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CLOSURE/POST-CLOSURE PLAN

Tailings Management Areas
Verpol Plant
Florence, Vermont

Prepared for
Omya Inc.

Prepared by
Sanborn, Head & Associates, Inc.

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ATTACHMENTS

1.0 INTRODUCTION

This Closure and Post–Closure Plan (Plan) was prepared for the tailings management areas (TMAs) at the Omya Inc. (Omya) Verpol Plant located in Florence, Vermont. This Plan is a component of the Interim Certification Application for the TMAs, and was prepared in accordance with the following requirements of the Vermont Solid Waste Management Rules (VSWMRs):

- Subchapter 10 (i.e., Closure and Post-Closure), Section (§) 6-1002 (i.e., Closure Plan), Paragraph (b)(1)-(7);
- Subchapter 10, §6-1003 (i.e., Post-Closure Plan), Paragraph (c)(1)-(4); and
- Subchapter 6 (i.e., Design Standards), §6-606 (i.e., Disposal Facilities), Paragraph (b)(2)(H), (I), (J), (K), (M), and (N).

The remainder of this Plan is organized as follows:

- General site information is presented in Section 2.0;
- A review of the regulatory requirements related to closure and post-closure is provided in Section 3.0;
- The proposed closure schedule is presented in Section 4.0;
- The proposed closure design is described in Section 5.0; and
- The anticipated post-closure care activities are described in Section 6.0.

2.0 GENERAL SITE INFORMATION

The Omya Verpol Plant is located in Florence, Town of Pittsford, Rutland County, Vermont on approximately 385 acres. Calcium carbonate (an amendment to products such as paint and plastics) is produced at the Verpol Plant from which a tailings product is generated. Initially the tailings product is in a slurry form comprised of approximately 99.6 percent crushed rock that, based on grain size analyses, may be described as sandy silt, and chemical compounds utilized in the production process, most notably a flotation reagent. TMAs are located on the same property as the production facility that generates the tailings product, in former quarry areas. The quarry areas are identified as: (i) the Dolomite (aka Hard Rock) Quarry; (ii) the Kane & Drake Quarry; and (iii) the Loveland (aka Dog Leg) Quarry. The locations of the quarries are shown on Sheet 1 of the Engineering Drawings (see Part D-2 to the Interim Certification Application).

The tailings product slurry is initially dewatered in settling cells located east of the former Loveland Quarry. Periodically the tailings product in the settling cells is excavated and transported to the Kane & Drake and Dolomite TMAs. Therefore, Omya controls the handling and management of the tailings product and keeps the material separate from wastes generated at the Verpol Plant. Furthermore, only on-site roads are used to transport the tailings product to the TMAs.

For purposes of this application, only the Dolomite Quarry and the Kane & Drake Quarries, together with the settling cells utilized to dewater the tailings product, are proposed for use during the term of the Interim Certification to meet the operating needs and requirements of the Verpol Plant.

Sheet 1 presents the grading in the TMAs as of July 7, 2005. As shown on Sheet 1, placement of the tailings product in the TMAs has been performed with the objective of approximating the elevation of the immediately surrounding areas. The outer slopes of the TMAs are currently inclined no steeper than about 2.5 horizontal to 1 vertical (2.5H:1V).

It has been Omya's intention to retain control over the tailings product, with the goal to recover the significant calcium carbonate content as technology permits, to find alternative uses for the tailings product, or to use the tailings product to reclaim depleted quarry operations on site. Approval for the approach was obtained in initial, and subsequent amendments, to the Act 250 permit for the development of the Verpol Plant.

Tailings product initially was placed in the Kane & Drake Quarry starting in 1979. Prior to placing tailings product in the Kane and Drake TMA, Omya constructed a retaining embankment along the open (east) side of the quarry using shot rock. The retaining embankment also allows for vehicular access around the TMA perimeter. The retaining embankment averages between 20 and 30 feet tall, is about 20 feet wide at the top, and was constructed with exterior and interior sideslopes inclined at 2H:1V.
The Dolomite Quarry has been used as a TMA since 2000. With the exception of an area formerly used as an access way for trucks, the Dolomite Quarry TMA is bounded by rock walls developed during quarry operations. The truck access way was replaced with an engineered retaining structure also approved by the state.

The Loveland Quarry has received tailings product since 1979. The Loveland TMA currently contains the least amount of tailings product, deposited primarily as part of the dewatering process.

Visual observations indicate that the tailings product existing slopes of the TMAs are stable (i.e., no sloughing) and are capable of sustaining vegetation. The portions of the TMA slopes that have been vegetated (using a soil conservation seed mix) do not show signs of significant erosion or other distress.

For the purposes of the Interim Certification application, only the Kane & Drake and Dolomite TMAs are proposed. Omya reserves the right to apply for additional TMA capacity in the Loveland TMA and other areas in the future.

3.0 REGULATIONS

This Plan addresses the following requirements of the VSWMRs:

- §6-606(b)(2)(H) – The facility design is to include a sequential capping plan for time periods not exceeding five years.

- §6-606(b)(2)(I) – The facility design is to include control and treatment, if necessary, of decomposition gas to prevent hazards to public health and safety, the environment, or the creation of a nuisance.

- §6-606(b)(2)(J) – The facility design is to include appropriate control of stormwater runon and runoff.

- §6-606(b)(2)(K) – The final cover system is to incorporate drainage controls to prevent ponding of stormwater.

- §6-606(b)(2)(M) – The final cover system is to include the following components, listed from top to bottom:

    - A minimum 6-inch thick layer of earthen material capable of sustaining native plant growth; and

    - A minimum 2-foot thick layer of earthen material with a permeability of less than 1×10^{-5} cm/sec and less than the permeability of the base soils.

    The VTDEC Secretary may approve alternate materials if achievement of equivalent performance is demonstrated.

- §6-606(b)(2)(N) – The final cover system is to be graded such that the minimum slope is five (5) percent and the maximum slope is 33 percent or 3H:1V.

- §6-1002(b) – The closure plan must address the following:

    - A description of the steps necessary to close the facility;

    - A list of labor, materials, and testing necessary to close the facility;

    - An estimate of the expected year of closure;

    - A schedule for final closure, including the total time required to close the facility and the time required for the various steps/phases in the closure process;

- A cost estimate for facility closure that satisfies the requirements of §6-1004;
- A description of the methods for compliance with the closure requirements; and
- Required remedial action needed prior to closure.

- §6-1003(c) – The post-closure plan must address the following:
  - Appropriate air, surface water, and groundwater monitoring activities;
  - Planned maintenance activities;
  - Contact information; and
  - Post-closure care cost estimate that satisfies the requirements of §6-1005.

With respect to other site permits, Omya will submit an application for Construction General Permit for the operation of the TMAs.[1] Furthermore, Omya has a Stormwater Discharge Permit (i.e., Permit No. 3512-9010) for the stormwater management system on the west side of the Verpol Plant. In addition, Omya has a Discharge Permit (No. 3-0395) authorizing the discharge of treated process water from the Verpol Plant to Otter Creek and to an unnamed tributary of Smith Pond. It is noted that Omya has not discharged water under that permit for several years but maintains the permit for those instances when such discharge may be necessary. Because the closed TMAs do not increase the impervious area at the Verpol Plant, a modification to the Stormwater Discharge Permit is not required.

4.0 PROPOSED CLOSURE SCHEDULE

Closure of the various TMAs will occur when one or more of the following milestones occur:

- Placement of the tailings product achieves the desired final grades;
- The term of the certification has expired; or
- On-site storage of tailings product no is longer needed.

Pursuant to 10 VSA §6605b(c)(7), the term of an Interim Certification is limited to two years. As such, the Verpol Plant TMAs would be closed within two years of the date of certification unless either a one-time two-year extension to the Interim Certification is approved or the TMAs are certified otherwise.

[1] A Construction General Permit (# 3-9001(2003) NOI # 1044) was issued for the prior proposal to develop a larger, above-grade TMA on approximately 32 acres of land above and surrounding the Dolomite Quarry. That proposal is not a part of this application for Interim Certification.

Closure of the TMAs will occur in the sequence illustrated on Sheets 3 through 10 of the Engineering Drawings. The time period for each phase is about one year, assuming 150,000 tons (about 110,000 cubic yards (yd^3) of tailings product are generated each year.

Closure of individual TMAs will be accomplished as follows:

1. Following placement of the tailings product, the surface of the TMA will be graded to the contours and slopes presented on the applicable grading plan (see Sheets 2 through 10 of the Engineering Drawings). During the TMA grading activities, the existing perimeter stormwater features are to be maintained free of obstructions and otherwise to comply with the design criteria.

2. Construct the proposed stormwater management features around and within the limits of the TMAs (see the Engineering Drawings).

3. Once the surface of the TMA is graded properly, the exposed tailings product is to be seeded with the approved grass seed (e.g., conservation mix) and fertilizer based on soil nutrient testing.

4. Following completion of the above steps, an application for Closure Certification is to be submitted to VTDEC. This application will be prepared in accordance with §6-1002(i) of the VSWMRs and the VTDEC Solid Waste Management Procedure entitled "Procedure Addressing Post-Closure Care and Post-Closure Certification at Solid Waste Landfills", dated February 8, 1999.

5.0 CLOSURE DESIGN

5.1 General

The closure design for the TMAs consists of the following three components: (i) final grading; (ii) erosion and sediment control/stormwater management; and (iii) final cover system and re-vegetation. The design of each of these components is described below. In addition, information related to the labor, materials, and testing necessary to close the TMAs, the methods for complying with closure requirements, and the cost to construct and effect the proposed closure is provided below. As of the date of this document, no remedial action related to the TMAs is needed prior to closure.

5.2 Final Grading

The proposed final grading plan for the TMAs is presented on Sheet 2 of the Engineering Drawings, which are provided as Attachment D-2 to the Interim Certification Application. The proposed final grading shown on Sheet 2 assumes that Facility Certification is obtained in the future and that future placement of the tailings product occurs within the Dolomite, Kane & Drake, and Loveland Quarries. As shown on Sheet 2, the maximum elevation of the TMAs will

be generally consistent with the elevation of the immediate surrounding areas. The final TMA grades in areas where additional tailings product will be placed, where possible, will provide a maximum slope of 3H:1V and minimum slope of 5 percent per §6-606(b)(2)(N) of the VSWMRs. In some areas the existing slopes are inclined as steep as about 2.5H:1V. Disturbing the existing in-place tailings, which are currently well vegetated and stable, will be minimized so as not to compromise the stability of the TMA and/or increase the potential for erosion.

5.3 Erosion and Sedimentation Control / Stormwater Management

Because the closure of the TMAs essentially is an earthwork project, the design incorporates the erosion and sedimentation controls and stormwater management features necessary to comply with state requirements and the associated Construction General Permit for such a project. These features, which are shown on Sheets 11 and 12 of the Engineering Drawings, were designed in accordance with the guidance obtained from the "Vermont Handbook for Erosion Prevention and Sediment Control", released 2003. Furthermore, these features were designed to comply with §6-606(b)(2)(J) of the VSWMRs and the VTDEC Solid Waste Management Procedure entitled "Procedure Addressing Requirements for Run-on/Run-off Control Systems for Municipal Solid Waste Landfills", dated May 27, 1994. As shown on Sheet 2, stormwater runoff from the TMAs will flow to the existing stormwater management system of the Verpol Plant. Calculations related to the design of the proposed stormwater management features are provided in Attachment D-3 of the Interim Certification Application.

5.4 Final Cover System and Re-Vegetation

Based on the characteristics of the tailings product, it is anticipated that the material will be used for the 2.5-foot thick earthen material components of the final cover system. As noted in Section 3.0 of this Plan, the requirements of §6-606(b)(2)(M) of the VSWMRs have two parts: a hydraulic conductivity requirement and a vegetation support requirement.

With respect to the hydraulic conductivity requirement, it is anticipated that, when placed and compacted in a controlled manner, the tailings will exhibit an in-place hydraulic conductivity of about 1×10^{-5} cm/sec or less. In order to ensure that this requirement is achieved, compaction and hydraulic conductivity testing will be performed as part of the construction quality control program. Hydraulic conductivity tests of the tailings product will be performed in accordance with ASTM D5084, which uses a flexible wall permeameter and is the preferred test method for fine-grained materials.

As noted in Section 2.0, there is physical evidence that the tailings product is capable of supporting vegetation (i.e., conservation mix). In addition to the physical evidence, Heindel & Noyes performed a study of grass growth in the tailings product in 2005. The results of that study document that the tailings product will sustain vegetation. A copy of the Heindel & Noyes study is provided as Attachment D-5 to the Interim Certification Application. As such, the tailings product would comply with §6-606(b)(2)(M) of the VSWMRs.

5.5 Labor, Materials, and Testing

In order to implement the proposed closure design, Omya will retain the services of an earthwork contractor to grade the area to be closed to the proposed lines and grades, place and compact the upper layer of the tailings product, and construct the proposed stormwater management features. A professional surveyor, licensed in the State of Vermont, will be retained to document the construction by preparing record drawings of the closure construction.

As noted in Section 5.4 of this Plan, construction quality control (CQC) testing of the upper 2.5 feet of the TMA will be performed to verify that the tailings exhibit the desired in-place hydraulic conductivity. The proposed CQC testing includes:

- Laboratory moisture-density testing of the tailings product in accordance with ASTM D698 at a frequency of one test per every 10,000 yd^3 of tailings product placed in the final cover system;

- Laboratory hydraulic conductivity testing of the tailings product in accordance with ASTM D5084 as follows:

    - Initial testing to include five tests at varying moisture contents and densities based on the results of ASTM D698 to define a target window for field test verification; and

    - Performance testing at a frequency of one test per every 10,000 yd^3 of tailings product placed in the final cover system to verify field test data;

- Field moisture and density testing using ASTM D2922 (i.e., Standard Test Method for Density of Soil and Aggregate in Place by Nuclear Methods (Shallow Depth) and ASTM D3017 (i.e., Standard Test Method for Moisture Content of Soil and Aggregate in Place by Nuclear Methods (Shallow Depth)) at a frequency of one test every 25,000 square feet of compacted tailings product.

5.6 Closure Compliance

Omya will assure compliance with the closure requirements by retaining a professional engineer, licensed in the State of Vermont, to serve as a quality assurance consultant. The quality assurance consultant will be tasked with auditing the closure construction and preparing the application for Closure Certification. The application will include a closure construction documentation report, the survey record drawings, and the CQC test results.

5.7 Closure Construction Costs

In order to support the financial assurance instruments (see Part A-8 of the Interim Certification Application), an opinion of closure construction costs was prepared in accordance with the §6-1004 as required by §6-1002(b)(5) of the VSWMRs. The relevant factors considered are listed below.

1. The size and topography of the facility;
2. The location of the facility and the character of the surrounding area;
3. Requirements for surface drainage;
4. Environmental quality monitoring systems, as required; and
5. Structures and other improvements to be dismantled and removed.

The opinion of the closure construction cost is provided as Attachment A to this Plan.

6.0 POST-CLOSURE PLAN

6.1 General

The following outlines the proposed post-closure requirements for the Verpol Plant TMAs. In accordance with §6-1003(c) of the VSWMRs, these requirements include the following:

- Appropriate air, surface water, and groundwater monitoring activities;
- Planned maintenance activities;
- Contact information; and
- Updating the post-closure care cost estimate.

The following addresses each of the above requirements.

6.2 Post-Closure Monitoring

The proposed post-closure monitoring consists of sampling and testing surface water and groundwater in accordance with the Monitoring Plan presented as Part C-2 to the Interim Certification Application.

6.3 Post-Closure Maintenance

The proposed post-closure maintenance activities include: (i) quarterly visual inspection of the final cover system and stormwater management features; and (ii) routine inspection of the groundwater monitoring wells during regular sampling events. Should the results of the inspection indicate that repair or replacement of a closure component is needed, then the required remedy would be scheduled and implemented as soon as practicable.

6.4 Contact Information

As of the date of this Plan, the contact information for the TMAs is:

Mr. Michael Laurent
Omya Inc.
P.O. Box 10
Whipple Hollow Road
Florence, Vermont 05744-0010
(802) 770-7568

6.5 Post-Closure Care Costs

In order to support the financial assurance instrument (see Part A-8 of the Interim Certification Application), an opinion of post-closure care costs was prepared as required by §6-1003(c)(4) in accordance with §6-1005 of the VSWMRs. The relevant factors considered are listed below.

1. The size and topography of the facility;
2. The location of the facility and the character of the surrounding area;
3. The type and quantity of waste received;
4. Environmental quality monitoring system; and
5. The location of the site and the characters of the surrounding area.

The opinion of the post-closure care costs is provided in Attachment B to this Plan. Omya will update the opinion of post-closure care costs to reflect changes to the post-closure activities that may increase the cost of post-closure monitoring and maintenance.

Attachment A

Opinion of Probable Closure Construction Cost
Interim Certification Application
Omya Inc. - Verpol Plant
Florence, Vermont

ITEM	DESCRIPTION	QUANTITY	UNIT COST	UNITS	COST
1	Mobilization/Demobilization		7%	%	$ 52,824
2	Erosion and Sedimentation Control				
	a. Silt Fence	2,000	$4	LF	$ 8,000
	b. Stone Check Dams	170	$125	EA	$ 21,250
3	Grading	28	$900	AC	$ 25,200
4	Installation of Culverts and Drainage Structures				$ -
	a. 30" CPP Culvert	210	$50	LF	$ 10,500
	b. 36" CPP Culvert	3,600	$70	LF	$ 252,000
5	Grade Channels and Install Lining & Geotextile				$ -
	a. Grass Line Channels (no geotextile)	2,500	$4	LF	$ 10,000
	b. Riprap Lined Channels (2.5 feet deep)	4,740	$67	LF	$ 317,580
	c. Riprap Lined Channels (3 feet deep)	550	$83	LF	$ 45,650
	d. Gabion Downchute (18" deep)	50	$105	LF	$ 5,250
	e. Riprap Aprons (12" D50, 18" deep)	360	$40	SY	$ 14,400
6	Fertilize, Hydroseed, and Mulch	28	$1,600	AC	$ 44,800
	Subtotal (Items 1 - 6)				$ 807,500
7	Project Management	1	5%	---	$ 40,400
8	Contingency	---	20%	---	$ 169,600
TOTAL PRESENT VALUE CLOSURE CONSTRUCTION COST					**$ 1,018,000**

Notes:

1. This opinion of probable cost represents an estimate for financial planning purposes, and does not represent a contractor's construction cost estimate.
2. The above opinion of probable cost is consistent with the standard of practice for preparing engineering estimates and is limited to an accuracy of approximately +50% to -30%.
3. Quantities estimates were obtained from the Engineering Drawings (Part D-2 of the Interim Certification Applicatic
4. The contingency reflects uncertainty associated with the market including, but not limited to: oil prices, labor rate increases, transportation cost, quantity overruns, and design changes during construction.

Attachment B

8/15/05

Opinion of Probable Post-Closure Care Cost
Interim Certification Application
Omya Inc. - Verpol Plant
Florence, Vermont

ITEM	DESCRIPTION	QUANTITY	UNIT COST	UNITS	COST
	(Years 1 through 30)				
1	Water Quality Monitoring and Reporting	1	$ 37,000	EA	$ 37,000
2	Site Visits	2	$ 750	EA	$ 1,500
3	Mowing	30	$ 140	AC	$ 4,200
4	Erosion Repair	1	$ 2,500	AC	$ 2,500
5	Project Management	1	$ 20,000	YR	$ 20,000
				Subtotal, Annual Cost	$ 65,000
6	Contingency	---	20%	---	$ 13,000
				Present Day Annual Cost	$ 78,000
				No. of Years	30
				inflation rate	3%
				Future Value , Years 1-30	**$ 3,711,000**
	(Years 5, 10, 15, 20, 25, 30)				
7	Maintain/Repair Monitoring Wells	5	$ 1,000	EA	$ 5,000
8	Repair Grading	2	$ 2,500	AC	$ 5,000
9	Repair Vegetation	4	$ 1,600	AC	$ 6,400
10	Rebuild drainage features	200	$ 4	LF	$ 900
				Present Day Subtotal, Five Year Costs	$ 17,300
11	Contingency	---	20%	---	$ 3,500
				Present Day Cost (every 5 years)	$ 21,000
				inflation rate	3%
				Future Value, Years 5, 10, 15, 20, 25, 30	**$ 218,000**
				Total Future Value for Post Closure Care	**$ 3,929,000**
				PRESENT VALUE POST-CLOSURE CARE COST	**$ 2,637,000**

Notes:

1. This opinion of probable cost represents an estimate for financial planning purposes, and does not represent a contractor's construction cost estimate.
2. The above opinion of probable cost is consistent with the standard of practice for preparing engineering estimates and is limited to an accuracy of approximately +50% to -30%.
3. Quantities estimates were obtained from the Engineering Drawings (Part D-2 of the Interim Certification Application).
4. The contingency reflects uncertainty associated with the market including, but not limited to: oil prices, labor rate increases, transportation cost, quantity overruns, and design changes during construction.