VERMONT AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Air Quality & Climate Division

TECHNICAL SUPPORT DOCUMENT

FOR

PERMIT TO CONSTRUCT AND OPERATE

#AOP-14-029

Permit Date: August 8, 2017

Omya, Inc. Florence, VT

Prepared By: Steven K. Snook
Air Quality & Climate Division

This Technical Support Document details the Agency of Natural Resources, Department of Environmental Conservation, Air Quality & Climate Division review for the Air Pollution Control Permit to Construct and Operate and is intended to provide additional technical information, discussion and clarification in support of the Permit. It is not intended to provide a comprehensive review of the Facility or permit process or duplicate the information contained in the Permit.

Facility:
Omya, Inc.
Mineral Processing
Whipple Hollow road
Florence, VT 05744

Facility / Applicant Contact Person:
Dennis Carroll
Omya, Inc.
206 Omya West
Florence, VT 05744
dennis.carroll@omya.com
Mobile: 802-558-0533

1.0 INTRODUCTION

Omya, Inc. (hereinafter "Permittee") owns and operates the East Plant, Verpol Plant, and Cogeneration Plant which are involved in the production of finely ground calcium carbonate materials (also referred to herein as "Facility") in Florence, Vermont.

Administrative Milestones:

Table 1-1: Administrative Summary

Administrative Item	Result or Date
Date Application Received:	8/7/2014
Date Administratively Complete:	8/7/2014
Date Draft Decision:	4/27/2017
Date & Location Draft Decision/Comment Period Noticed:	4/27/2017 *The Rutland Herald* & VTDEC Environmental Notice Bulletin
Date & Location Public Meeting Noticed:	No meeting requested
Date & Location of Public Meeting:	NA
Deadline for Public Comments:	5/30/2017
Proposed Permit Sent to U.S. EPA Region 1	6/7/2017
Date Final Decision:	8/8/2017
Classification of Source Under §5-401:	§5-401(3) - Electrical power generation facilities; §5-401(5) - Mineral product industries, including mining, quarrying and crushing operations; §5-401(6)(a) - Fossil fuel burning equipment with a rated heat input of 10 MMBTU/hr or greater; §5-401(12) - Operations involving the handling or transferring of sand or dust producing materials.
Classification of Application:	Title V Subject Source
New Source Review Designation of Source:	Major Stationary Source
Facility SIC Code & Description:	1422 / Crushed and Broken Limestone
NAICS Code & Description:	212312 Crushed and Broken Limestone Mining and Quarrying

The allowable emissions for the Facility are summarized below:

Table 1-2: Estimated Air Contaminant Emissions (tons/year)[1]						
$PM/PM_{10}/PM_{2.5}$	CO	**NO_x**	**SO_2**	**VOCs**	**HAPs[2]**	***CO_2e [3]***
111	123	156	1.0	38	<10/25	133,600

[1] $PM/PM_{10}/PM_{2.5}$ - particulate matter and particulate matter of 10 micrometers in size or smaller, and particulate matter of 2.5 micrometers in size or smaller. Unless otherwise specified, all PM is assumed to be $PM_{2.5}$; SO_2 - sulfur dioxide; NO_x - oxides of nitrogen measured as NO_2 equivalent; CO - carbon monoxide; VOCs - volatile organic compounds; HAPs - hazardous air pollutants as defined in §112 of the federal Clean Air Act.

[2] Emissions of individual HAPs each < 10 tpy and emissions of total HAPs combined <25 tpy.

[3] CO_2e 'at the stack' – includes emissions from biogenic sources. See section 3.3 for details. This is not a facility limit.

2.0 FACILITY DESCRIPTION AND LOCATION

2.1 Facility Locations and Surrounding Area

The Facility is located approximately 65 kilometers (km) north of the Lye Brook Wilderness Area, 9.4 km southwest of Mount Nickwaket (the nearest designated Vermont sensitive area) and 170 km southwest of the Great Gulf and Dry River Wilderness areas.

2.2 Facility Description

The East Plant and Verpol Plant are involved in the production of finely ground calcium carbonate materials. Various non-metallic mineral processing operations are employed in the production of the ground calcium carbonate materials. The processing of calcium carbonate materials at OMYA's facilities is classified as a source of air contaminants under §§5-401(5) [mineral product crushing operations] and (12) [operations involving the handling or transferring of sand or dust producing materials] of the *Regulations*. The Spray Dryers and Flash Dryers are classified as sources of air contaminants under §5-401(6)(a) [fossil fuel burning equipment] of the *Regulations*. Additionally, located adjacent to the Verpol Plant is the Cogeneration Plant also owned by Omya, Inc. (formerly known as Vermont Marble Power Division). The Cogeneration Plant consists of two combustion turbines utilized for the generation of electrical power. Exhaust heat from the combustion turbines is used in the production of dried calcium carbonate materials at the Verpol Plant. The Cogeneration Plant is classified as a source of air contaminants under §5-401(3) [electrical power generation facilities] of the *Regulations*.

The Cogeneration Plant, Verpol Plant (also known as West Plant) and the East Plant are classified as one single stationary source of air contaminants within the definition of stationary source (see §5-101 of the *Regulations*), since the facilities are under common control and located on contiguous property. This stationary source currently operates within the confines of an existing Air Pollution Control Permit to Construct and Operate #AOP-98-015a issued on October 26, 1999 and Air Pollution Control Permit to Construct #AP-13-010 issued on May 24, 2013.

The regulated sources of air contaminant emissions at the Facility are listed in Permit AOP-14-029, Findings of Fact, Section A – Facility Description.

Table 2-1: Verpol Plant: Existing Air Pollution Control Equipment	
Spray Dryer #1 ESP Flakt Corporation Model: 76557.03	Rated gas volume: 42,000 ACFM (continuous) 50,000 ACFM (peak) 99.7% efficiency. Plate collection area: 20,255 ft^2
Spray Dryer #2 Precollector Cyclones (2) - Chovet: ESP – Flakt, Inc Model FAA 2x37.5H-63-90	Diameter: 7 feet Pressure Drop: 6 inches W.C. minimum Plate collection area: 30,519 ft^2 Design: wire electrode, plate collector Rated gas volume: 32,000 ACFM (continuous), 33,000 ACFM (peak). 99.997% efficiency
Flash Dryer #1 Fabric filter: Flex-Kleen Model 120-WXWC-464III	Number of filter bags: 460 Minimum total cloth area: 7,099 ft^2
Flash Dryer #2 Fabric filter: Flex-Kleen Model 120-WXWC-464III	Number of filter bags: 460 Minimum total cloth area: 7099 ft^2
Flash Dryer #3 Fabric filter: Flex-Kleen Model 120-WXWC-464III	Number of filter bags: 460 Minimum total cloth area: 7099 ft^2
Flash Dryers #1, #2, and #3 Product Conveying	Rated gas volume: 2,700 DSCFM each See the bin vent on the silos
Surface Treaters A Fabric filter: Flex-Kleen 100-WMW-720III	Number of filter bags: 720 Minimum total cloth area: 9,072 ft^2
Surface Treaters C Fabric filter: Flex-Kleen 100-WMW-720III	Number of filter bags: 720 Minimum total cloth area: 9,072 ft^2
Surface Treater B Fabric filters: Genevet North: Model Luhr MVF2.5/7.5/2/1351 – Series L7043 South: Model Luhr MVF2.5/7.5/2/1351 3 – Series L704	Number of filter bags: 1365 Minimum total cloth area: 10,388 ft^2 Number of filter bags: 1365 Minimum total cloth area: 10,388 ft^2
Surface Treaters A, B, & C Product Conveying	Rated gas volume: 1,200 DSCFM each See the bin vent on the silos
Deagglomerator C Fabric filter: Luhr Model MVF 2.5/7.5/2/1351 reverse air fabric filter collector	Number of filter bags: 1351 Minimum total cloth area: 11,030 ft^2
Deagglomerator C Product Conveying Fabric filter: Flex-Kleen Model: 84-WRBS-96	Rated gas volume: 3,000 DSCFM See the bin vent on the silos
Bulk Bag transfer hopper	Number of filter bags: 1350 Minimum total cloth area: 11,000 ft^2
Treated bulk bag dust collector (W & X)	Number of filter bags: 64 Minimum total cloth area: 3000 ft^2
Untreated bulk bag dust collector (U & Z)	Number of filter bags: 64 Minimum total cloth area: 3000 ft^2
Verpol Silos 1 & 3 Fabric filter: Flex-Kleen Model: 84-WRBS-96 II G	Number of filter bags: 96 each Minimum total cloth area: 905 ft^2 each With pleated bags area: 1,810 ft^2 each
Verpol Silos 4 & 5 Fabric filter: Flex-Kleen Model: 84-WRBS-48 II G	Number of filter bags: 48 each Minimum total cloth area: 905 ft^2 each
Verpol Silos 2 & 7 Fabric filter: Flex-Kleen Model 84 WRC 80 II G	Number of filter bags: 80 each Minimum total cloth area: 1508 ft^2
Verpol Silos 6, & 8 - 16 Fabric filter: Flex-Kleen Model 84-WRBS II G	Number of filter bags: 96 each Minimum total cloth area: 1,810 ft^2 each

Table 2-2: East Plant: Existing Air Pollution Control Equipment	
Flash Dryer #4 (surface treater) Fabric filter	Number of filter bags: 200 Minimum total cloth area: 3680 ft^2
Flash Dryer #4 recycle collector Fabric filter	Number of filter bags: 54 Minimum total cloth area: 993.6 ft^2
Flash Dryer #5 Fabric filter	Number of filter bags: 240 Minimum total cloth area: 9432 ft^2
Silos 103, 106, 110, 120 Fabric filters	Number of filter bags: 54 Minimum total cloth area: 993.6 ft^2 each
Bin 111 and 112 Fabric filters	Number of filter bags: 54 Minimum total cloth area: 993.6 ft^2 each
Bin 114	Number of filter bags: 36 Minimum total cloth area: 662.4 ft^2
Manual packaging fugitive dust collector and bin 113 Fabric filter	Number of filter bags: 61 Minimum total cloth area: 1122.4 ft^2
Automatic packaging fugitive dust collector Fabric filter	Number of filter bags: 54 Minimum total cloth area: 993.6 ft^2
40 Mesh Unloading Fabric filter	Number of filter bags: 24 Minimum total cloth area: 115.4 ft^2

2.3 Description of Compliance Monitoring Devices

The Permittee has installed and uses continuous measurement devices (a.k.a. broken bag detectors) designed to monitor the relative loading of particulate matter in the exhaust from several of the baghouses. These measurement systems were designed to provide the Permittee with information concerning the degradation of particulate matter control in the collectors over time, and thus assist the operator in scheduling preventative maintenance repairs to the control system. These monitors also detect a catastrophic failure of one or more bags requiring immediate attention of the operator. The following is a list of bag houses at the Facility that have broken bag detectors:

Table 2-3: Broken Bag Sensors Installed on Fabric Filters	
Bag House	**Broken bag detector**
Surface Treater A	Auburn Triboguard II Model 4002
Surface Treater B	Auburn Triboguard II Model 4002
Surface Treater C	Auburn Triboguard II Model 4002
Deagglomerator C	Auburn Triboguard II Model 4002
Product Silos (1 – 16)	Tribo U3800 (on each silo fabric filter)
Treated bulk bag dust collector	Armac

Table 2-3: Broken Bag Sensors Installed on Fabric Filters	
Bag House	**Broken bag detector**
Untreated bulk bag dust collector	Armac
Flash Dryer #1	Auburn Triboguard II Model 4002
Flash Dryer #2	Auburn Triboguard II Model 4002
Flash Dryer #3	Auburn Triboguard II Model 4002

Additionally, the combustion turbines present at the Cogeneration Plant are equipped with devices to monitor the water injection rates and fuel flow into the turbines in order to monitor the water to fuel ratio used as a means of reducing NO_x emissions.

2.4 Recent Modifications to Facility

The Permittee has received permission from the Agency to make the following minor changes to the Facility. See Section 3.4 for a review of these modifications along with past modifications that show the aggregated emissions do not represent a major modification.

2.4.1 LNG Containment Snow Melt Containment:
In the operating permit renewal application received on August 7, 2014, the Permittee proposed installing a 0.9 MMBtu/hr natural gas fired boiler for providing heat for melting snow and ice from a concrete containment at the LNG facility. The snow melt system is to be used intermittently as necessary to maintain the concrete containment area at the LNG system. The Agency considers the snow melt system to be a routine maintenance activity and as such it does not represent a modification of the Facility. This system was acknowledged in a letter dated September 26, 2014. A 1.0 MMBtu/hr boiler was installed in March 2015

2.4.2 Silo Penthouse/Dust Collector Project:
In the operating permit renewal application receive on August 7, 2014, the Permittee proposed the following changes to the product silos. The silo products are pneumatically blown into the silos (16 silos in total). Each of these silos has a dedicated bag house dust collector used to (a) remove the air from the silo during filling; and (b) capture the dust that is created during filling. Previously the exhaust air from the silos vented through the dust collector and into the penthouse when the silos are being filled. This created very hot working conditions in the penthouse. The new duct work directly discharges the exhaust from the bag houses to the ambient air. A TRIBO U3800 advanced all-digital, self-checking particulate monitoring sensor is now used in each silo exhaust duct after the bag house. For each silo, a diverter valve has been installed downstream of the bag house: in the event of a bag failure (as indicated by the Tribo U3800), the diverter valve will direct the discharge into the penthouse and signal an alarm in the control room. This project was completed during January

2015. The potential PM emissions from the silos are based on the 7 different product conveying systems that can (simultaneously) transfer product to the silos.

2.4.3 Bulk Bag Dust Collector Upgrade Project:
In the operating permit renewal application received on August 7, 2014, and again on May 11, 2015, the Permittee proposed the following modification. Previously the treated bulk bag dust collector from Bulk Bags W & X vented through the roof, while the untreated bulk bag dust collector vented back into the building. This project installed an independent vent through the roof for the untreated bulk bag dust collector. Additionally, an automated dust detector (instrumentation by Armac) was installed in the duct for each of the dust collectors upstream of the new diverter valves. When a broken bag is detected, the dust detector controls divert the exhaust from the roof vent and the dust is directed inside the plant and an alarm will be activated so that the operators will know to shut down the dust collector for repairs. Also, during the winter months (from October to April) the diverter valves will stay closed to retain hot air inside the plant, but still alarm for repairs if dust is detected. The control of the dust collector fans will be upgraded to optimize the fan speed and reduce electricity usage. If the untreated bulk bag dust collector were to operate 8760 hours/yr and discharge outside, the estimated emissions of PM are 0.9 ton/yr. This process change was considered a minor change was approved via a letter dated May 11, 2015. This project was completed August 2015.

2.5 Identification of Sources with Insignificant or Negligible Emissions

Although not required for determining applicability with Subchapter X, quantifiable emissions from “insignificant activities” must be included for the purposes of establishing whether or not a source is subject to other air pollution control requirements, including, but not limited to: reasonably available control technology, major source status, and Title V operating permit applicability.

Additionally, guidance provided by the U.S. EPA (entitled “White Paper for Streamlined Development of Part 70 Permit Applications”) lists activities which are considered as “trivial” sources of air contaminants, and may be presumptively omitted from operating permit applications.

Table 2-3 lists activities at the Facility which were considered negligible or exempt sources of air contaminant emissions, and therefore were not considered as emission sources as part of the Operating/Construction Permit review.

Table 2-3: Negligible Sources of Contaminant Emissions	
Fuel storage tanks:	Two (2) No.2 fuel oil storage tanks with the following capacities: 270,000 gallons 500,000 gallons
Fuel burning equipment	0.35 MMBtu/hr distillate oil space heater in an out-building at the Verpol plant.

It should be noted that a process or piece of equipment which is considered a "negligible activity" does not relieve the owner or operator from the responsibility of complying with any applicable requirements associated with said process or equipment.

2.6 Proposed Limitations

In the permit application for AP-13-010 the Permittee proposed to reduce the fuel oil sulfur content from 0.30% to 0.0015% (15 ppm). A fuel oil limit of 0.0015% sulfur by weight is being included in this operating permit.

3.0 QUANTIFICATION OF POLLUTANTS

The quantification of emissions from a stationary source is necessary in order to establish the regulatory review process necessary for the operating permit application and to determine applicability with various air pollution control requirements. These determinations are normally based upon allowable emissions. Allowable emission is defined as the emission rate calculated using the maximum rated capacity of the source and, if applicable, either: (a) the applicable emission standard contained in the *Regulations*, if any, or (b) the emission rate or design, operational or equipment standard specified in any order or agreement issued under the *Regulations* that is state and federally enforceable. An applicant may impose in its application an emission rate or design, or an operational or equipment limitation which may be incorporated in the Permit to restrict operation to a lower level. Such limitations may include fuel restrictions or production limits.

Table 3-1 Summary of Existing Allowable Emissions Based on the Previous Operating Permit [1]

Facility	Air Contaminant Emissions, tons/year					
	PM/PM_{10}	CO	NO_x	SO_2	VOCs	HAPs
East Plant	23	2	6	5	<1	<1
Verpol Plant	80	11	44	30	<1	<1
Cogeneration Plant	26	92	104	143	11	<1
Total	129	105	154	178	12	<1

[1] Based on future allowable emissions contained in Air Pollution Control Permit #AOP-98-015a. Assumes the Cogeneration Plant is operating at Full Load and supplying heat for Spray Dryers #1 & #2 (limited supplemental fuel firing for spray dryers).

3.1 Estimating Potential Emission of Criteria Pollutants from the Existing Stationary Source

The previous operating permit (AOP-98-015a) included allowable emissions for equipment that was never installed. The permit to construct authority for those pieces of equipment has expired, so those allowable emissions no longer apply to this facility. The equipment not installed included: (1) new steel silos, (2) bulk bagging stations and silos, (3) house vacuum system, (4) new product transfer conveyor, and (5) rotopackers.

Additionally, the Agency issued a permit to construct (AP-13-010) for the addition of natural gas as an allowable fuel for the Facility. This permit to construct increased the allowable carbon monoxide emissions for the fuel combustion sources at the Facility.

Throughout this document there are discussions of the limits, emission factors and calculated emissions of particulate matter. At times the particulate matter in question may be 'filterable' or 'condensable' or smaller than certain particle sizes. The following are the definitions in the Vermont regulations, established EPA test methods, and assumptions made by the Agency regarding the differences (or lack thereof) between PM, PM10, PM2.5 and FPM with regards to this permitting action.

As defined in Vermont Air Pollution Control Regulations, Subchapter I Definitions:

"Particulate Matter" ("PM") means any airborne finely divided solid or liquid material with an aerodynamic diameter smaller than one-hundred (100) micrometers.

"Particulate Matter Emissions" means all finely divided solid or liquid material, other than uncombined water, emitted to the ambient air as measured by applicable reference methods, or an equivalent or alternative method, specified in 40 C.F.R. Chapter 1. Emissions shall include gaseous emissions from a source or activity which condense to form particulate matter at ambient temperatures.

"PM10" means particulate matter with an aerodynamic diameter less than or equal to a nominal ten (10) micrometers as measured by a reference method based on appendix J of 40 C.F.R. Part 50 and designated in accordance with 40 C.F.R. Part 53, or by an equivalent method designated in accordance with 40 C.F.R. Part 53.

"PM10 Emissions" means finely divided solid or liquid material, with an aerodynamic diameter less than or equal to a nominal ten (10) micrometers emitted to the ambient air as measured by an applicable reference method, or an equivalent or alternative method, specified in 40 C.F.R. Chapter 1. Emissions shall include gaseous emissions from a source or activity which condense to form particulate matter at ambient temperatures.

"PM2.5" means particulate matter with an aerodynamic diameter less than or equal to a nominal two-and-a-half (2.5) micrometers as measured by a reference method based on Appendix L of 40 C.F.R. Part 50 and designated in accordance with 40 C.F.R. Part 53, or by an equivalent method designated in accordance with 40 C.F.R. Part 53.

"PM2.5 direct emissions" means finely divided solid or liquid material, with an aerodynamic diameter less than or equal to a nominal two-and-a-half (2.5) micrometers emitted to the ambient air as measured by an applicable reference method, or an equivalent or alternative method, specified in 40 C.F.R. Chapter 1. Emissions shall include gaseous emissions from a source or activity which condense to form particulate matter at ambient temperatures. It does not include emissions of other gaseous precursors which may subsequently contribute to formation of secondary PM2.5 particles through chemical reactions.

For this permitting action, all PM emitted from this facility is assumed to be smaller than 2.5 micrometers in diameter. Because 'PM2.5' is a subset of 'PM10', which is a subset of 'PM': the mass of 'PM' = the mass of 'PM10' = the mass of 'PM2.5.' In most of the emission tables in the Technical Support Document, it is sufficient to use the term 'PM'

Filterable PM ('FPM') is measured by 40 CFR Part 60, Appendix A, Reference Method 5.

Condensable PM ('CPM') is measured by 40 CFR Part 51, Appendix M, Reference Method 202.

PM (sometimes referred to as 'Total PM') is the sum of FPM and CPM.

For process that have a cyclone, baghouse or electrostatic precipitator as a PM control device, the PM limit is based on FPM.

Section 3.1 shows the calculations for establishing the allowable emissions

East Plant: The East Plant is limited to 84,000 MMBtu/year of fuel energy. This is equivalent to 600,000 gallons of No. 2 fuel oil (0.14 MMBtu/gal) or 82.35 mmcf of natural gas (1020 btu/cf). For calculating estimated emissions, this fuel has been distributed to Boiler #1 (21%) and Flash Dryer #5 (79%). Note that the estimated PM emissions from Flash Dryer #5 is based on 0.02 gr/dscf and an exhaust flow of 8,310 dscfm.

Table 3-2: East Plant Boiler #1 – Estimated Emissions

No.2 Fuel Oil: 126,000 gallons @ 0.0015%S (equivalent to 17,640 MMBtu/yr)

	Emission Factor			Emissions
	Factor	Units [2]	Source	tons / year
PM	3.3	lbs / 1000 gal	AP-42, Fuel Oil Combustion, Tables 1.3-1 and 1.3-2 (5/10)	**0.21**
CO	5		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	0.32
NO_x	20		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**1.26**
SO_2	142S [1]		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**0.01**
VOC	0.34		AP-42, Fuel Oil Combustion, Table 1.3-3 (5/10)	0.02
HAPs	0.0622		AP-42, Fuel Oil Combustion, Tables 1.3-8 to 1.3-10 (5/10)	0.004

Natural Gas: 17.3 MMCF

	Emission Factor			Emissions
	Factor	Units [3]	Source	tons / year
PM	7.6	lbs / MMCF	AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	0.07
CO	84		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	**0.7**
NO_x	100		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	0.9
SO_2	0.6		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	0.005
VOC	5.5		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	**0.05**
HAPs	1.89		AP-42, Natural Gas Combustion, Tables 1.4-3 & 1.4-4 (7/98)	**0.016**

[1] S represents the weight % of sulfur in the oil. For example, if the fuel is 1.5% sulfur, then S=1.5
[2] lb/1000 gal: pounds of pollutant emitted per 1000 gallons of fuel input to the boiler.
[3] lb/MMCF: pounds of pollutant per million cubic feet of natural gas combusted.

Table 3-3: Flash Dryer #5 Fuel Combustion Estimated Emissions				
No.2 Fuel Oil: 474,000 gallons No.2 fuel oil 0.0015%S (equivalent to 66,360 MMBtu/yr)				
	Emission Factor			Emissions
	Factor	Units	Source	tons / year
FPM	-	lbs / 1000 gal	PM emission limit of 0.02 gr/dscf and flow rate 8,310 dscfm	**6.2**
CO	5		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	1.2
NO_x	20		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**4.74**
SO_2	142S		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**0.01**
VOC	-		Data from Stack Testing June 2006	0.39
HAPs	-		Use Facility-wide process emission testing during 2006	-
Natural Gas: 65.1 MMCF				
	Emission Factor			Emissions
	Factor	Units	Source	tons / year
FPM	-	lbs / MMCF	PM emission limit of 0.02 gr/dscf and flow rate 8,310 dscfm	**6.2**
CO	84		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	**2.73**
NO_x	100		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	3.25
SO_2	0.6		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	0.004
VOC	-		Defer to fuel oil data from Stack Testing June 2006	**-**
HAPs	-		Use Facility-wide process emission testing during 2006	**-**

Table 3-4: East Plant Allowable Filterable Particulate Matter Emissions by Mineral Processing Production & Storage Units				
Equipment/Source	***Emission Factor (gr/dscf)***	***Source of Emission Factor [1]***	***Maximum Flow Rate (dscfm)***	***Emission Rate (ton/yr)[2]***
Silo 110 (Silo #1)	0.02	AP-89-049	1700	1.28 [3] 1.28 1.28
Silo 120 (Silo #2)	0.02		1700	
Silo 106 (Silo #3)	0.02		1700	
Silo 103 (Silo #4)	0.02		1700	
Bin 113 (Bin A)	0.02		1700	
Bin 112 (Bin C)	0.01		1700	
Bin 111 (Bin D)	0.01		1700	
Bin 114 (Bin C&D receiver)	0.01		800	
Man. Packaging dust relief	0.02		1400	1.05
Auto. Packaging dust relief	0.02		2700	2.03
40 Mesh Unloading	0.02		900	0.68
FD #4 (surface treater, formerly FD#1)	0.02		9,000	6.76
FD #4 recycle collector (formerly FD#1 recycle)	0.02		2,900	2.18
East Plant total	-	-	-	**16.5**

[1] The air dispersion modeling included with the permit application for the installation of Surface Treater B used 0.02 gr/dscf to characterize the emission rate from the above noted processes.
[2] Annual emission rate based on 8760 hours of operation.
[3] Only 3 of these 8 silos operate at any one time, so the PM emissions are only calculated for three units.

Verpol Plant: The Verpol Plant is limited to 770,000 MMBtu/year of fuel energy for the dryers and boilers. This is equivalent to 550,000 gallons of No. 2 fuel oil (0.14 MMBtu/gal) or 755 mmcf of natural gas (1020 btu/cf). The maximum potential emissions from the Facility would occur when the combustion turbines are operating and SD#1 & SD#2 are being heated by the combustion turbines' exhaust combined with supplemental fuel (distillate oil or natural gas) at the spray dryers. Spray Dryer #1 is limited to 8.68 MMBtu/hr of supplemental fuel and Spray Dryers #2 is limited to 23.7 MMBtu/hr of supplemental fuel.

Following the approach used in permit AOP-98-015a, the estimated emissions are based on the following annual fuel usage:

1. Boilers: 95,200 MMBtu (680,000 gallons distillate oil or 93.3 MMCF natural gas)
2. Spray Dryer#1: 68,433 MMBtu (488,808 gallons distillate oil or 76.1 MMCF natural gas). This value is derived from 62 gallons/hr of distillate fuel and a 90% utilization factor.
3. Spray Dryer #2: 186,535 MMBtu (1,332,396 gallons distillate oil or 182.9 MMCF natural gas). This value is derived from 169 gallons/hr of distillate fuel and a 90% utilization factor.
4. Flash Dryers #1, #2, and #3: 266,000 MMBtu (1,900,000 gallons distillate oil or 260.8 MMCF natural gas)

Note that the estimated PM emissions from the spray dryers and flash dryers are based on the PM permit limit of 0.01 gr/dscf and their respective exhaust flow rates.

Table 3-5: Verpol Plant Boilers #1 & #2 – Estimated Emissions

No.2 Fuel Oil: 680,000 gallons @ 0.0015%S (equivalent to 95,200 MMBtu/yr)

	Emission Factor			Emissions
	Factor	Units	Source	tons / year
PM	3.3	lbs / 1000 gal	AP-42, Fuel Oil Combustion, Tables 1.3-1 and 1.3-2 (5/10)	**1.1**
CO	5		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	1.7
NO_x	20		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**6.8**
SO_2	142S		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**0.07**
VOC	0.34		AP-42, Fuel Oil Combustion, Table 1.3-3 (5/10)	0.12
HAPs	0.062		AP-42, Fuel Oil Combustion, Tables 1.3-8 to 1.3-10 (5/10)	0.02

Natural Gas: 93.3 MMCF

	Emission Factor			Emissions
	Factor	Units	Source	tons / year
PM	7.6	lbs / MMCF	AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	0.35
CO	84		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	**3.9**
NO_x	100		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	4.7
SO_2	0.6		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	0.03
VOC	5.5		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	**0.26**
HAPs	1.89		AP-42, Natural Gas Combustion, Tables 1.4-3 & 1.4-4 (7/98)	**0.09**

Table 3-6: Spray Dryers #1 & #2 Estimated Emissions				
No.2 Fuel Oil: 1,821,204 gallons No.2 fuel oil 0.0015%S (equivalent to 254,969 MMBtu)				
	Emission Factor			Emissions
	Factor	Units	Source	tons / year
FPM	-	lbs / 1000 gal	PM emission limit of 1.7 lb/hr for SD#1 & 2.31 lb/hr for SD#2	**17.6**
CO	5		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	4.6
NO_x	20		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**18.2**
SO_2	142S		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**0.04**
VOC	-		Stack Testing August, 2006	**3.0**
HAPs	-		Use Facility-wide process emission testing during 2006	-
Natural Gas: 250 MMCF				
	Emission Factor			Emissions
	Factor	Units	Source	tons / year
FPM	-	lbs / MMCF	PM emission limit of 1.7 lb/hr for SD#1 & 2.31 lb/hr for SD#2	**17.6**
CO	84		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	**10.5**
NO_x	100		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	12.5
SO_2	0.6		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	0.01
VOC	-		Refer to fuel oil emission data	**-**
HAPs	-		Use Facility-wide process emission testing during 2006	**-**

Table 3-7: Flash Dryers #1, #2, & #3 Estimated Emissions				
No.2 Fuel Oil: 1,900,000 gallons No.2 fuel oil 0.0015%S (equivalent to 266,000 MMBtu)				
	Emission Factor			Emissions
	Factor	Units	Source	tons / year
FPM	-	lbs / 1000 gal	PM emission limit of 0.01 gr/dscf and flow rate 30,000 dscfm (total flow for three flash dryers)	**11.3**
CO	5		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	4.8
NO_x	20		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**19.0**
SO_2	142S		AP-42, Fuel Oil Combustion, Table 1.3-1 (5/10)	**0.04**
VOC			Stack Testing August, 2006	7.4
HAPs	-		Use Facility-wide process emission testing during 2006	-
Natural Gas: 260.8 MMCF				
	Emission Factor			Emissions
	Factor	Units	Source	tons / year
FPM	-	lbs / MMCF	PM emission limit of 0.01 gr/dscf and flow rate 30,000 dscfm (total flow for three flash dryers	**11.3**
CO	84		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	**11.0**
NO_x	100		AP-42, Natural Gas Combustion, Table 1.4-1 (7/98)	13.0
SO_2	0.6		AP-42, Natural Gas Combustion, Table 1.4-2 (7/98)	0.02
VOC	5.5		Refer to fuel oil emission data	**-**
HAPs	-		Use Facility-wide process emission testing during 2006	**-**

Table 3-8: Verpol Plant Allowable Filterable Particulate Matter Emissions by Mineral Processing Production & Storage Units				
Equipment/Source	***Emission Factor (gr/dscf)***	***Source of Emission Factor***	***Maximum Flow Rate (dscfm)***	***Emission Rate (ton/yr)[1]***
FD#1 product conveying	0.01	AP-89-049D	2700	1.0
FD#2 product conveying	0.01	AP-89-049D	2700	1.0
FD#3 product conveying	0.01	AOP-98-015	2700	1.0
Surface Treater A	0.01	AP-89-049	10000	3.8
Surface Treater B	0.01		24400	9.2
Surface Treater C	0.01		10000	3.8
Deagglomerator C	0.01		16200	6.1
Surface Treater A Product conveying	0.01		1200	0.5
Surface Treater B Product conveying	0.01		1200	0.5
Surface Treater C Product conveying	0.01		1200	0.5
Deagglomerator C Product conveying	0.01		3000	1.1
Bulk Bag transfer hopper	0.01		3300	1.2
Treated bulk bag dust collector	0.01		2300	0.9
Untreated bulk bag dust collector	0.01		2300	0.9
Verpol Plant Total	-	-	-	**31.5**

[1]Annual emission rate based on 8760 hours of operation.

Cogeneration Plant:

Table 3-9: Cogeneration Plant Combustion Turbines – Allowable Emissions				
Pollutant	**Emission Factor**			**Allowable Emissions, tons/yr**
	Factor [1]	**Units**	**Source**	
PM	3	lb/hr/turbine	Permit Application for AP-89-049	26.3
CO	10.5			92
NO_X	11.8			103
SO_2	0.213 [2]	LB/1000 gallons No.2 fuel oil	Permit Application for AP-13-010	0.7
VOC	1.3 [3]	lb/hr/turbine	Permit Application for AP-89-049	11.4

[1] Emission rates for PM, NO_X, CO and VOC are based on the permit limit for fuel oil for the combustion turbines at this Facility.
[2] SO_2 emission rate is based on 15 ppm sulfur content by weight for fuel oil.
[3] The VOC emission limit is based on a vendor guarantee.

Table 3-10: Cogeneration Plant 3 Diesel Generators – Allowable Emissions				
Emission estimate based on 100 hours/yr for each generator.	Emission Factor			Allowable Emissions, tons/yr
	Factor [1]	Units	Source	
PM	0.13	lb/hr	Permit Application for AP-89-015	0.02
CO	1.3			0.20
NO_X	3.6			0.54
SO_2	0.35			0.05
VOC	0.23			0.03

[1] The emission factors are based on the values used in the Technical Support Document for permit AOP-98-015a.

Facility Wide:

Estimated emissions from the other generators are based on an estimated 200 hours/yr of operation.

Table 3-11: Diesel Generators – Allowable Emissions East Plan GM 371RC (80 hp), Aurora Fire Pump (116 hp), Tailings Dewatering Pump (234 hp), Patterson Fire Pump (129 hp): total 559 hp. Estimated 28 gal/hr max fuel				
Emission estimate based on 200 hours of operation for each engine	Emission Factor			Allowable Emissions, tons/yr
	Factor	Units	Source	
PM	0.31	lb/MMBtu	AP-42 Gasoline and Diesel Industrial Engines, Table 3.3-1 (10/1996)	0.12
CO	0.95			0.4
NO_X	4.41			1.7
SO_2	0.0015		0.0015% sulfur content in fuel	-
VOC	0.36		AP-42 Gasoline and Diesel Industrial Engines, Table 3.3-1 (10/1996)	0.1

Table 3-12: Propane Generator – Allowable Emissions LNG Facility – 30 kW Generac propane generator				
Emission estimate based on 200 hours of operation for each engine	Emission Factor			Allowable Emissions, tons/yr
	Factor	Units	Source	
PM	-	g/HP-hr	40 *CFR* Part 60 Table 1 to Subpart JJJJ Emergency engine, 25<HP<130	-
CO	387			1.9
NO_X	10 [1]			0.05
SO_2	-			-
VOC	- [1]			-

[1] Emission factor is for NOx + hydrocarbons

Table 3-13: Summary of Allowable Air Contaminant Emissions by Source (tons/year)						
Source	***PM/PM_{10}***	***CO***	***NO_X***	***SO_2***	***VOC [1]***	***Total HAPs***
East Plant Boiler #1	0.21	0.7	1.3	0.01	0.05	0.016
East Plant Flash Dryer #5	6.2 [2]	2.7	4.7	0.01	0.39	-
Total of East Plant Mineral Processing Equipment Dust Collectors	16.5 [2]	-	-	-	-	-
Verpol Boilers #1 & #2	1.1	3.9	6.8	0.07	0.26	0.09
Spray Dryers #1 & #2 and Flash Dryers #1, #2, & #3	28.8 [2]	21.5	37.2	0.08	10.2	-
Verpol wet grinders – data from 2006 Emission Testing	-	-	-	-	11.0	
VOC emissions for ST-A, B, & C and FD#4 based on 2006 Testing.	-	-	-	-	4.1	
Total of Verpol Plant Mineral Processing Equipment Dust Collectors	31.5 [2]	-	-	-	-	-
Cogen Plant – Combustion Turbines	26.3	92	103.4	0.7	11.4	-
Cogen Plant – diesel engines	0.02	0.20	0.54	0.05	0.03	-
Facility wide stationary engines (excluding Cogen diesel engines).	0.12	2.3	1.7	-	0.1	-
Emission Estimates based on 2006 Testing	-	-	-	-	-	4.9
Facility Totals	**111**	**123**	**156**	**1**	**38**	**5**

[1] VOC emissions from the dryers, surface treaters and the milling processes are based on stack testing during 2006. This stack testing was conducted to estimate the emission rate of hazardous air contaminants, but it also provided an estimate for the VOC emissions. The total VOC emissions from the Facility are greater than the value in the previous permit: this is not due to an increase in emissions; it is due to a different approach for estimating the VOC emissions.
[2] These particulate matter emission estimates are based on FPM.

As summarized in Table 3-13 above:

- The Facility has allowable emissions of all air contaminants in the aggregate of ten (10) or more tons per year: the Facility is therefore subject to Subchapter X of the Regulations and is designated as a Subchapter X Major Source.
- The Facility is a “Major Source” of air contaminants, but is not proposing any changes that constitute a Major Modification therefore is not subject to the new source review requirements of §5-502 of the *Regulations* at this time.
- The Facility has allowable emissions which classifies the source as a "Title V Subject Source" and therefore is subject to the federal operating permit requirements of 40 *C.F.R.* Part 70 or 71.

3.2 Estimating Actual Emissions of Hazardous Air Contaminants from the Existing Stationary Source.

For the permit application for AOP-98-015a, the Permittee determined that its emissions of crystalline silica exceeded the AL of 0.010 pounds per eight hours (“lbs/8-hrs”). Laboratory analysis performed by OMYA, Inc. indicated the silica content of its products is typically 0.16%. Assuming the silica content of its PM emissions are the same percentage as the product emitted from the air pollution control equipment, the Permittee estimated its actual emissions of crystalline silica are 0.07 lbs/8-hrs (0.009 lb/hr).

During 2006, the Permittee conducted air emission testing on 11 of their processes for speciated VOC compounds that included 17 listed HACs. This testing included Flash Dryers #4 and #5 in the East Plant during May and June. The testing in June represented a reconfiguration of the processes: Flash Dryer #5 was used as a flash dryer and Flash Dryer #4 was used as a surface treater without any fuel combustion. This battery of testing was used to estimate the overall actual emissions of HACs from the combined processes at the East Plant and the Verpol Plant. There were four HACs estimated to exceed their respective Action Levels: formaldehyde, acetaldehyde, acrolein, and benzene. The results of the testing are summarized in Table 3-14 below:

Table 3-14 Quantification of HAC Emissions

Hazardous Air Contaminant	CAS#	Toxic Category	Estimated Actual Emission Rate (lb/8-hrs)[1]	Action Level (lb/8-hrs)
Formaldehyde	50-00-0	1	2.6	0.0065
Acetaldehyde	75-07-0	1	5.5	0.038
Acrolein	107-02-8	2	0.48	0.002
Benzene	71-43-2	1	0.11	0.011
Crystalline Silica	14808-60-7	2	0.07	0.010

[1] For category 3 contaminants, emission rate is based on 2000 hours/year of operation. For category 1 & 2 contaminants, the emission rate is based on 8760 hours/year.

3.3 – Estimating Potential Green House Gas Emissions

Potential Green House Gas Emissions are calculated for 100% natural gas and 100% distillate fuel oil. The calculations are shown in the next two tables. The use of distillate oil results in a higher potential annual emission of CO_2e

GHG Estimates for Natural Gas

Facility:	Omya - Verpol/East/Cogen	Permit #:	AOP-14-029

Table B-1. Stationary Source Fuel Combustion

Source ID	Source Description	Fuel Combusted	Quantity Combusted	Units	100% natural gas	
	Overall plant	Natural Gas	1,624,411,765	scf		

Table B-2. Total Company-Wide Stationary Source Fuel Combustion

Fuel Type	Qty Combusted	Units
Natural Gas	1,624,411,765	scf

Table B-3. Total Company-wide CO_2, CH_4 and N_2O Emissions from Stationary Source Fuel Combustion

Fuel Type	CO_2 (kg)	CO_2 (lb)	CH_4 (kg)	CH_4 (lb)	N_2O (kg)	N_2O (lb)
Natural Gas	88,537,848	195,192,312	1,670	3,681	167	368
Total Fossil Fuel Emissions	88,537,848	195,192,312	1,670	3,681	167	368
Total Emissions for all Fuels	88,537,848	195,192,312	1,670	3,681	167	368

Global Warming Potential	CO_2	CH_4	N_2O	CO_2e	
	1.0	21.0	310.0	metric ton	short ton
All CO2e emissions at stack (Fossil CO2e + Biogenic CO2e) - for APCD Permit info				**88,625**	**97,692**

GHG Estimates for Distillate Fuel Oil

Facility:	Omya - Verpol/East/Cogen	Permit #:	AOP-14-029

Table A-1. Stationary Source Fuel Combustion

Source ID	Source Description	Fuel Combusted	Quantity Combusted	Units
	Overall plant	Distillate Fuel Oil #2	11,835,000	gallons

100% Distillate

Table A-2. Total Company-Wide Stationary Source Fuel Combustion

Fuel Type	Qty Combusted	Units
Distillate Fuel Oil #2	11,835,000	gallons

Table A-3. Total Company-wide CO_2, CH_4 and N_2O Emissions from Stationary Source Fuel Combustion

Fuel Type	CO_2 (kg)	CO_2 (lb)	CH_4 (kg)	CH_4 (lb)	N_2O (kg)	N_2O (lb)
Distillate Fuel Oil #2	120,793,691	266,304,187	4,900	10,802	980	2,160
Total Fossil Fuel Emissions	120,793,691	266,304,187	4,900	10,802	980	2,160
Total Emissions for all Fuels	120,793,691	266,304,187	4,900	10,802	980	2,160

Global Warming Potential	CO_2	CH_4	N_2O	CO_2e	
	1.0	21.0	310.0	metric ton	short ton
All CO2e emissions at stack (Fossil CO2e + Biogenic CO2e)				**121,200**	**133,600**

3.4 Designation of Proposed Modification for the Permit to Construct

The designation of the proposed modification is determined by the designation of the existing Facility and the allowable emissions associated with the proposed modification. The existing Facility, before construction or installation of the proposed modification, is designated as a major stationary source of air contaminants, as defined in §5-101 of the Regulations. The modification's allowable emissions are calculated according to the following procedure.

Step a: Calculate the allowable emissions for each new piece of equipment or process being added. As noted above in Section 2.4, there were two modifications that have the potential to increase emissions.

Silo Vents: the change the discharge location (ambient air vs. into building such as the penthouse) for the Verpol finished product silo vent dust collectors has the potential to increase the PM emissions to the ambient air as follows:

The potential PM discharge from the silo vents are quantified based on the product conveying systems for the following production systems:

- Flash Dryer #1 Product Conveying (2,700 dscfm)
- Flash Dryer #2 Product Conveying (2,700 dscfm)
- Flash Dryer #3 Product Conveying (2,700 dscfm)
- Surface Treater A Product Conveying (1,200 dscfm)
- Surface Treater B Product Conveying (1,200 dscfm)
- Surface Treater C Product Conveying (1,200 dscfm)
- Deagglomerator C Product Conveying (3,000 dscfm)

Total exhaust flow is 14,400 dscfm

(14,400 dscfm) * (0.1 gr/dscf) * 60 min/hr * (8760 hr/yr) * (1 lb/7000 grains) * (1 ton/2000 lbs) = 5.4 tons PM/yr

The allowable emissions calculated for AOP-98-015a included the PM emissions from the silo vent dust collectors even though the exhaust was discharged into the penthouse. Therefore the changes at the silo penthouse will not increase the calculated allowable emissions from the product conveying systems, so there is no quantifiable increase in PM emission from this modification: **0 tons PM/yr**

Untreated bulk bag dust collector: The untreated bulk bag dust collector is now allowed to discharge to the ambient air:

(2300 dscfm) * (0.01 gr/dscf) * (60 min/hr) * (8760 hr/yr) * (1 lb/7000 grains) * (1 ton / 2000 lbs.) = **0.9 tons PM/yr**

Total for Step a: 0.9 ton PM/hr

Step b: Calculate the allowable emissions for all existing processes that are affected by the modification:

The allowable emission for other processes are not anticipated to be affected by the modifications.

Step c: Calculate the actual emissions from all existing processes that are affected by the modification (i.e., that were included in Step b) that were installed prior to 1979 or have already been reviewed as being major under §5-502 of the Regulations.

No other processes are affected by the modifications.

Step d: Calculate the allowable emissions from all other equipment or processes at the facility modified since 1979 that have not been reviewed as being major in the past.

Modifications prior to 1991 were reviewed as major modification for PM/PM_{10}, SO_2, NOx, and CO. Therefore, no longer necessary to consider minor modifications prior to 1991 for the previously identified air contaminants for major source applicability.

March 29, 1996 AP-89-049c Modifications to East Plant to increase the permitted fuel consumption limit from 445,000 gal/yr to 600,000 gal/yr. Calculations provided in Technical Analysis dated March 29, 1996, with one change (must consider 80% SO2 removal due to inherent scrubbing of SO2 in drying process by calcium carbonate) and summarized as follows:

Table 3-15: Change in Allowable Air Contaminant Emissions (tons/year) AP-89-049c

Modification	**PM/PM_{10}**	**SO_2**	**NO_x**	**CO**
East Plant – increase in fuel from 445,000 to 600,000 gal/yr.	<0.1	1.1	1.6	0.4

September 23, 1996 AP-89-049d - Addition of new flash dryer systems and associated product conveying equipment at Verpol Plant. The emission increase for this modification has been changed to reflect a reduction in the permitted fuel consumption limit for the Flash Dryers #1 and #2 from 1,880,000 gal/yr to 1,400,000 gal/yr as requested by OMYA, Inc. in 1997, and again proposed to be reduced from 2,100,000 to 1,900,000 gal/yr for all three dryers (Flash Dryer #1, Flash Dryer #2, and Flash Dryer #3 - 633,333 gal/yr each). Calculations as provided in Technical Analysis dated September 13, 1996, with two other changes (1) assume 80% reduction in SO2 emissions rather than original estimate of 50% based upon emission testing; (2) flash dryer and conveyor PM10 emissions based on % of product handled being < 10 um in size (FD#1 for Omyacarb 5 at 70% and FD#2 for Omyacarb 3 at 90%] and summarized as follows:

Table 3-16: Change in Allowable Air Contaminant Emissions (tons/year) AP-89-049d				
Modification	**PM_{10}**	**SO_2**	**NO_x**	**CO**
Addition of FD#1 and FD#2 and their respective product conveying equipment.	9.6	5.4	12.7	3.2

December 2. 1997 AP-89-049e Addition of replacement boiler at Verpol Plant. Emissions equivalent to the new allowable emissions identified in Technical Analysis dated December 2, 1997, minus actual emissions associated with operation of boilers which pre-exist 1991. Also reviewed was an increase in emissions associated with increasing the allowable PM/PM10 emission rate for Spray Dryer #1 at Verpol Plant from 1.32 lbs/hr to 1.7 lbs/hr in 1997.

Table 3-17: Change in Allowable Air Contaminant Emissions (tons/year) AP-89-049e				
Modification	**PM/PM_{10}**	**SO_2**	**NO_x**	**CO**
New 24 MMBtu/hr boiler - Verpol	0.5	9.5	4.4	1.1
Increase in PM emission limit for SD#1	1.7	-	-	-
Total	2.2	9.6	4.4	1.1

November 16, 1998 AOP-98-015 Addition of Flash Dryer #3 system and Flash Dryer #3 product conveying system in 1998. Emissions equivalent to the new allowable emissions identified in Technical Analysis revised November 6, 1998. The emission increase for this modification has been changed to reflect a reduction in the permitted fuel consumption limit for the Flash Dryer #3 from 700,000 gal/yr to 633,333 gal/yr as requested by OMYA, Inc. as part of this modification. Three flash dryers limited to 1,900,000 gal/yr (Flash Dryer #1, Flash Dryer #2, and Flash Dryer #3 - 633,333 gal/yr each).

Table 3-18: Change in Allowable Air Contaminant Emissions (tons/year) AOP-98-015				
Modification	**PM/PM_{10}**	**SO_2**	**NO_x**	**CO**
Addition of FD#3	3.8	2.7	6.3	1.6
FD#3 product conveying system	1.0	-	-	-
Total	4.8	2.7	6.3	1.6

October 26,1999 AOP-98-015a Permit for the addition of bulk bagging station silos, now product conveying system, house vacuum system, rotopackers, and an increase in production throughput for Spray Dryer #2 from 20 metric tons/hour to 30 metric tons/hour. The modification review for permit AOP-98-015a concluded that aggregated PM emissions represented a Major Modification and

MSER was required for the PM emissions for the proposed changes. Note that the increase in SD#2 combustion emissions were based on the maximum potential fuel usage in SD#2 (321 gal/hr, 8760 hours/yr, 90% utilization = 2,530,763 gallons) compared to the actual fuel usage in 1998 (1,102,797 gallons) None of the equipment was installed, but the production increase for SD#2 was used. For the modification review for permit AOP-14-029 only the PM emissions and combustion emissions from the production increase for SD#2 will be considered in the aggregated emissions from AOP-98-015a

Table 3-19: Change in Allowable Air Contaminant Emissions (tons/year)
AOP-98-015a

Modification	**PM/PM_{10}**	**SO_2**	**NO_x**	**CO**
Increase in through put for SD#2 from 20 to 30 metric ton/yr	3.8	6.1	14.3	3.6

May 24, 2013 AP-13-010 Permit for the addition of liquefied natural gas (LNG) as an alternate fuel for the gas turbines, boiler and dryers at the facility. The uses of natural gas (displacing 15 ppm sulfur content No.2 fuel oil) is expected to have no effect on the potential emissions of PM and SO2, it should reduce NOx emissions and will increase CO emissions.

Table 3-20: Change in Allowable Air Contaminant Emissions (tons/year)
AP-13-010

Modification	**PM/PM_{10}**	**SO_2**	**NO_x**	**CO**
Addition of LNG as a permitted fuel	-	-	-	16.3

Summary for Step D:

Table 3-21: Summary of Prior Minor Modifications Since 1991

	Air Contaminant Emissions, tons/year			
	PM/PM_{10}	**SO_2**	**NO_x**	**CO**
AP-89-049c	<0.1	1.1	1.6	0.4
AP-89-049d	9.6	5.4	12.7	3.2
AP-89-049e	2.2	9.5	4.4	1.1
AOP-98-015	4.8	2.7	6.3	1.6
AOP-98-015a	3.8	6.1	14.3	3.6
AP-13-010	-	-	-	16.3
Total Aggregated Modifications	0 [1]	24.8	39.3	26.2

[1] Modifications prior to and including changes approved in Permit AOP-98-015a were reviewed as major modification for PM and PM_{10}. – this 'reset' the aggregation of prior modifications for PM emissions and for PM_{10} emissions on October 20, 1999.

Step e: Calculate the size of the modification on a pollutant-by-pollutant basis using the following formula:

Results of [step a + step b – step c + step d] = size of modification

The proposed modification's allowable emissions are summarized in Step A shown in Table 3-21. The proposed modification's allowable emissions are estimated to result in an emissions increase less than significant levels for each air contaminant. Therefore, the proposed modification is designated as a non-major modification and is not subject to review under §5-502 of the Regulations.

Table 3-22: Aggregated Emissions Increase & Comparison to Significant Levels

	Air Contaminant Emissions, tons/year			
	PM/PM_{10}	**SO_2**	**NO_x**	**CO**
Proposed Modification (Step A)	0.9	0	0	0
(plus) Step B	0	0	0	0
(minus) Step C	0	0	0	0
(plus) Prior Minor Modifications (Step D)	0	24.8	39.3	26.2
Aggregated Modifications	0.9	24.8	39.3	26.2
Significant Levels	25/15	40	40	50

4.0 DISCUSSION OF SELECT APPLICABLE AND NON-APPLICABLE REQUIREMENTS

The Agency will assess compliance with these regulations during any inspections of the Facility. The inspections will include confirmation of the proper operation and maintenance of equipment and air pollution control devices, visual observations of emission points, and review of any records required by the Permit.

4.1 Vermont Air Pollution Control Regulations and Statutes

§5-211(2) - Prohibition of Visible Air Contaminants - Installations constructed subsequent to April 30, 1970

This standard applies to any equipment installed subsequent to April 30, 1970, and specifies that visible emissions may not exceed twenty (20) percent (%) opacity for a period or periods aggregating to six (6) minutes or more in any hour, and at no time may they exceed sixty (60) % opacity. This emission standard applies to all the equipment at the Facility.

However, all of the non-metallic mineral processing equipment at the Facility are subject to a more stringent visible emission limit of 7% opacity. This includes the equipment that are identified in permit AOP-14-029 Findings of Fact (F)(b) that are otherwise not subject to 40 CFR Part 60, Subpart OOO.

§5-221(1) - Prohibition of Potentially Polluting Materials in Fuel; Sulfur Limitation in Fuel

This prohibition applies to all stationary fuel burning equipment used on-site. Based on the application submittal, the applicant is expected to comply with this regulation based on the use of natural gas/distillate oil/residual oil. Natural gas and distillate oil, by their official fuel specification definition, comply with this requirement.

In their application for AP-13-010 the Permittee proposed to restrict the sulfur content of the No.2 diesel fuel oil to 15 ppm sulfur content by weight. This restriction meets the requirements of §5-221 (1)(iii) five years ahead of the deadline of July 1, 2018.

§5-231(1) - Prohibition of Particulate Matter; Industrial Process Emissions

This section limits the discharge of PM from industrial processes. An emission limit is derived based upon the limitations established in Table 1 of the *Regulations*, or depending upon the circumstances, a concentration limit of 0.06 grains per dry standard cubic foot (gr/dscf) of undiluted exhaust gas. Table 1 of the *Regulations* specifies a maximum PM discharge rate based upon the maximum processing rate in units of pounds per hour (lbs/hr) for any given piece of process equipment. Where the processing rate is not considered an appropriate measure of pollution potential, such as wood processing equipment, Table 1 is substituted by the concentration standard.

For the process emissions controlled by fabric filter dust collectors, the Agency has determined that a concentration limit applies at this facility. The Agency requires more restrictive concentration limits from the process equipment at this Facility.

For the process equipment that was operating at the Facility before 1977, the concentration limit is 0.02 gr/dscf. For equipment installed on or after 1977, the concentration limit is 0.01 gr/dscf.

§5-231(4) - Prohibition of Particulate Matter; Fugitive Particulate Matter

This section requires the use of fugitive PM control equipment on all process operations and the application of reasonable precautions to prevent PM from becoming airborne during the handling, transportation, and storage of materials, or use of roads. This requirement applies to the entire Facility, and the Facility is therefore expected to comply with the fugitive emission limitations of this section.

§5-241(1) & (2) - Prohibition of Nuisance and Odor

This requirement applies to the entire Facility and prohibits the discharge of air contaminants that would be a nuisance to the public or the discharge of objectionable odors beyond the property-line of the Facility.

The Facility had issues with objectionable odors During 2005 – 2007. The Permittee conducted a study to determine the cause(s)/source(s) of the odors. Part of the root cause was due to applying steric acid directly into Flash Dryers #4 and #5. The high heat of these process vessels resulted in the formation of chemical compounds with objectionable odors. The solution was to modify the process so there are 2 stages: drying in Spray Dryer #5, and converting Spray Dryer #4 into a surface treater that does not have any fuel combustion.

§5-261 - Control of Hazardous Air Contaminants
See Section 6.0 below.

4.2 Federal Air Pollution Control Regulations and the Clean Air Act

See Title V Air Pollution Control Permit to Construct and Operate AOP-14-029 Findings of Fact section (F)(a)(iv) for a list of the federal regulations that the Facility is subject to.

5.0 AMBIENT AIR QUALITY IMPACT EVALUATION

An ambient air quality impact evaluation is performed to demonstrate whether or not a proposed project will cause or contribute to violations of the ambient air quality standards and/or significantly deteriorate existing air quality. The Agency's implementation procedures concerning the need for an ambient air quality impact evaluation under §5-406(1) of the Regulations, specifies that such analyses may be required when a project results in an allowable emissions increase of ten (10) tons per year or more of any air contaminant, excluding VOCs.

In 1990 and 1998 Air Quality Impact Evaluations were conducted. The results of these AQIEs are summarized below:

Ambient Air Quality Impact Evaluations – PSD Demonstration

Date of AQIE/ Permit #	Pollutant	Averaging Period	Remaining Available PSD Increment [1]	Increment Consumption
July 27, 1990 #AP-89-049	Class I Area			
	PM_{10}	Annual	1.3 µg/m^3	0.008 µg/m^3
		24-hour	7.5 µg/m^3	0.13 µg/m^3
	SO_2	3-hr	25.0	2.8
		24-hr	3.8	0.6
		Annual	0.5	0.02
	NO_2	Annual	0.6 µg/m^3	0.01 µg/m^3
	Class II Areas			
	PM_{10}	Annual	4.8 µg/m^3	3.1 µg/m^3
		24-hour	27.8 µg/m^3	9.8 µg/m^3

Ambient Air Quality Impact Evaluations – PSD Demonstration				
Date of AQIE/ Permit #	**Pollutant**	**Averaging Period**	**Remaining Available PSD Increment [1]**	**Increment Consumption**
	SO_2	3-hr	512.0 µg/m^3	139.2 µg/m^3
		24-hr	68.3 µg/m^3	31.7 µg/m^3
		Annual	5.0 µg/m^3	3.8 µg/m^3
	NO_2	Annual	6.3 µg/m^3	1.4 µg/m^3
October 26, 1999 #AOP-98-015a	Class I Area			
	PM_{10}	Annual	1.0 µg/m^3	<0.1 µg/m^3
		24-hour	6.0 µg/m^3	<0.1 µg/m^3
	NO_2	Annual	2.5 µg/m^3	<0.1 µg/m^3
	Class II Areas			
	PM_{10}	Annual	3.4 µg/m^3	2.7 ug/m^3
		24-hour (worst case)	15.0 - 18.7 µg/m^3 (15.8 µg/m^3)	11.5 - 15.7 µg/m^3 (15.5 µg/m^3)
	NO_2	Annual	25 µg/m^3	7 µg/m^3

[1] Total PSD increment values are stated in Table 2 of the *Regulations*. Pursuant to '5-502(5) of the Regulations, a new major source or major modification may not consume more than 25% and 75% of the remaining annual and 24-hour PSD increment values, respectively, for each significantly increasing air contaminant.

Ambient Air Quality Impact Evaluations - NAAQS		
Date of AQIE/ Permit #	Pollutant(s)	Summary of Results Total Estimated Impact / NAAQS
July 27, 1990 #AP-89-049	PM_{10} 24-hr	88 (µ/m^3) / 150 (µ/m^3)
	PM_{10} Annual	32 (µ/m^3) / 50 (µ/m^3)
	NO_2 Annual	38 (µ/m^3) / 100 (µ/m^3)
	SO_2 3-hr	444 (µ/m^3) / 1300 (µ/m^3)
	SO_2 24-hr	184 (µ/m^3) / 365 (µ/m^3)
	SO_2 Annual	40 (µ/m^3) / 80 (µ/m^3)
October 26, 1999 #AOP-98-015a	PM_{10} 24-hr	104 (µ/m^3) / 150 (µ/m^3)
	PM_{10} - Annual	31 (µ/m^3) / 50 (µ/m^3)
	NO_2 - Annual	31 (µ/m^3) / 100 (µ/m^3)

The recent modifications summarized in Section 2.4 were estimated to produce an increase of less than 1 tpy of PM emissions and the Agency is not requiring an AQIE at this time.

6.0 HAZARDOUS AIR CONTAMINANTS

The emissions of hazardous air contaminants ("HACs") are regulated under to §5-261 of the Regulations. The Owner/Operator of a source must quantify its emissions of HACs regulated by this rule. Any Facility whose emission rate of a HAC exceeds its respective Action Level ("AL") is subject to the rule for the HAC, and the Owner/Operator must then demonstrate that the emissions of the HAC are minimized to the greatest extent practicable by achieving the Hazardous Most Stringent Emission Rate ("HMSER") for that HAC.

The emission of hazardous air pollutants ("HAPs") may also be regulated separately under to §112 of the Federal Clean Air Act.

Any applicable HAP regulations are discussed under Section 4 above. In addition, this facility has a permit condition limiting the emissions of HAPs to 10 ton/year of any single HAP and 25 tons/year of all HAPS combined, therefore the facility is not subject to the federal HAP standards.

As shown in Section 3.2, the facility is expected to exceed the action level of crystalline silica, formaldehyde, acetaldehyde, acrolein and benzene and is therefore subject to §5-261.

6.1 HMSER Selection

If the emission of any HAC from all regulated sources at the Facility is estimated to exceed its AL, then the Facility is subject to the rule and the emissions must be reduced to achieve HMSER for that HAC.

6.1.1 Crystalline Silica:

For permit AOP-98-015a, time the Agency used the estimated emission rate (0.009 lb/hr) as the most stringent emission rate, and required the use of an ESP on each of the two spray dryers and fabric filter control on the remaining non-metallic mineral processing equipment.

Going forward, the numerical emission limit will be removed from the permit, and the required PM control equipment (ESPs and fabric filters) will continue to represent HMSER for crystalline silica:

HMSER for crystalline silica is the use Electrostatic Precipitators on Spray Dryers #1 and #2 and fabric filter control on the remaining non-metallic mineral processing equipment.

6.1.2 HMSER Review for: Formaldehyde, Acetaldehyde, Acrolein & Benzene:

As noted in Section 3.2, the emission study indicated that formaldehyde, acetaldehyde, acrolein & benzene were all estimated to exceed their respective Action Level.

Using the data from the emission testing conducted during 2006, the Permittee hired a consultant to carry out an HMSER analysis. On January 2, 2009, the Agency received a HMSER analysis from the Permittee for formaldehyde,

acetaldehyde, acrolein & benzene. A HMSER analysis is similar to a Best Available Control Technology (BACT) review and it incorporates a top down review of available control technologies, reviews the feasibility of the various potential technologies, and includes an economic analysis to assess the cost of control for the feasible technologies. Permit AOP-14-029 is the first renewal of the Operating Permit for this Facility, so this is the permit that incorporates the HMSER determination.

Since the four HACs that are predicted to exceed their respective Action Levels are organic compounds, the HMSER analysis reviewed treatment options for VOCs as the basis for treatment options of the organic HACs.

Step 1: Identify all Control Technologies: There were 15 alternatives identified in the HMSER analysis. These alternatives were from industry literature, Omya, and the EPA's RACT-BACT-LAER Clearinghouse (RBLC). Some of these alternatives don't apply to the operations at the Facility; the reasons are noted in Table 6-1 below in the list of alternatives.

The 2006 emission study helped identify that the addition of steric acid (a product additive) into a process stage that also included fuel combustion, such as a spray dryer or flash dryer, resulted in increased generation of odors and HACs. The Permittee demonstrated that by changing the processing steps at the East plant, a significant reduction in objectionable odors as well as reductions in the emissions of formaldehyde, acrolien, acetaldehyde and benzene were achieved. Option 15 in Table 6-1 represents this process modification that was implemented in 2008.

Table 6-1 Control Technology Review				
Option	**Description**	**Control Type [1]**	**Source**	**Why not applicable to Facility**
1	Good Combustion	PP	RBLC	By-products of combustion of virgin fuel not regulated as a source of HACs.
2	Fuel Limitations	PP	RBLC	
3	Engineering Design	PP	RBLC	Covered under "Process Modification"
4	Baghouse	APC	RBLC	Does not control VOCs / organic HACs
5a	Thermal Oxidation - direct flame	APC	Industry Literature	
5b	Thermal Oxidation - Recuperative	APC	Industry Literature	
5c	Thermal Oxidation - Regenerative	APC	Industry Literature	
6	Catalytic Oxidation	APC	Industry Literature	
7	Adsorption	APC	Industry Literature	
8	Volume Concentrators	APC	Industry Literature	
9	Absorption	APC	Industry Literature	
10	Condensation	APC	Industry Literature	
11	Flaring	APC	Industry Literature	
12	Biofiltration	APC	Industry Literature	
13	Membrane Technologies	APC	Industry Literature	
14	Additive Substitution	PP	Permittee	No known alternative additives that are expected to reduce organic HAC emissions.
15	Process Modification	PP	Permittee	

[1] Control Type: PP = Pollution Prevention; APC = add-on Air Pollution Control device

Step 2: Eliminate Technically Infeasible Options: For many of the potential treatment options there are limitations on the concentration of the pollutant, the volume and the temperature of the exhaust gases. A summary of why certain treatment options that are not technically feasible is shown in Table 6-2.

Table 6-2 Control Technology – Technically Feasible?					
Option	**Description**	**VOC [1](ppm)**	**Flow Rate (scfm)**	**Temperature (oC)**	**Technically Feasible?**
5a	Thermal Oxidation - direct flame	<10,000	0 – 10,000	No practical limit	**Yes**
5b	Thermal Oxidation - Recuperative	2,000 – 10,000	250 – 100,000	No practical limit	No – process VOC concentration too low
5c	Thermal Oxidation - Regenerative	100 – 2,000	2,000 – 500,000	No practical limit	No – process VOC concentration too low

Table 6-2 Control Technology – Technically Feasible?					
Option	**Description**	**VOC [1](ppm)**	**Flow Rate (scfm)**	**Temperature (oC)**	**Technically Feasible?**
6	Catalytic Oxidation	<10,000	0 – 75,000	No practical limit	**Yes**
7	Adsorption	100 – 5,000	No practical limit	Pollutant/ media dependent	No – process VOC concentration too low
8	Volume Concentrators	<100	>10,000	Pollutant/ media dependent	**Yes, for high volume sources.**
9	Absorption	>200	No practical limit	Pollutant/ media dependent	No – process VOC concentration too low
10	Condensation	>1,000	<3,000	Pollutant/ media dependent	No – process VOC concentration too low
11	Flaring	No practical limit	No practical limit	No practical limit	Yes
12	Biofiltration	<1,000	>1,000	<38	No – exhaust gas is too hot
13	Membrane Technologies	>5,000	<500	Pollutant/ media dependent	No – process VOC concentration too low
15	Process Modification	-	-	-	**Yes, for East Plant**

[1] Testing showed the VOC concentration ranged from 11 – 32 ppm for the various processes tested at the Facility.

Step 3: Rank Remaining Control Technologies by Control Effectiveness: The vendors of flaring control equipment did not recommend the use of flares for the low concentration VOC emissions at this Facility, therefore information on the control efficiency and economics of operating flares were not reviewed. Since the mass emission rate of the 4 HACs is about 1/5th of the VOC mass emission rate, the VOC control cost/ton in the Table 6-3 should be multiplied by 5 to have a cost estimate for controlling the 4 organic HACs.

Table 6-3 Control Technology – Effectiveness					
Option	**Description**	**Targeted Processes at Facility**	**Control Efficiency**	**Estimated No. 2 fuel oil usage (gallon/yr)**	**VOC Reduction Cost Range ($/ton)**
5a	Thermal Oxidation - direct flame	Low-Flow Emission Units [1] – 16 @ Verpol	99%	3,000,000	$367,000 – $11,000,000
6	Catalytic Oxidation		95%	769,000	$65,000 - $1980,000
6	Catalytic Oxidation	High-Flow Emission Units [2] – 6 @ Verpol	96%	288,000	$184,000 - $440,000
6 & 8	Volume Concentrator used with Catalytic Oxidizer		96%	188,000	$137,00 - $327,000

Table 6-3 Control Technology – Effectiveness					
Option	**Description**	**Targeted Processes at Facility**	**Control Efficiency**	**Estimated No. 2 fuel oil usage (gallon/yr)**	**VOC Reduction Cost Range ($/ton)**
6	Catalytic Oxidation	Flash Dryer #4 @ East	96%	47,900	$104,000
6 & 8	Volume Concentrator used with Catalytic Oxidizer		96%	20,300	$77,000
5a	Thermal Oxidation – direct flame	Flash Dryer #5 @ East	99%	188,000	$146,000
6	Catalytic Oxidation		96%	47,900	$98,000
15	Process Modification	Flash Dryer #5 & FD#4 converted to Surface Treater	96%	0	$40,000

[1] "Low-Flow" emission units have <5,500 scfm
[2] "High-Flow" emission units have 15,000 – 25,000 scfm

Based on the emission testing study in 2006 with additional testing in 2008, recommendations were made by the consultant to limit the outlet temperature of the process units where the steric acid is added to the product (surface treaters) to a maximum of 90 ^{o}C. Further testing on 10/22/2013 by the Permittee on exhaust from Surface Treater B demonstrated that there is no appreciable increase in the emission of these HACs at temperatures up to 118 ^{o}C.

After reviewing the HMSER analysis the Agency has hereby concluded that HMSER is achieved by only introducing steric acid to a separate processing unit (i.e. 'surface treater') which does not use fuel combustion for product drying. In addition, the outlet temperature from each of the following processes shall be limited to a maximum temperature of 121 °C: Surface Treater B, Surface Treater A, Surface Treater C and Flash Dryer #4 (which is a surface treater). Due to potential variability in the measurement of the process temperature the Agency is allowing a temperature limit of 121 ^{o}C. The outlet temperature will be based on an hourly average.

6.2 Air Quality Impact Evaluation

If the emission of any HAC from all regulated sources at the Facility is estimated to exceed its AL, then the Facility is subject to the rule and the emissions must be reduced to achieve HMSER for that HAC.

If the emission rate of any HAC after achieving HMSER is still expected to exceed its AL, the Agency may require an air quality impact evaluation to further assess the ambient impacts for compliance with the HAAS or SSHAIS.

In 2007, using the emission data from the testing during 2006, the Permittee had TRC Environmental Corporation conduct air dispersion modeling of the

emissions of formaldehyde, acetaldehyde, acrolein & benzene using the EPA approved regulatory model at that time: ISC ST3 (version 02035) and BPIP (version 04274) for building downwash. The modeling used 5 years (1987 – 1991) of surface meteorological data from the Burlington airport and upper air date from Albany, NY.

The results are summarized in Table 6-4. The predicted offsite impacts are lower than the Hazardous Ambient Air Standard for the respective pollutants.

Table 6-4: Hazardous Air Contaminant Air Quality Impact Evaluations

Pollutant	Total Plant Emission Rate (lb/8-hr) [1]	Offsite Impact – Maximum Annual Average (µ/m^3)	HAAS (µ/m^3)
Formaldehyde	2.3487	0.048	0.078
Acetaldehyde	5.4612	0.123	0.455
Acrolein	0.4487	0.012	0.02
Benzene	0.0980	0.001	0.13

[1] The emission rate was adjusted to not include the HAC emissions from the combustion of virgin fuel which is not subject to §5-261 of the *Regulations.* As a result, the emission rates in Table 6-4 are a little lower than those shown in Table 3-13.