in Naperville, DuPage County, Illinois. In general, fiber drums are produced by cutting fiber material to the appropriate length, forming the material into a cylinder and attaching a top and bottom to the cylinder. Some of the fiber drums require the addition of a polyethylene drum liner to meet customer specifications, particularly for storage and transport of food-grade products. Greif conducts quality control ("QC") testing of the liners of these drums by spraying a QC test fluid (a denatured alcohol product, which is a VOM) into the interior of the drums at the QC spray station. The drums then are conveyed 45 feet to the QC inspection station where the interior of the drum is visually inspected for pinholes. If pinholes are present, the ethanol causes a brown spot to appear, enabling the line inspector to detect the pinhole. The drum is then conveyed 120 feet to a drying oven where most of the remaining test fluid is evaporated. After leaving the drying oven any remaining fluid is vacuumed from the drum and then the drum is wiped dry. VOM is emitted throughout the QC Test Process as well as in the paint drying oven. Emissions of VOM are calculated based on the mass of VOMs used assuming that all usage is emitted to the atmosphere.

Air emissions of VOM and hazardous air pollutants ("HAPs") at Greif's Naperville facility are subject to Federally Enforceable State Operating Permit No. 9707044 ("FESOP").[1] Condition 3 of the FESOP limits VOM emissions from the QC Test Process (which includes the paint drying oven) to 22.8 tons per year ("tpy"). Condition 3 also includes emission unit specific limits on VOM emissions from the remainder of the plant (which includes a paint spray booth, a caulk applicator, water based ink printing and the Weather Pak Winder). The aggregate of these limits is 1.4 tpy. The FESOP limits HAP emissions to 10 tpy for any single HAP or 25 tpy for any combination of such HAPs. Greif reported 2009 emissions from its Naperville facility of 7.7 tons of VOM (plant-wide) and total combined HAPs of 1.3 tons.

On July 5, 2007, the Illinois Environmental Protection Agency ("Agency") issued Violation Notice A-2007-00132 ("Violation Notice") to Greif alleging, in relevant part, that the Naperville facility exceeded condition 3 of the FESOP, relating to VOM emissions. Greif reported emissions from the QC Test Process in 2006, 2007, 2008 and 2009 of 35.2, 46.7, 19.1 and 7.7 tons, respectively. The Agency alleges that Greif's VOM emissions now are subject to the 81 percent capture and control requirements of 35 Ill. Adm. Code Part 218, Subpart TT, Section 218.986(a), because emissions in 2006 and 2007 exceeded the 25 tpy applicability

[1] In 2006, the FESOP was issued to Greif Bros. Corporation, which had changed its name to Greif, Inc. Greif, Inc. has transferred ownership and operation of the Naperville plant to its wholly owned subsidiary, Greif Packaging LLC. When the FESOP is renewed, it will also be transferred into the name of Greif Packaging LLC.

threshold and because Subpart TT is a "once in – always in" regulation. *See* 35 Ill. Adm. Code Section 218.980 (a) – (c).

The Board promulgated 35 Ill. Adm. Code Part 218 to implement reasonably available control technology ("RACT") for sources of VOM emissions within certain areas of Illinois. *See In the Matter of Reasonably Available Control Technology for Major Sources Emitting Volatile Organic Materials in the Chicago Ozone Nonattainment Area: 25 Tons,* R93-14, Final Order (January 6, 1994). Section 218.986 provides, in relevant part:

> Every owner or operator of an emission unit subject to [Subpart TT] shall comply with the requirements of subsection (a), (b), (c), (d), or (e) below.
>
> a) Emission capture and control equipment which achieves an overall reduction in uncontrolled VOM emissions of at least 81 percent from each emission unit . . ..

Greif conducted a RACT Study to evaluate whether various emission control options for the QC Test Process satisfy RACT control requirements in Section 218.986(a). *See* Exhibit A, Reasonably Available Control Technology Study, dated August 2010, prepared for Greif by Thomas C. Ponder, Jr., PE ("RACT Study"). Greif submitted the RACT Study to the Agency on September 16, 2010. The RACT Study evaluated three capture and control systems: capture plus recuperative thermal oxidizers, capture plus carbon adsorbers and capture plus biofilters and material substitution. The RACT Study concludes that each option could achieve at least 81 percent capture and control of VOM emissions as required under Section 218.986(a), but only at a cost per ton of VOM emissions controlled of between $11,667 - $17,672. These costs exceed what the Board typically has considered reasonable in adopting RACT regulations. *See infra* at Section II(H)(1)(d).

The RACT Study also evaluated the technical feasibility and economic reasonableness of two material substitution options: mixing the QC test fluid with acetone or water. Material substitution using acetone was found to be technically infeasible because of product quality concerns related to the effect of acetone on the product. Acetone in the QC test fluid causes the gasket material that seals the drum bottom to the side walls to dissolve, which is unacceptable. However, material substitution using a test fluid composed of 45 percent denatured alcohol and 55 percent water achieves a 55 percent reduction in VOM emissions and results in an overall cost reduction. The RACT Study concludes that the material substitution option using 45 percent denatured alcohol and 55 percent water constitutes RACT for Grief's Naperville facility. Based on the RACT Study and the analysis of adjusted standard requirements as set forth herein, Greif has satisfied the conditions for issuing an adjusted standard from the 81 percent capture and control requirement of Section 218.986(a).

II. <u>35 ILL. ADM. Code Section 104.406: Petition for Adjusted Standard</u>

The procedural requirements for submission of an adjusted standard petition to the Board are found at 35 Ill. Adm. Code Part 104, Regulatory Relief Mechanisms, Subpart D. Sections 104.406(a) – (l) of Subpart D specify the information that must be included in any adjusted standard petition. The requisite headings and corresponding information required under Subpart D are set forth below.

A. <u>Standard From Which Relief Is Sought – Section 104.406(a)</u>

Greif seeks an adjusted standard from the requirements of 35 Ill. Adm. Code Part 218, Subpart TT, Section 218.986(a), Control Requirements, which sets emission reduction requirements for sources of VOM emissions not regulated under other subparts of Part 218. Section 218.986 became effective January 6, 1994. *RACT for Chicago Ozone*, R93-14. Pursuant to Section 218.980(b)(1), the applicability threshold for Subpart TT is the potential to emit 25 tpy of VOM, in the aggregate, from emission units at a source other than those specifically excluded from Subpart TT. The control requirements for qualifying emission units at sources subject to Subpart TT are set forth in Section 218.986. Section 218.986 provides, in relevant part:

> Every owner or operator of an emission unit subject to [Subpart TT] shall comply with the requirements of subsection (a), (b), (c), (d), or (e) below.
>
> a) Emission capture and control equipment which achieves an overall reduction in uncontrolled VOM emissions of at least 81 percent from each emission unit . . ..

Greif seeks an adjusted standard from the 81 percent capture and control requirement of Section 218.986(a) as it applies to Grief's Naperville facility. The facility is not seeking an adjusted standard from Section 218.986(b) – (e).[2]

As Greif will demonstrate, achieving capture and control of at least 81 percent of VOM emissions from its QC Test Process is not economically reasonable as applied to Greif, could increase emissions of other pollutants and may pose increased health and safety risks. Other alternative control strategies are technically infeasible because of negative impacts on product quality. Instead, Grief proposes to dilute the QC test fluid from 100 percent denatured alcohol to 45 percent denatured alcohol and 55 percent water. Modification of the QC test fluid will reduce VOM emissions from Greif's QC Test Process by 55 percent – to an annual emission level that is below the applicability threshold of Subpart TT.

[2] Subsections (b) – (e) are not applicable to the QC Test Process at Naperville and thus are not included in this Petition. *See* 35 Ill. Adm. Code Section 218.986(b) – (e) (applicable to: coating lines (subsection (b)), submission of an equivalent alternative control plan (subsection (c)), non-contact process cooling water (subsection (d)) and specific control measures applicable to leaks from components subject to the control requirements of Subpart TT (subsection (e))).

Greif will not require an adjusted standard from Section 218.108, "Exemptions, Variations, and Alternative Means of Control or Compliance Determinations" for the adjusted standard from Section 218.986(a) to become effective at the state level. Section 218.108 provides:

> Notwithstanding the provisions of any other Sections of this Part:
>
> a) Any exemptions, variations or alternatives adopted by the Board pursuant to Section 28, 28.1 or 35 of the Act to the control requirements, emission limitations, or test methods set forth in this Part shall be effective only when approved by the USEPA as a SIP revision.

While the Agency will need to request the United States Environmental Protection Agency's ("USEPA") approval of any Board-approved adjusted standard from Section 218.986(a) in the form of a SIP revision, the adjusted standard will be effective at the state level immediately upon granting by the Board. *See In the Matter of: Petition of Alumax Inc. for an Adjusted Standard from 35 Ill. Adm. Code Part 218*, AS 92-13, Slip. Op. at 4 (September 1, 1994); *see also, In the Matter of Reasonably Available Control Technology for Major Sources Emitting Volatile Organic Materials in the Chicago Ozone Nonattainment Area: 25 Tons,* R93-14, Slip. Op. (Second Notice) at 5-6 (November 18, 1993).

B. <u>Nature of the Regulation of General Applicability – Section 104.406(b)</u>

The Board promulgated 35 Ill. Adm. Code Part 218 to implement Section 182(b)(2) of the Clean Air Act, 42 U.S.C. § 7511a(b)(2), which, among other things, requires individual states with severe non-attainment areas to adopt RACT regulations applicable to sources of VOM emissions within the non-attainment area. *See RACT for Chicago Ozone*, R93-14, Slip Op. (Final Rule) at 2. As mandated by the Clean Air Act, the Board promulgated Part 218, including Subpart TT. *Id.*

C. Level of Justification – Section 104.406(c)

The regulations of general applicability from which Greif seeks an adjusted standard do not specify a level of justification for an adjusted standard. Accordingly, the level of justification is that generally applicable to all adjusted standards. *See* 415 ILCS 5/28.1 (Authorizing the Board to grant an adjusted standard upon adequate proof of the following: (1) the factors relating to the petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to the petitioner; (2) the existence of those factors justifies an adjusted standard; (3) the requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and (4) the adjusted standard is consistent with applicable federal law.).

D. Facility and Process Description – Section 104.406(d)

Greif operates a fiber drum container manufacturing facility in Naperville, DuPage County, Illinois. DuPage County is part of the Metropolitan Chicago Interstate Air Quality Control Region. 40 C.F.R. § 81.14. This area is designated as a non-attainment area for ozone (1-hour and 8-hour standard) under 40 C.F.R. § 81.314.

The Naperville facility employs about 90 hourly and salaried people. Fiber drum manufacturing began at the Naperville plant in April 1988. Greif's Naperville facility manufactures fiber drums ranging in size from six (6) gallons to seventy-five (75) gallons. In general, fiber drums are produced by cutting fiber material to the appropriate length, forming it into a cylinder and attaching a top and bottom to the cylinder. Some of the fiber drums require the addition of a polyethylene drum liner to meet customer specifications, particularly for storage and transport of food-grade products. Greif conducts QC testing of the liners of these drums using spray test equipment as follows: (1) a QC test fluid (a denatured alcohol product, which is a VOM) is sprayed into the interior of the drums at the QC spray station; (2) the drums are conveyed 45 feet to the QC inspection station where the interior of the drum is visually inspected for pinholes; (3) the drums are conveyed 120 feet to a drying oven where most of the remaining test fluid is evaporated; (4) after leaving the drying oven any remaining fluid is vacuumed from the drum and then the drum is wiped dry. The QC test fluid evaporates slowly, resulting in VOM emissions throughout the process. *See* RACT Survey at Section 1.0.

In addition to the QC Test Process described above, VOM emission sources at the Naperville facility include the paint drying oven, a caulk applicator, the paint spray booth, water based ink printing and the Weather Pak Winder. Each of these sources has a source-specific annual VOM limit in the FESOP, and the aggregate of those VOM limits is 1.4 tpy. Because the plant's emissions have historically been less than 25 tpy, the facility has not previously been subject to Subpart TT and does not employ any equipment to capture or destroy VOM emissions.

E. Investigation of Compliance Alternatives: Methods for Reducing VOM Emissions from Greif's Quality Control Testing Process Emission Unit – Section 104.406(e)

Relevant provisions of Section 218.986 would require Greif to capture and control at least 81 percent of VOM emissions from the QC Test Process through the application of emission capture and control equipment. Greif investigated multiple compliance alternatives and the corresponding costs for each alternative. *See* RACT Study at Section 3. As discussed below, the RACT Study demonstrates that dilution of the QC test fluid with water is the only technically feasible and economically reasonable alternative. This alternative also can be implemented without increased health and safety risks and without additional emissions that may potentially offset the benefits of any associated VOM reductions.

1. *Capture Systems*

Greif's fiber drums with polyethylene liners are sprayed with the QC test fluid, conveyed 45 feet to the QC test station for visual inspection and then conveyed 120 feet to the drum paint oven to evaporate most of the QC test fluid. The QC test fluid evaporates while the drums are being sprayed, transported for and awaiting inspection and then conveyed to the drum paint oven. Any remaining test fluid is vacuumed or wiped from the drums and to the extent it still contains VOM, may still be emitting VOM. An effective capture system would require a tunnel enclosure covering the 165 foot conveyer system from the QC spray station to the inspection station and, later, to the drum paint oven. *See* RACT Study at Section 3.1. Enclosures also would be needed for the hood at the QC spray station and the opening of the drum paint oven to ensure adequate capture of emissions. *Id.* Ducting to the associated control device(s) also would be required from the QC Test Process hood, the conveyor tunnel enclosure and the drum paint oven. *Id.* This type of capture system is assumed for each control method discussed below. The capital and annual operating costs for the capture system are included within the cost summary for each control system.

2. *Control Technologies.*

Greif's RACT Study includes a thorough evaluation of the following add-on control technologies: (a) recuperative thermal incinerator; (b) carbon adsorption; and (c) biofilter and material substitution. *Id.* at Section 3.2. As detailed below, each of these potential control systems are economically unreasonable, have inherent characteristics that could partially offset the environmental benefits of VOM reduction and/or have potentially harmful safety impacts.

a. **Recuperative Thermal Incinerators**

Thermal incinerators heat an exhaust stream to a temperature sufficiently high to oxidize (burn) VOM in the exhaust. Thermal recuperative oxidizers have a heat exchanger that preheats the incoming air by recuperating heat from the exiting air. *Id.* at Section 3.2.1. As the incoming air passes on one side of the metal tube or plate, hot clean air from the combustion chamber passes on the other side of the tube or plate. Heat is transferred to the incoming air through the process of conduction using the metal as the medium of heat transfer. This system has heat recovery as great as 60 percent and therefore requires less natural gas than traditional incinerators to boost the combustion temperatures to 1600°F (the required temperature to ensure complete destruction of VOM). *Id.*

While a recuperative thermal incinerator can be more cost-effective than a traditional incinerator, it requires a large amount of natural gas as compared to other control options (fuel must be used even when the QC Test Process is not operating to maintain the thermal oxidizer at temperature). *Id.* Frequent operation cycles in thermal oxiders cause condensation corrosion and thermal deterioration of the insulation which requires ongoing maintenance costs. *Id.* at Section 1.0. In addition, the large amount of natural gas required to operate thermal oxidizers generates NOx and CO emissions and small quantities of VOM and HAPs, which would partially offset any benefits obtained from the associated VOM reduction. *Id.*

The RACT Study concludes that total capital costs of the capture system and the recuperative thermal incinerator control technology at Greif's Naperville facility would be $1,752,000 with annualized capital and operating costs of $17,672 per ton of VOM controlled. *See* RACT Study at Table 4-1.

b. **Carbon Adsorbers**

Carbon adsorbers are used to control systems with low to medium VOM emission concentrations. *See* RACT Study at 3.2.2. A carbon adsorber typically consists of two or more beds of activated carbon – one treats the exhaust emissions while the other is being regenerated. *Id.* Typically, regeneration involves passing steam through the carbon bed to remove the VOM with the steam, leaving the regenerated carbon to be reused. Carbon adsorbers work best with insoluble VOM, which simplifies the recovery of the VOM from the saturated beds. *Id.* In some cases, distillation is required to separate the VOM materials from the regeneration steam. *Id.*

The QC test fluid is water soluble and would be very expensive to recover from the regeneration fluid. *Id.* In addition, the regeneration fluid likely could be sent to a local sewage district along with Grief's other process wastewaters. *Id.* Most sewer districts use equalization basins to reduce biological oxygen demand loading, which in this context includes VOM, by blowing solvents into the atmosphere; meaning that VOM emissions may not truly be reduced by the use of carbon beds. *Id.* Further, ketones found in the denatured alcohol present an inherent safety risk of fires from reactions between the ketones and the carbon in the beds. *Id.* Although carbon beds that handle ketones utilize water deluge systems to control bed fires, the increased health and safety risks remain. *Id.*

The RACT Study concludes that total capital costs of the capture system and the carbon adsorbers control technology would be $1,170,000. This control option would result in total annualized capital and operating costs of $12,594 per ton of VOM controlled. *See* RACT Study at Table 4-1.

c. **Biofilter and Material Substitution**

Biofilters can be used to reduce VOM emissions without the use of natural gas to burn the hydrocarbons. *See* RACT Study at Section 3.2.3. Bioren has proposed to install a biofilter on the Greif drum plant in Oakville, Ontario, which could potentially reduce VOM emissions from that plant by 70 percent. *Id.* At Naperville, the 81 percent capture and control objective could be met only by combining the biofilter with another control technology or by considering the reductions in VOM emissions from the use of the water diluted test fluid as a capture and control technology reduction. *Id.* A biofilter system has lower operating costs, although the capital costs are comparable to incinerators. *Id.* Biofilters must be heated to maintain destruction activity during winter months and heat for the filter can be supplied by the direct combustion of natural gas, steam or electricity. *Id.* Natural gas used for combustion would increase NOx emissions from the facility, partially offsetting the benefit from reductions in VOM emissions. *Id.*

Based on the RACT Study, total capital costs to install the capture system and the biofilter control technology (which includes use of the water diluted test fluid) is $1,800,000 and annualized capital and operating costs are $11,667 per ton of VOM controlled. *See* RACT Study at Table 4-1.

3. *Material Substitution Options*

a. **QC Test Fluid – Dilution with Acetone**

Greif considered dilution of the QC test fluid with acetone (a non-VOM material) as a possible alternative. However, dilution of the testing fluid with acetone could cause the gasket material sealing the bottom of the drum to the drum walls to dissolve. *See* RACT Study at 3.3.2.

Due to the potential for product damage, diluting the QC testing fluid with acetone is considered technically infeasible. *Id.*

b. **QC Test Fluid – Dilution with Water**

Grief evaluated the operational impact of diluting the QC test fluid with varying amounts of water as a means to reduce VOM emissions. Grief experimented with different ratios of water to denatured alcohol to identify the composition able to reduce VOM emissions to the greatest extent possible while maintaining the ability to visually detect pinholes or other tears or imperfections in the drum linings.

The testing procedure involved intentionally creating pinholes in the liners of five drums before sending them through the QC Test Process. The drums were sprayed with varying modifications of the QC test fluid and visually inspected to determine if the pinholes could be detected within an acceptable time period (here, about 70 seconds). *Id.* at 3.2.1. If the pinholes were detected, the test and the associated test fluid were considered acceptable. *Id.* If the pinholes could not be detected, the fluid was considered a technically infeasible option based on Grief's inability to meet its customers' quality assurance standards. *Id.*

Greif experimented with five potential alternative test fluids. A mixture of 80 percent denatured alcohol and 20 percent water revealed pinholes in each of five test drums within about 5 seconds. *Id.* Based on this result, Greif next experimented with a mixture of 70 percent denatured alcohol and 30 percent water. The 70/30 mixture revealed pinholes in each of five test drums after 7 seconds; but with noticeably lighter staining than with the 80/20 mixture. *Id.* A third test, using a 50 percent denatured alcohol and 50 percent water mixture identified significantly lighter staining around pinholes in each test drum within 45 seconds. *Id.* The test using 40 percent denatured alcohol and 60 percent water failed to identify flaws in the liners within an acceptable time period. *Id.* Grief then evaluated a 45 percent denatured alcohol and 55 percent water mixture. This mixture detected all of the pinholes within 50 seconds of spraying – although with significantly lighter staining. *Id.* Based on these test runs, Greif determined that 55 percent dilution with water was the highest dilution percentage that would allow the plant to meet its customer's quality assurance requirements.

Greif informed the Agency of these test results and began utilizing the diluted QC test fluid in May 2008 to achieve immediate reductions in VOM emissions even though the Agency had not formally approved the substitution. To date, the water-diluted test fluid has allowed the detection of drum defects without harming the product.

Diluting the QC test fluid with water also has the potential to reduce annual emissions of VOM from the QC Test Process below the 25 tpy applicability threshold of Section 218.980 and below the 22.8 tpy emissions limit in condition 3 of the FESOP. This has been demonstrated by the significant reduction in overall facility emissions between 2007 and 2008. *See supra,* at 2. In addition, diluting the QC test fluid with water results in lower operating costs. Total capital costs to dilute the QC test fluid with water would be $0 and annualized capital and operating costs are reduced by $679 per ton of VOC controlled. *See* RACT Study at Table 4-1.

4. *Compliance Alternatives Conclusion*

Three capture and control systems would be technically feasible: capture plus recuperative thermal oxiders, capture plus carbon adsorbers and capture plus biofilters and material substitution. While each of these options could achieve the 81 percent capture and control objectives of Subpart TT, the cost/ton of VOM controlled range from $11,667 to $17,672. These costs exceed what the Board has considered reasonable in adopting RACT regulations. *See infra* at Section II(H)(1). Material substitution using acetone is technically infeasible because of product quality issues. Material substitution using 55 percent water and 45 percent denatured alcohol results in an overall reduction in costs while achieving a 55 percent reduction in VOM emissions compared to pre-substitution levels.

F. Greif's Proposed Adjusted Standard – Section 104.406(f)

Greif proposes the following adjusted standard for adoption by the Board:

1. Greif will reduce VOM emissions from its QC Test Process by using a test fluid composed of 45 percent denatured alcohol and 55 percent water.

2. Greif will coordinate with the Agency to submit to EPA a request for revision of the SIP consistent with this proposed adjusted standard requiring use of the diluted QC test fluid as an alternative to capture and control technology.

3. Environmental staff of Greif's parent will conduct a formal training session for Naperville facility personnel on the requirements of the FESOP and the internal procedures for tracking compliance with FESOP conditions.

4. Greif will continue to implement an improved system for monthly tracking and calculations of VOM emissions and monthly comparison of the calculations to VOM limits contained in the FESOP. The results of the comparison will continue to be reported to Greif's facility management monthly so that any deviations or exceedances of FESOP conditions can be identified and timely reported to the Agency as required by FESOP condition 6.

G. Quantitative and Qualitative Description of Greif's Impact on the Environment Before and After the Proposed Adjusted Standard – Section 104.406(g)

1. *Air Quality Impact Analysis of Greif's Operations*

Application of the proposed adjusted standard will allow Greif to reduce current VOM emissions from the QC Test Process by 55 percent. While this reduction is less than the 81 percent capture and control requirement of Section 218.986(a), the proposed adjusted standard will allow Grief to reduce VOM emissions below levels required by its FESOP and the threshold for Subpart TT applicability.

The emissions of VOM from the QC Test Process at the Naperville plant will have no impact on air quality. In 2009, state-wide VOM point source emissions were 54,668 tons. *See* Illinois Annual Air Quality Report 2009, Table C-5 (IEPA November 2009) (available at www.epa.state.il.us/air/air-quality-report/2009/air-quality-report-2009.pdf). Thus, even at the maximum permitted emissions levels for the Naperville plant (22.8 tpy based on condition 3 of the FESOP), VOM emissions from the QC Test Process would amount to about 0.04% of state-wide point source emissions. Similarly, 2009 VOM point source emissions for the Metropolitan Chicago area were 11,884. *See* September 8, 2010 E-mail from EPA.FOIA.BOA@ Illinois.gov to Susan Charles responding to Freedom of Information Act request, attached as Exhibit B. Assuming maximum emissions permitted under the FESOP for the Naperville plant, VOM emissions from the QC Test Process would amount to only 0.19% of Metropolitan Chicago point source emissions.

The Board previously has found that adjusted standards from Subpart TT from sources with much higher VOM emissions would have no significant impact on air quality. *See, e.g., In the Matter of: Petition of Ford Motor Co. (Chicago Assembly Plant) for an Adjusted Standard from 35 Ill. Adm. Code Section 218.986,* AS 00-6, Slip. Op. at 5 (April 6, 2000) (uncontrolled emissions of 390 tpy would have no significant impact on air quality or human health); *In the Matter of: Petition of Alumax, Inc. for an Adjusted Standard from 35 Ill. Adm. Code Part 218,* AS 92-13, Slip. Op. at 9 (Sept. 1, 1994) (excess uncontrolled emissions of 76 tpy would not significantly impact air quality). The Board also has shown a particular concern for capture and control technologies, such as incinerators, that create alternate emissions, *e.g.*, NOx, which also contribute to ozone formation or hazardous waste generation that offset any environmental gains from reducing VOM emissions. *See, e.g., Alumax,* AS 92-13, Slip. Op. at 7 (Board granted adjusted standard where control technologies created offsetting emissions of NOx and VOM); *In the Matter of: Joint Petition of Quantum Chemical Corporation, USI Division (and the Illinois Environmental Protection Agency) for an Adjusted Standard from Parts of 35 Ill. Adm. Code 218.966 and 218.986,* AS 92-14, Slip. Op. at 9 (Board granted adjusted standard where use of control technology would emit NOx which, like VOM, contributes to ozone formation, that would partially offset the benefits of VOM reduction).

2. *Cross-Media Environmental Impacts Resulting from an Adjusted Standard.*

None. Greif's waste and wastewater generation is independent of VOM emissions from the QC Test Process; therefore, no change in the nature or volume of waste and wastewater is anticipated.

H. Justification – Section 104.406(h)

Where, as here, the regulation of general applicability does not specify a level of justification required for a petitioner to qualify for an adjusted standard, Section 28.1(c) of the Illinois Environmental Protection Act, 415 ILCS 5/28.1(c), authorizes the Board to grant an adjusted standard upon adequate proof of the following: (1) the factors relating to the petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to the petitioner; (2) the existence of those factors justifies an adjusted standard; (3) the requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and (4) the adjusted standard is consistent with applicable federal law.

1. *Factors Relating to Greif are Substantially and Significantly Different.*

The factors relating to Greif's ability to reduce VOM emissions are substantially and significantly different from any the Board may have relied on in adopting Subpart TT. First, the Board did not rely on any specific industry factors in adopting Subpart TT and, therefore, the factors associated with Greif's operations are necessarily "substantially and significantly" different. Second, Grief's ability to manage VOM emissions by diluting its QC test fluid is substantially and significantly different from factors the Board may have relied on in deciding to require capture and control methods for managing VOM emissions. Third, even if Greif could not manage VOM emissions by dilution of the QC test fluid, the physical design of Greif's operations and the slow-evaporation of its QC test fluid are unique factors impacting and significantly limiting Greif's ability to capture and control VOM emissions through add-on controls. Fourth, the costs to achieve the 81 percent capture and control requirement of Section 218.986(a) would exceed the threshold cost level the Board previously has found to be economically reasonable.

a. **The Board Did Not Consider Factors Involving the Drum Manufacturing Business in Adopting Subpart TT.**

Subpart TT of Part 218 is essentially a "catch-all" applicable to VOM sources that are not governed by other subparts of Part 218. In adopting Subpart TT, the Board did not consider factors relating to any specific industry or practice – including the fiber drum manufacturing business. Rather, the purpose of Subpart TT was to cover sources that had not otherwise been specifically considered. *See* 35 Ill. Adm. Code § 218.980(a) and (b). The Board previously has reasoned that, because it did not consider any specific factors in adopting Subpart TT, virtually any factors specific to an industry or specific source not otherwise addressed in Part 218 would be "substantially and significantly different." *See Ford Motor Company (2000),* AS 00-6, Slip. Op. at 5.

In *Ford Motor Company*, the Board considered an adjusted standard petition in which Ford sought an alternative emissions control plan to address solvent cleanup operations at its Chicago assembly plant. *Id.* Slip Op. at 1. The Board stated that Subpart TT applies to VOM sources with certain characteristics that are not governed by other subparts of Part 218 and, in adopting Subpart TT, the Board did not consider factors relating to any specific industry or practice. *Id.* Slip. Op. at 5. The Board then ruled that, because factors relating to Ford's cleaning operations were not considered in adopting Section 218.986(a), the requirement to demonstrate significantly different factors "is therefore met." *Id.*

b. **<u>Greif's Ability to Manage VOM Emissions Through Dilution of its QC Test Fluid Constitute Substantially and Significantly Different Factors</u>.**

Even if the Board had considered factors impacting the capture and control of VOM emissions at drum manufacturers when it promulgated Section 218.986(a), it did not consider Greif's unique QC Test Process, the particular complexity of constructing capture equipment over an extended conveyor line or the ability to manage VOM emissions by diluting the QC test fluid with water. Construction of effective capture equipment is further complicated by the need to maintain physical access to the drums for visual inspection. This means the conveyor line cannot be totally enclosed to maximize capture. These factors are substantially and significantly different from emission units where material substitution is not possible and the construction and operation of emission capture equipment is less extensive.

c. **Greif's QC Test Process is Substantially and Significantly Different from Other Manufacturing Activities Considered by the Board.**

In addition, even assuming, *arguendo,* that capture and control could be an economically reasonable option, Greif's specific system would be complicated by the physical location of different production activities within the Naperville plant, the slow evaporation of the testing fluid and the need for Greif to inspect drums visually after the QC test fluid has been sprayed into the drum. The testing fluid begins to evaporate while being sprayed in the QC spray station. Evaporation continues while the drum is being conveyed to and awaiting QC inspection and also as the drums are conveyed from the inspection area to the drum paint oven and, possibly, even afterward. Because the lined drums must be accessible for visual inspection by plant staff, complete enclosure of the drum conveyor line is not possible. These factors would require large capture systems, including a hood at the QC spray station, at the opening of the drum paint oven and along the conveyor used to transport the drums from the spray station to the inspection area and from the inspection area to the drum oven. *See* RACT Study at Section 1.0. The need to construct and operate a capture system this complex and this large likely was not considered by the Board in adopting Subpart TT and will significantly impact Greif's costs to control VOM emissions. *See infra at* Section II(H)(2).

d. **Costs of Achieving RACT Control Standard Exceed those Considered by Board in Setting RACT Standard.**

In addition, as reflected in the RACT Study, feasible technologies to achieve the 81 percent combined capture and control objective of Section 218.986(a) would require costs per ton of annual VOM removed ranging from $11,667 to $17,672. These costs exceed the threshold cost level the Board previously has found to be economically unreasonable. *See In the Matter of: Petition of Formel Industries, Inc. for an Adjusted Standard from 35 Ill. Adm. Code.*

218.401(a), (b) and (c), AS 00-13, Slip. Op. at 9 (January 18, 2001) (Board granted adjusted standard and the Agency agreed that costs of $10,911 - $18,041 per ton of VOM reduced were economically unreasonable); *Ford Motor Company (2000),* Slip. Op. at 5 (citing *In re: Petition of Louis Berkman,* AS 97-5 (Dec. 4, 1997) *aff'd sub nom EPA v. PCB*, 308 Ill. App. 3d 741, 746 & 752-53, 721 N.E.2d 723, 726-27 & 731 (2d Dist. 1999) (for proposition that costs exceeding $1,734 in 1996 dollars per ton of reductions was economically unreasonable); *In the Matter of: Joint Petition of Reynolds Metals Company and the Illinois Environmental Protection Agency for an Adjusted Standard from 35 IAC 218.980,* AS 91-8 (Sept. 21, 1995) (Board found $40,000 per ton of VOM reduced to be economically unreasonable).

2. *The Existence of These Factors Justifies an Adjusted Standard*.

The intent of the regulations promulgated under 35 Ill. Adm. Code Part 218 is to implement RACT for VOM emission sources in the Chicago ozone non-attainment area. *See In the Matter of Petition of Ford Motor Company (Chicago Assembly Plant) for an Adjusted Standard from 35 Ill. Adm. Code 218.986*, AS 02-3, Slip. Op. at 4 (November 21, 2002). Greif's RACT Study demonstrates that use of the water-diluted test fluid as an adjusted standard reduces emissions from the QC Test Process below the applicability threshold for Subpart TT[3] and below applicable FESOP limits while reducing costs. The existence of these factors demonstrates that dilution of the QC test fluid constitutes RACT and justifies the granting of the instant request.

3. *The Requested Standard Will Not Result in Adverse Health Effects*.

The requested adjusted standard will have little, if any, adverse impact on human health or the environment. In 2009, state-wide VOM point source emissions were 54,668 tons. *See*

[3] Greif understands that Subpart TT is a "once in-always in" rule. 35 Ill. Adm. Code Section 218.980(c). However, the fact that the diluted QC test fluid will bring emissions below the applicability threshold is of some significance because the Board certainly did not consider sources with uncontrolled emissions less than the threshold being subject to Subpart TT.

Illinois Annual Air Report at Table C-5. Thus, even at the maximum permitted emission levels for the Naperville plant (22.8 tpy based on condition 3 of the FESOP), VOM emissions from the QC Test Process would amount to less than 0.04% of state-wide point source emissions and only 0.19% of Metropolitan Chicago emissions. The Board has previously found that adjusted standards from Subpart TT from sources with much higher VOM emission levels would have no significant impact on air quality. *See, e.g., Alumax,* AS 92-13, Slip. Op. at 9; *Ford Motor Company (2000),* AS 00-6, Slip. Op. at 5.

The Board has granted numerous exemptions to the 81 percent capture and control requirement in Subpart TT in cases where the annual VOM emissions that were exempted from Section 218.986(a) were significantly greater than those proposed by Greif. *See, e.g., Ford Motor Co. (2000)*, AS 00-6, Slip. Op. at 3 (even with uncontrolled emissions of 390 tpy of VOM, the Board found no significant impact on air quality or human health); *Quantum Chemical Corporation,* AS 92-14, Slip. Op. at 10 (Board agreed that operation of emission units resulting in over 260 tpy of VOM was small compared to the total VOM emissions in the Chicago ozone non-attainment area and would have no measurable impact on air quality); *Alumax*, AS 92-13, Slip. Op. at 9 (Board found the foregone emission reductions of 76 tpy from not achieving 81 percent control would not significantly impact human health).

Moreover, the Board previously has found that a control plan resulting in an overall emissions reduction constitutes a ***positive*** environmental impact. *See Ford Motor Company (2002),* AS 02-3, Slip. Op. at 4. In *Ford*, the Board found that a 50 tpy reduction of VOM emissions (from 390 tpy to 340 tpy – or 13%) was "significant" and would have a "positive impact on air quality." *Id.* Here, dilution of the QC test fluid is producing a 55% reduction of

VOM emissions – an even greater reduction on a percentage basis than what was at issue in the *Ford* petition.

4. *The Requested Standard is Consistent with Federal Law*.

Section 110 of the federal Clean Air Act, 42 U.S.C. § 7410, grants individual states the authority to promulgate a plan for implementation, maintenance and enforcement of air quality standards, subject to approval by EPA. Based on the RACT Study, the proposed adjusted standard constitutes RACT for the Greif facility, and is therefore consistent with the federal Clean Air Act. A state may revise its SIP, again subject to EPA approval. 42 U.S.C. § 7410. Greif will work with the Agency to submit a SIP revision to EPA that is consistent with any adjusted standard granted by the Board.

J. Hearing – Section 104.406(j)

Greif requests a hearing in this matter.

K. Supporting Documentation – Section 104.406(k)

1. RACT Study, attached to this Petition as Exhibit A.
2. FOIA Response from Illinois Environmental Protection Agency, Bureau of Air, attached to this Petition as Exhibit B.

III. CONCLUSION

Greif requests that the Board grant the proposed adjusted standard as an alternative to the RACT regulations adopted by the Board in Subpart TT. To require Greif to comply with the requirements of 35 Ill. Adm. Code Subpart TT, Section 218.986(a), would result in substantial economic hardship to Greif with no corresponding environmental benefit. Certain compliance options examined by Greif could have the reverse effect of creating increased emissions of other pollutants and environmental detriment. Finally, add-on controls are unreasonably expensive, provide little, if any, environmental benefit and certain control options may result in increased health and safety risks.

WHEREFORE, Greif, Inc. requests that the Board grant Greif the proposed adjusted standard from 35 Ill. Adm. Code, Subpart TT, Section 218.986(a), as that rule applies to the emissions of VOM from Greif Packaging LLC's operations in Naperville, Illinois.

Respectfully submitted,

GREIF, INC. AND
GREIF PACKAGING LLC

By: /s/ Susan Charles

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January 24, 2011

REASONABLY AVAILABLE CONTROL TECHNOLOGY STUDY

August 2010

Prepared for:

GREIF

Naperville, IL

Prepared by:

TCP

Itasca, IL

Exhibit A

REASONABLY AVAILABLE CONTROL TECHNOLOGY STUDY

Prepared for:

GREIF

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TCP Project No. 8003

August 2010

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1.0 SUMMARY

This study was undertaken to evaluate the reasonably available control technologies (RACT) options that could be implemented at the quality control (QC) testing process emission unit of the Greif Industrial Packaging & Services, LLC (Greif) fiber container facility in Naperville, Illinois. The options are being considered to determine if the 81% combined capture and control requirement of 35 IAC 218.986 is technically achievable and economically reasonable for the QC testing process emission unit and, if not, to identify equivalent alternative control plans that would constitute RACT for this emission unit.

Section 218.986 requires emission units subject to its requirements to achieve an overall reduction in uncontrolled VOM emissions of at least 81 percent through the application of emission capture and control equipment. Capture technology would involve a combination of permanent total enclosures and exhaust hoods designed to achieve at least 90 percent capture of VOM at the QC testing process. The following control equipment options were evaluated for potential implementation in connection with 90 percent capture methodology:

- Recuperative thermal incinerator
- Carbon adsorber
- Biofilter

In addition, the following methods of VOM emission reduction were evaluated as possible equivalent alternative control plans:

- Dilution of the QC testing process fluid (a mixture of solvents, primarily denatured alcohol) with water
- Dilution of the QC testing process fluid with acetone (a non-VOM material)

The recuperative thermal incinerator, biofilter, carbon adsorption, and QC testing fluid dilution options were completely evaluated. Dilution of the testing fluid with acetone was determined to be technically infeasible. Acetone, does not work at Naperville since it causes the gasket material which seals the bottom of the drum to the drum walls to dissolve. Due to this problem with product damage, diluting the QC test fluid with acetone was determined to be infeasible.

Capture of emissions from the QC test process is complicated by slowly evaporating solvents in the testing fluid and the need for employees to inspect each drum visually after the QC test fluid has been sprayed into the drum. Currently the drums are sprayed and inspected at the QC test station. Then the drums are conveyed approximately 160 feet to the drum paint oven to insure that the test fluid completely evaporates. So, the QC test process requires capture of emissions at the QC test station, itself, the conveyors, and the drum paint oven. This is a very complicated capture system that requires tunnel enclosures around the conveyors. The QC test process station must be enclosed and the opening to drum paint oven must be reduced to ensure 90 percent capture of the emissions. The control system requires both enclosures of the process and ducting to the control device. Uniform capture is difficult when system components include a spray station, tunnel hoods, and an oven.

Because of the difficulties with the capture system, the air flow rate to the control device will necessarily be high. This creates the need for larger control systems, which impacts costs. As reflected in Table 1-1, the costs of VOM control stated in terms of dollars per ton of annual VOM reduction range from $11,167 to $17,672. This range of control costs is significantly higher than the level of costs considered to be economic in adopting RACT controls, about $2,250 per ton in 2008 dollars.

Table 1-1 Costs of VOM Control ($/ton)

Control Option	Cost of VOM Control ($/ton)
Recuperative Thermal Oxidizer (20,000 acfm)	17,672
Carbon Adsorber (20,000 acfm)	11,667
Biofilter (20,000 acfm) & Water Diluted Solvent	11,167
Water Diluted solvent	-679

In addition, all control systems for the reduction of VOM emissions have inherent characteristics that would partially offset the environmental benefits of VOM reduction. Thermal oxidizers use large quantities of natural gas. Fuel will be used even when the QC test process is not operating to maintain the thermal oxidizer at temperature. Frequent operation cycles in thermal oxidizers cause condensation corrosion and thermal deterioration of the insulation. Thermal oxidizers emit NOx and CO and small quantities of VOM and HAPS are also emitted. These emissions will partially offset any benefits obtained from VOM reduction. Carbon adsorbers also have drawbacks. Since all of the solvents used in the QC test process are water soluble, the used solvents can not be recovered from the carbon adsorbers without an elaborate distillation system. Given these difficulties, the condensed regeneration fluid is commonly discharged with wastewater to the sewers. Depending on the type of treatment system at the municipal treatment facility, the VOM may not be biodegraded but simply blown into the atmosphere in an equalization basin. In that case, VOM emission reductions at the facility will be offset by higher emissions at the treatment facility. Biofilters must be heated to maintain destruction activity during winter months. Heat for the biofilter can be supplied by the direct combustion of natural gas, steam, or electricity. Natural gas combustion would increase NOx emissions from the facility. In addition, the large size of these units may limit feasible locations at a facility. Also, the biofilter cannot achieve the 81% control objective by itself and would require an additional control system or the counting of the QC test fluid dilution as a control technology to achieve that objective.

In contrast, diluting the QC test fluid with water has been calculated to reduce annual emissions of VOM below the 25 tons per year (tpy) threshold for applicability of Section 218.986 at a reduced cost from pre-dilution operations. Based on this analysis, conversion to the diluted QC test fluid achieves RACT control for this emission unit and should be approvable as an equivalent alternative control plan in place of the 81% capture and control requirement of Section 218.986.

2.0 FACILITY INFORMATION

Greif operates a fiber container manufacturing facility in Naperville, Illinois. The primary activity involves the cutting of fiber material into appropriate lengths, molding the shapes into a drum and connecting tops and bottoms to the drum sides. VOM emissions are minimal in the actual drum making operation. Emissions occur during the application of caulk, silk screening of information onto the drum, and in drum painting. . Combined VOM emissions from all these units are currently permitted at a maximum of 1.4 tpy, and Greif has proposed increasing the emissions from those units to an aggregate of 2.6 tpy. Under 35 IAC 218.980(d), these units are exempt from the requirements of Section 218.986 because no single unit emits greater than 2.5 tpy of VOMs and the aggregate emissions from the other units does not exceed 5 tpy.

Some of the fiber drums manufactured at Naperville are required by customers to have polyethylene liners, primarily to comply with requirements for food grade containers. Drums with these liners must be tested to ensure that the liner is free from pinholes or other tears or imperfections. The QC Test Process emission unit involves the spraying of a VOM-containing liquid onto the polyethylene liner, which causes imperfections in the liner to become visible to the naked eye and detectable to plant personnel who inspect each of the lined drums as it proceeds through the process on a conveyor belt. At the Naperville plant, only the QC Test Process emission unit emits significant quantities of VOM emissions. Emissions from the QC Test Process are currently permitted at 22.8 tpy, and Greif has proposed to reduce those emissions to a maximum of 21 tpy. Accordingly, this study only assesses RACT options for the QC Test Process emission unit.

3.0 CONTROL TECHNOLOGIES

Brief descriptions of the capture and control systems evaluated for this study are given in the following sections.

3.1 Capture Systems

Due to the slow evaporation rate of the QC test fluid, the need to achieve adequate emission capture to achieve overall 81% control adds to the VOM control costs. A total tunnel enclosure will be required for the conveyor from the QC test process spray station to the drum paint oven. Enclosures will be added to the hood at the QC test process spray station and the opening of the drum paint oven to ensure adequate capture will be achieved. Ducting to the control device will be required from the QC test process hood, the conveyor tunnel enclosure and the drum paint oven. This complicated system is hard to balance so that adequate capture is achieved. The capital and annual operating costs for the ducting and enclosure systems are included with each control system.

3.2 Add-on Control Technologies

Recuperative thermal oxidizers, carbon adsorbers, and biofilters were the control systems evaluated.

3.2.1 Recuperative Thermal Incinerators

Recuperative thermal incinerators use a heat exchanger to capture the exhaust heat and transfer the heat to incoming gases. Less natural gas is needed to boost the combustion temperatures to 1600°F to ensure complete destruction of the VOMs. This system has heat recovery as great as 60%. The primary advantages of this control system are lower annual costs relative to other incinerators and flexibility in handling a range of VOM materials. The primary disadvantages of this control system relative to other control options are higher operating costs due to the amount of natural gas that is consumed and the resulting increase in emissions of NOx.

3.2.2 Carbon Adsorbers

Carbon adsorbers are used to control systems with low to medium VOM concentrations. Normally, a carbon adsorber consists of two or more beds of activated carbon. One bed is treating the exhaust emissions while the other bed is being regenerated. Large systems may have several beds on stream while a bed is being regenerated. Carbon adsorbers work best with insoluble VOMs, which simplify the recovery of the VOM materials. In some cases, distillation is required to separate the VOM materials from the regeneration steam. Since all the VOM used in the QC testing process is water soluble, it would be very expensive to recover the denatured alcohol from the regeneration fluid. The waste steam would most likely be sent to a local sewage district along with wastewaters since most sewer districts will allow facilities to discharge water soluble solvents that are not chlorinated. However, most sewer districts use equalization basins to reduce VOM (BOD) loading by blowing solvents into the atmosphere. Therefore, VOM emissions may not truly be reduced with carbon beds but only the emission source changed. Due to the presence of ketones in the denatured alcohol, there is also an inherent risk of fires from reactions between the ketones and the carbon in the beds. Carbon beds that handle ketones require water deluge systems to control bed fires.

3.2.3 Biofilter

Biofilters can be used to reduce VOM emissions without the use of natural gas to burn the hydrocarbons. Biorem has proposed to install a biofilter for odor control on the Greif drum plant in Oakville, Ontario. In this process, VOM is reduced by 70 percent by the biofilter media. Biorem would achieve 95% control by adding a carbon adsorber after the biofilter media. At Naperville, the 81% control objective could be met only by combining the biofilter with another control technology or by considering the reductions in VOM emissions from the use of the water diluted test fluid as a capture and control technology reduction. This system has lower operating costs although the capital costs are comparable to incinerators. Biofilters must be heated to maintain destruction activity during winter months. Heat for the biofilter can be supplied by the direct combustion of natural gas, steam, or electricity. Natural gas combustion would increase NOx emissions from the facility.

3.3 Potential Equivalent Alternative Control Plans

3.3.1 QC Test Fluid – Dilution with Water

Naperville experimented with changing the QC testing process fluid from 100% denatured alcohol to a mixture of denatured alcohol and water. The goal of the experiment was to reduce the proportion of denatured alcohol to the greatest extent possible, which would achieve corresponding reductions in VOM emissions, while maintaining the ability to visually detect imperfections in the drum linings.

The experiment was conducted in the following general manner. Using a sharp point awl, pinholes would be made in the side and bottom of liners of five drums prior to sending them through the QC Test Process. The drums would then be sprayed in the QC Test Process and visually inspected on the conveyor system to determine if the pinholes could be detected in an acceptable time period. Under normal operations, it takes a drum about 70 seconds to move on a conveyor system from the QC Test Process spray system to the location where the drums are inspected. If the pinholes could be detected, the test was considered successful and the fluid used for the test considered acceptable. If the pinholes could not be detected, the test was considered a failure and unable to meet the product quality assurance standards required by Greif's customers.

The first alternative test fluid consisted of 80% denatured alcohol and 20% water. At this mixture, plant personnel were able to detect the pinholes in all five test drums within about 5 seconds. The experiment was repeated with a test fluid consisting of 70% denatured alcohol and 30% water. As with the first test fluid, this second mixture allowed the detection of all pinholes in the five test drums, although they were only detectable after 7 seconds and the staining around the holes was noticeably lighter than with the 80/20 mixture. Similar tests were conducted with mixtures of 50% denatured alcohol/50% water, then 40% denatured alcohol/60% water and finally 45% denatured alcohol/55% water. With the 50/50 mixture, all pinholes were detected within 45 seconds, although the staining was much lighter than with mixtures containing more alcohol. The test using the 40/60 mixture failed. All of the pinholes were not visible when the drums reached the inspector station. Continued observation of these drums from the inspector station to the drying oven revealed that the pinholes did not even become visible by the time the drum reached the drying oven. The test using the 45/55 mixture allowed the detection of all pinholes within 60 seconds after spraying, although as noted above the staining around the pinholes was significantly lighter than with mixtures containing more alcohol. Based on these test runs, the plant determined that 55% dilution with water was the highest dilution percentage that would still allow the plant to meet its product quality assurance requirements. To date, the diluted test fluid has been able to allow the detection of drums with defects in the polyethylene liner. This diluted test fluid is less expensive than the previously used test fluid consisting of 100% denatured alcohol.

3.3.2 QC Test Fluid – Dilution with Acetone

Another option to achieve reduction in VOM emissions would be to dilute the current QC test fluid with acetone or switch to acetone as an entire substitute because acetone is a non-VOM solvent. Tests by facility personnel determined that acetone, even when diluted, may dissolve the gasket that binds the bottom of the fiber drum to the walls of the drum. For that reason, this alternative was deemed by the facility to be infeasible for full implementation.

4.0 CONTROL COSTS

The capital and annual costs for different control options are shown in Table 4-1. Capture (ducting and enclosures) costs are included in the capital and operating costs of each of the three control systems evaluated. The complete cost analysis of the recuperative thermal oxidizer control system is shown in Appendix A. The complete cost analysis of the carbon adsorber control system is shown in Appendix B. The cost for the biofilter was scaled to the projected biofilter size for the Naperville facility based on the bid received for the installation at the Oakville, Ontario facility. In addition, the cost analysis for the biofilter option assumes the diluted QC test fluid can be treated as a control technology because adding a carbon adsorber would dramatically increase the cost per ton of VOM controlled.

4.1 Capital Costs

The procedures for estimating capital costs for pollution capture and control equipment generally follow the procedures developed by the United States Environmental Protection Agency (EPA). Specifically for this study, the information used to develop the capital costs were derived from "Estimating Costs of Air Pollution Control" by William Vatavuk. Using algorithms in the book, costs for the capture and control equipment were determined. After determining equipment costs, costs for auxiliary equipment such as fans, ductwork, and a stack were calculated. It was assumed that the control equipment would be too heavy to mount on the roof, so the control systems would be located on the ground near the QC testing process. Once the costs of the capture and control equipment and auxiliary equipment were determined, they were used to develop direct installation costs for such things as foundations, electrical work, erection, insulation, painting, and support facilities. Indirect costs such as engineering, construction management, contractor fees, and testing were added to the direct installation costs. Contingency costs were added to total installation costs in order to determine the total project cost for each control option.

4.2 Annual Costs

Annual costs also follow the EPA guidelines. Items for direct operation of the capture and control equipment such as electricity, natural gas, operating labor, and maintenance are determined based on the capture and control equipment requirements. Indirect costs such as plant overhead, taxes, and insurance are added to the costs. Capital recovery is a method for recovering the cost of money used to finance the project and determining the depreciation of the equipment. Although there are other methods for determining these costs, capital recovery is used by EPA in RACT analysis in determining the cost per ton of pollutants controlled.

Annual costs for diluted QC testing fluids are based on a \$3.16/gallon cost for the 55% diluted testing fluid versus \$4.84/gallon for the undiluted denatured alcohol. A cost savings occurs since the water-reduced solvent is lower cost than the all solvent test fluid.

4.3 Reasonably Available Control Technology Costs

Section 218.986 requires emission units subject to its requirements to achieve an overall reduction in uncontrolled VOM emissions of at least 81 percent through the application of emission capture and control equipment. In adopting that requirement, the Illinois Pollution Control Board considered a level of cost per ton of estimated VOM reductions that would typically be incurred to achieve the 81% standard. In 1996 dollars, the Board's RACT cost threshold was a maximum of $1,734 per ton of VOM controlled. In re: Petition of Louis Berkman, AS 97-5 (Dec. 4, 1997) aff'd sub. nom. EPA v. PCB, 308 Ill. App. 3d 741, 746 & 752-53 (2d Dist. 1999). Escalating that threshold to 2008 dollars, the RACT cost would be approximately $2,249 per tom of VOM controlled.

4.4 Comparing RACT to the Naperville Control Systems

A review of the costs in Table 4-1 indicates that all of the add-on control systems and their associated capture system upgrades cost much more than the RACT threshold of $2,249 per ton of VOM controlled. Control costs range from $11,667 to $17,672 per ton of VOM controlled.

In addition, all control systems for the reduction of VOM emissions have inherent characteristics that would partially offset the environmental benefits of VOM reduction. Thermal oxidizers use large quantities of natural gas. Fuel will be used even when the QC test process is not operating to maintain the thermal oxidizer at temperature. Frequent operation cycles in thermal oxidizers cause condensation corrosion and thermal deterioration of the insulation. Thermal oxidizers emit NOx and CO and small quantities of VOM and HAPS are also emitted. These emissions will partially offset any benefits obtained from VOM reduction. Carbon adsorbers also have drawbacks. Since all of the solvents used in the QC test process are water soluble, the used solvents can not be recovered from the carbon adsorbers without an elaborate distillation system. Given these difficulties, the condensed regeneration fluid is commonly discharged with wastewater to the sewers. Depending on the type of treatment system at the municipal treatment facility, the VOM may not be biodegraded but simply blown into the atmosphere in an equalization basin. In that case, VOM emission reductions at the facility will be offset by higher emissions at the treatment facility. Biofilters must be heated to maintain destruction activity during winter months. Heat for the biofilter can be supplied by the direct combustion of natural gas, indirect steam heat, or electric heaters. Natural gas combustion would increase NOx emissions from the facility. In addition, the large size of these units may limit feasible locations at a facility. Also, the biofilter cannot achieve the 81% control objective by itself and would require an additional control system or the counting of the QC test fluid dilution as a control technology to achieve that objective.

In contrast, diluting the QC test fluid with water has been calculated to reduce annual emissions of VOM below the 25 tons per year (tpy) threshold for applicability of Section 218.986 at a reduced cost from pre-dilution operations. Based on this analysis, conversion to the diluted QC test fluid achieves RACT control for this emission unit and should be approvable as an equivalent alternative control plan in place of the 81% capture and control requirement of Section 218.986.

Table 4-1 Control Cost Comparisons – Naperville RACT Study

Control Options	Controlled acfm	Uncontrolled VOM lb/yr	Uncontrolled VOM TPY	Controlled VOM lb/yr	Controlled VOM TPY	Total Capital Cost, $	Total Capital Cost, $/acfm	Total Annual Cost , $	Cost per Ton of VOM Controlled, $
Projected Emissions with undiluted QC Test Fluid	------	89,840	44.92	0	0	0	0	------	------
QC Test Fluid Diluted with Water	------	89,840	44.92	49,412	24.71	0	0	-17,000	-679
Recuperative Thermal Oxidizer	20,000	89,840	44.92	72,770	36.39	1,752,000	87.60	679,000	17,672
Carbon Adsorber	20,000	89,840	44.92	72,770	36.39	1,170,000	58.50	458,000	12,594
Biofilter & Diluted QC Test Fluid	20,000	89,840	44.92	74,880	37.44	1,800.000	90.00	437,000	11,667

Appendix A

Capital and Annual Costs for Thermal oxidizers with Recuperative Heat Exchangers

Recuperative Incinerator Costs - 20000 acfm

(All costs are in, or have been adjusted to, 12/2009dollars)

COST INDEXES

-- Base Date:	370.3 (September,1988)	[CE Plant Index/Equipment]	[1]
-- Analysis Date:	618.4 (December, 2009)	[CE Plant Index/Equipment]	
-- Escalation Factor:	1.670 (Analysis/Base)	[calculated]	

GAS STREAM and EMISSION PARAMETERS

-- Inlet stream flowrate (acfm):	20,000	Estimated
-- Inlet stream temperature (oF):	70	Greif Permit
-- Standard temperature (oF):	60	[Engineering judgment]
-- Uncontrolled Emissions, lb/yr	89,840	Calculated from emission inventory
-- Controlled emissions: lb/yr (81%)	17069.6	[calculated]

RECUPERATIVE INCINERATOR COSTS

If flow is < 5000 scfm, then use:
Heat Exchanger Efficiency = 70%, a = 5,690, b = 0.408, P = Price, Q = flow rate
Then P($) = aQ^b
NOTE: THIS EQUATION FOR 70% WAS USED FOR ALL FLOWS.

-- Recuperative Incinerator: $ 323,543

TOTAL CAPITAL INVESTMENT

-- Recuperative Incinerator:	$ 323,543	[Estimating Costs of Air Pollution Control--calculated]
-- Fan:	32,354	[Estimating Costs of Air Pollution Control--calculated]
-- Enclosure:	129,417	[Estimating Costs of Air Pollution Control--calculated]
-- Ductwork:	64,709	[Estimating Costs of Air Pollution Control--calculated]
-- Instrumentation:	48,532	[Estimating Costs of Air Pollution Control--calculated]
Subtotal, equipment:	$ 598,555	[calculated]
Purchased Equipment Cost (PEC):	$ 706,295	[calculated]
' " " "--escalated:	$ 1,179,511	[calculated]
Direct installation costs:	$ 294,878	[Estimating Costs of Air Pollution Control--calculated]
Indirect installation costs:	$ 117,951	[Estimating Costs of Air Pollution Control--calculated]
Subtotal, installation:	$ 412,829	[calculated]
Retrofit factor:	1.1	[Engineering judgment]
TOTAL CAPITAL INVESTMENT ($):	**$ 1,751,574**	[calculated]
($/acfm):	**87.6**	[calculated]

ANNUAL COSTS

Inputs:

Operating factor (hr/yr):	2,000	[calculated]
Operating labor rate ($/hr):	28.50	Estimated
Supervising Labor factor	0.15	[EPA Control Cost Manual]
Maintenance labor rate ($/hr):	22.00	Estimated
Maintenance Materials factor	1.00	Estimated
Operating labor factor (hr/sh):	0.50	[EPA Control Cost Manual]
Maintenance labor factor (hr/sh):	0.50	[EPA Control Cost Manual]
Natural Gas Usage,scfh	440.0	Calculated (based on ratio to flow)
Natural Gas Price, $/MMBtu	5.00	Estimated
Electricity usage, kWh:	7.00	Calculated (based on ratio to flow)
Electricity price ($/kWhr):	0.090	Estimated
Annual interest rate (fraction):	0.08	[OMB Guidelines]
Control system life (years):	20	[EPA Control Cost Manual]
Capital recovery factor:	0.1019	[calculated]
Taxes, insurance, admin. factor:	0.04	[EPA Control Cost Manual]
Overhead factor:	0.06	[EPA Control Cost Manual]

Costs:

Item	Cost ($/year)	
Operating labor	14,250	[calculated]
Supervisory labor	2,138	"
Maintenance labor	175,157	"
Maintenance materials	175,157	"
Electricity	1,260	"
Natural Gas	4,576	"
Overhead	22,002	"
Tax,ins.,adm	70,063	"
Cap. recov.	178,402	"
TOTAL ANNUAL COST:	**$ 643,005**	"
Tons of VOC controlled	**36.39**	
Cost per ton of VOC Controlled	**$17,672**	

Appendix B

Capital and Annual Costs for Carbon Adsorbers

Carbon Adsorbers - Naperville, Ohio - 20000 acfm

(All costs are in, or have been adjusted to, 12/2009 dollars)

COST INDEXES

-- Base Date:	370.3 (September,1988)	[CE Plant Index/Equipment]	[1]
-- Analysis Date:	618.4 (December, 2009)	[CE Plant Index/Equipment]	
-- Escalation Factor:	1.670 (Analysis/Base)	[calculated]	

GAS STREAM and EMISSION PARAMETERS

-- Inlet stream flowrate (acfm):	20,000	Estimated
-- Inlet stream temperature (oF):	70	Greif Permit
-- Standard temperature (oF):	60	[Engineering judgment]
-- Uncontrolled Emissions, lb/yr	89,840	Calculated from emission inventory
-- Controlled emissions: lb/yr (81%)	17069.6	[calculated]

CARBON ADSORBER COSTS

If the carbon weight is between 350 and 14,000 pounds then use:
Then $P(\$) = 32.8\ (W_c)^{0.860}$

The carbon volume at Naperville is 400 ft^3
If the carbon density is 28.8 pounds per cubic foot; then the weight of the carbon is
400*28.8= 11520 pounds

where P($) is the equipment price and W_c is the weight of the carbon.

-- Carbon Adsorber in stainless steel: $ 204,058

TOTAL CAPITAL INVESTMENT

-- Carbon Adsorber:	$ 204,058	[Estimating Costs of Air Pollution Control--calculated]
-- Fan:	20,406	[Estimating Costs of Air Pollution Control--calculated]
-- Enclosure:	81,623	[Estimating Costs of Air Pollution Control--calculated]
-- Ductwork:	40,812	[Estimating Costs of Air Pollution Control--calculated]
-- Instrumentation:	30,609	[Estimating Costs of Air Pollution Control--calculated]
Subtotal, equipment:	$ 377,507	[calculated]
Purchased Equipment Cost (PEC):	$ 471,883	[calculated]
" " " "--escalated:	$ 788,044	[calculated]
Direct installation costs:	$ 197,011	[Estimating Costs of Air Pollution Control--calculated]
Indirect installation costs:	$ 78,804	[Estimating Costs of Air Pollution Control--calculated]
Subtotal, installation:	$ 275,815	[calculated]
Retrofit factor:	1.1	[Engineering judgment]

TOTAL CAPITAL INVESTMENT ($):	**$1,170,245**	[calculated]
($/acfm):	**58.5**	[calculated]

ANNUAL COSTS

Inputs:

Operating factor (hr/yr):	2,000	[calculated]	
Operating labor rate ($/hr):	28.50		
Supervising Labor factor	0.15	[EPA Control Cost Manual]	
Maintenance labor rate ($/hr):	22.00	Estimated	
Maintenance Materials factor	1.00	Estimated	
Operating labor factor (hr/sh):	0.50	[EPA Control Cost Manual]	
Maintenance labor factor (hr/sh):	0.50	[EPA Control Cost Manual]	
Steam Usage,pounds per hour	2000.0	Calculated	(based on ratio to flow)
Steam Price, $/1000 pounds	12.00	Estimated	
Electricity usage, kWh:	17.30	Calculated	(based on ratio to flow)
Electricity price ($/kWhr):	0.080	Estimated	
Annual interest rate (fraction):	0.06	[OMB Guidelines]	
Control system life (years):	20	[EPA Control Cost Manual]	
Capital recovery factor:	0.1019	[calculated]	
Taxes, insurance, admin. factor:	0.04	[EPA Control Cost Manual]	
Overhead factor:	0.06	[EPA Control Cost Manual]	

Costs:

Item	Cost ($/year)	
Operating labor	14,250	[calculated]
Supervisory labor	2,138	"
Maintenance labor	117,025	"
Maintenance materials	117,025	"
Electricity	2,768	"
Steam	24,000	"
Overhead	15,026	"
Tax,ins.,adm	46,810	"
Cap. recov.	119,192	"
TOTAL ANNUAL COST:	**$ 458,233**	"
Tons of VOC controlled	**36.39**	
Cost per ton of VOC Controlled	**$12,594**	

Charles, Susan

From: BOA, EPA.FOIA [EPA.FOIA.BOA@Illinois.gov]
Sent: Wednesday, September 08, 2010 4:10 PM
To: Charles, Susan
Subject: RE: FOIA Request - Susan Charles 9/3/2010 3:11:35 PM

Dear Ms. Charles,

Here are the annual facility-reported VOM emissions in tons per year for the Chicago area as requested.

2004	2005	2006	2007	2008	2009
17,005	16,622	15,928	15,691	14,119	11,884

Sincerely,
FOIA Unit
Bureau of Air
Illinois Environmental Protection Agency

-----Original Message-----
From: Susan Charles [mailto:Susan.Charles@icemiller.com]
Sent: Friday, September 03, 2010 3:12 PM
To: BOA, EPA.FOIA
Subject: FOIA Request - Susan Charles 9/3/2010 3:11:35 PM

Following information submitted for FOIA request: 9/3/2010-3942225
Request for information was routed to:
Bureau of Air - Unit - 217/524-5683 - 217/524-5023(FAX)

From: Ms. Susan Charles
Organization: Ice Miller LLP
Organization Type: Legal Consultant
Location: 200 W. Madison Street
Chicago, IL. 60606
Cook
Phone: (312) 726-7146
Fax: (312) 726-7102
Susan.Charles@icemiller.com

Subject Matter: Metropolitan Chicago Interstate Air Quality Contro

Specific information requested from: Bureau of Air - Unit - 217/524-5683 - 217/524-5023(FAX)

Date From: 2004 To: 2009
Most Recent: Yes
Other Information: Please provide annual emissions data (in aggregate tons per year) of Volatile Organic Material ("VOM") from point sources in the Metropolitan Chicago Interstate Air Quality Control Region. Please provide data for calendar years 2004 - 2008 and, to the extent available, 2009.

Fee Waiver/Reduction Justification: Not Applicable

--end of request--

Exhibit B