RESPONSE TO TECHNICAL REVIEW COMMENTS

Tailings Management Areas
Verpol Plant
Florence, Vermont

Prepared for
Omya Inc.

Prepared by
Sanborn, Head & Associates, Inc.

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RESPONSE TO TECHNICAL REVIEW COMMENTS

Interim Certification Application
Tailings Management Areas
Omya Inc. Verpol Plant
Florence, Vermont

The purpose of this document is to provide specific responses to the April 18, 2006 technical review comment letter from the Solid Waste Management Program of the Vermont Department of Environmental Conservation Waste Management Division (VTDEC). The technical review comments were prepared during VTDEC's technical review of the August 15, 2005 Interim Certification Application (Application) submitted by Omya Inc. (Omya) for the tailings management areas (TMAs) at the Verpol plant in Florence, Vermont. The technical comments address the Application as well as the December 22, 2005 report entitled *Numerical Fate and Transport Modeling* that was submitted by Omya in support of the Application pursuant to a June 29, 2005 VTDEC request.

Included in the April 18, 2006 comment letter is the following statement:

> *Some of the following comments are meant as a confirmation of the material presented, or as a simple statement of our position, but the comments in* italics *require a response from Omya. Please address the following comments, and if changes to the application are warranted, our preference is that Omya simply revise the application text and resubmit the amended sections. In this way, the amended application is a stand alone, corrected, final version.*

As requested, this document and the enclosures provide Omya's responses to the comments in italics as well as to certain non-italicized comments that either are not correct, reflect a misunderstanding of the Application, or require clarification. For clarity, the VTDEC technical review comments are repeated below in boldface type, followed by responses presented in common type where responses are warranted.

COMMENTS AND RESPONSES

Volume I of III – Administrative Documents and Facility Management Plan:

Executive Summary

In the Executive Summary, and in many other locations in the application, the facility is referred to as a "storage" facility, and the tailings are exhibited as being "stored" at the facility. While the Program is comfortable with the term "management" as in Tailings Management Areas, the facility is being certified as a disposal facility, and the tailings that are being placed in the TMAs are being disposed of, and not stored. The Program recognizes and applauds Omya's initiatives towards creating a market for the beneficial use of the tailings, but currently none exists, and therefore the tailings need to be disposed.

- ***The application should be revised and all references to "storage" should be removed from the application.***

Response:

Since the beginning of its operations at the Verpol plant, Omya has managed the tailings product resulting from its production process in on-site TMAs. Omya purposefully has retained the tailings product on its site with the goal and expectation of retrieving the material for sale as an end-product or for further processing to recover the calcium carbonate content of the tailings product. In other words, Omya recognizes the tailings product as a potential significant source of feed to its processing plant.

Omya clarified its intention to recover calcium carbonate content of the tailings product shortly after submitting the Application (see the letter from Edward V. Schwiebert to Matt Chapman, dated August 26, 2005), in which Omya stated:

> "…as was stated throughout the Application documents (as well as on numerous prior occasions), it was and remains Omya's intent to reclaim, reuse, or market the tailings product as those opportunities become available in view of the benefits to be derived from such activities as well as the goals of solid waste management to reuse materials and thereby reduce the volume of what ultimately is 'wasted'. *See, e.g.* Volume I, Application Executive Summary at 2; Volume I, Part A-7, Planning Requirements, at 1-2; Part B, Facility Management Plan, at 2."

The use of the term "stored" in the Application was intended to represent Omya's retention of the material in keeping with its past and present goal to recover the tailings product for the calcium carbonate content or for the marketplace. While VTDEC determined the tailings product to be a waste that must be managed under the Waste Management Act and the Vermont Solid Waste Management Rules (VSWMRs), Omya has "stored" the tailings product on-site in the industrial sense of keeping it available for ultimate recovery. This continues to be Omya's intention, as reported to and acknowledged by the VTDEC, notwithstanding the certification process. Nonetheless, consistent with the VTDEC's request, the Executive Summary and other relevant portions of the Application will be revised to remove references to "storage", and will reflect that: (i) the TMAs will be certified as discrete disposal facilities; and (ii) the tailings product is properly managed within the TMAs.

Any comments regarding the individual subsections of the Executive Summary will be incorporated with the detailed sections, attachments, and appendices of the application.

PART A - Administrative

No comments on Parts A-1 through A-6. These sections were assessed as part of the previous administrative review of the Application and found to be satisfactory. Included are the signed application form, property deeds, location maps, notices, and list of surrounding property owners. Omya needs to ensure that any copies of revisions and

additions to the application be sent to the Pittsford Town Office and be kept at the Omya office to keep the both of those files current.

Part A-7 of the application addresses the planning requirements of the statutes and Rules. The relevant statute for interim certifications, 10 V.S.A. §6605b(b)(5), states… "that the operation of the facility is consistent with an approved plan, for the area in which the facility is located, or the state solid waste management plan." The relevant Rule, §6-306(5), states that the applicant must submit "evidence that the construction, alteration, continued operation of the facility or continuation of the activity is consistent with regional solid waste plans, if any, and the state waste management plan." Our review considers whether the operation of the Omya facility is consistent with both the Rutland County Solid Waste Management District (RCSWD) Solid Waste Implementation Plan (SWIP) and the State Solid Waste Management Plan (State Plan).

Regarding the RCSWD Plan, the Department has determined that the tailings are a solid waste, and that the Verpol Plant operation is a solid waste management facility. In its currently approved SWIP, the RCSWD "grandfathers" certain solid waste facilities. Section 6.6, entitled *Siting and Private Facilities,* states that the RCSWD grandfathers existing facilities in existence as of May 1, 1993. On July 7, 2005 RCSWD issued a statement finding that under the RCSWD SWIP the facility meets this grandfathering provision, which was included in the application.

Further, in the most recent version of the draft revised RCSWD SWIP, dated February 17, 2006, the OMYA facility is contained in a list of "Facilities Included in this Plan." While the draft plan has not been approved by the Secretary, and certification applications are judged against current plans, the 2006 draft SWIP does further support the "inclusion" finding. Because the Solid Waste Program approved the RCSWD's SWIP (June 30, 1993), as being in conformance with the State Plan, the operation of the facility is thereby consistent with the RCSWD's SWIP.

In order to issue a certification, the Program must find that the regional solid waste plan, that includes the facility applying for certification, is in conformance with the regional plan adopted under 24 VSA ch. 117. In other words, the RCSWD SWIP must be in conformance with the Rutland Regional Plan. The Program has evaluated the conformance of these two particular plans previously in the context of other certification applications. As a result, it has been found that the RCSWD SWIP conforms to the Rutland Regional Plan.

The State Plan is entitled "Revised Solid Waste Management Plan" and was adopted by the Agency of Natural Resources on August 31, 2001. Section I of the plan discusses progress in waste management since the 1989 State Plan and the status of current solid waste management. Section II of the plan presents the critical issues facing the State and sets forth action plans and goals for addressing these critical issues. Overall, very few of the action steps apply to specific facilities because the State Plan was developed and written primarily as a plan for ANR to implement and for municipal solid waste planning entities to use a standard by which to develop their own plans. With this in mind, several critical

issues and action steps apply to the Omya application, and the following findings can be made:

- **The determination of "consistency" with the State Plan cannot be based on any discussion of "wastes from mining operations" since the plan does not specifically mention this waste stream.**

- **Landfilling is recognized as a legitimate waste management option for industrial wastes. The operation of such a landfill would be consistent with the State Plan.**

- **The first critical issue identified in the State plan is to reduce waste through waste prevention, reuse and recycling and reducing the amount and toxicity of waste generated. The application for interim certification contains information that identifies recent OMYA process changes to limit discharges by recirculation process water (Part A-10, Page 8), and efforts to improve tailings environmental and reuse market quality (Part A-9, Page 10; and Part A-9, Golder Associates' Paste Technology Evaluation). It is in Omya's best interest to reduce the quantity of tailings produced, to lessen the chemical contamination load of the tailings, and to establish a viable market for the tailings.**

- **The third critical issue identified in the State Plan is Ensuring Environmentally Sound Waste Management Facilities. Given the regulatory history of this facility, this critical issue is being addressed by Omya's submittal of an application for certification and the State's review of that application and is consistent.**

Based on the information presented, for the purposes of interim certification, the operation of the facility is consistent with the State Plan.

<u>Part A-8, Financial Assurance</u> - For the application to be technically complete a specific plan for financial assurance evidence must be included with the Application. This plan would include the type of instrument and the financial institution to be used.

- ***Please revise the application to indicate which financial institution will be capitalizing the surety bond.***

<u>Response</u>:

Because of covenants and provisions of loan agreements and the restrictions contained in those documents, Omya has determined not to utilize a surety bond. Rather, Omya intends to utilize an irrevocable standby letter of credit according to the requirements of Section A-3 of Appendix A to the VSWMRs. The institution that will be expected to issue the Letter of Credit will be HSBC Bank USA, N.A., which maintains a branch located at 126 State Street, Albany, New York 12207.

The Application states that the surety bond will be posted after issuance of the interim certification. Please note that the financial instrument must be capitalized prior to us issuing a final certification. Also please see Appendix B of the Rules- Financial responsibility and capability; discussion and forms. You will note that a Financial Guarantee Bond (a surety bond) must also have a standby trust established.

Response:

Although obviated by Omya's decision to utilize a letter of credit, Omya believes it is important to state its disagreement with the position that a surety bond must have a standby trust established. According to §6-901(c) (i.e., Financial Responsibility-Private Facilities,) of the VSWMRs:

> *Evidence of financial responsibility shall be in one* [emphasis added] *or a combination of the following forms:*
> *(1) a trust fund maintained by the applicant for the benefit of the Agency with a surety bond guaranteeing full payment into the fund;*
> *(2) a surety bond guaranteeing performance of closure or post-closure care;*
> *(3) an irrevocable standby letter of credit;*
> *(4) a deposit of acceptable collateral, as determined by the Secretary;*
> *(5) a financial test and corporate guarantee, as determined appropriate by the Secretary; or*
> *(6) other financial responsibility instruments that the Secretary may deem appropriate.*

In the Application, Omya selected the second option, not the first. The second option requires a surety bond only, not a trust as well. See also Appendix A, Part A-2 of the VSWMRs. Notwithstanding the foregoing, as stated above, Omya intends now to utilize a Letter of Credit and Section A-8 of the Application has been revised accordingly.

The remainder of the language in the application in regard to the surety bond conforms to that of Appendix A of the Rules and is acceptable.

Part A-9, Background Disclosure, was reviewed as an element of the administrative completeness review. Omya was informed on November 30, 2005, that the Program was anticipating denying the application as a result of past environmental violations. OMYA preemptively submitted information on November 11, 2005, intending to demonstrate its rehabilitation as allowed under 10 V.S.A. §6605f. On December 16, 2005, the Program determined that Omya has rehabilitated the past violations, and that the technical review would commence.

Part A-10, Statutory and Regulatory Responses, is, effectively, justification for interim certification. That is, facilities that do not qualify for "full" certification may be issued an interim certification if additional information is submitted in accordance with Rule §6-306 and 10 V.S.A. §6605b, and the Secretary makes affirmative findings.

Omya lists the following deficiencies or areas of Rule non-compliance which presently preclude the site from full certification:

a. Minimum isolation distance to seasonal high water table (§6-503(b)(4))
b. Minimum isolation distance to bedrock (§6-503(b)(4))
c. Minimum isolation distance to a property line (§6-503(b)(4))
d. No liner or leachate collection system (§6-606(b)(2)(A))
e. Final cover system design (§6-606(b)(2)(M))
f. Maximum finished slope grades (§6-606(b)(2)(N))

On Page 2, Omya asserts that tailings disposal in the Kane & Drake and Loveland areas commenced prior to July 1, 1987, so that these areas are not required to be lined in accordance with Rule §6-606(b)(2)(A). This assertion is irrelevant since 10 V.S.A. § 6605b(b)(4) requires that the facility be operated in a manner that will not create an unreasonable risk to public health or the environment. The Program believes that this is best accomplished by both the Kane & Drake and Loveland TMAs demonstrating conformance with the performance standard of the Rules. That is, the facility shall be located such that an emission or discharge will not unduly harm the public health and have the least reasonable impact on the environment (§6-503), must be in compliance with all applicable environmental quality standards (§6-603), and must be designed to minimize the possibility of an emission or discharge (§6-606)(a)(1).

- ***Please delete all references to the issue of applicability of the 1987 liner requirement date.***

Response:

Omya agrees that §6-606(b)(2)(A) of the VSWMRs is not relevant to Interim Certification and will remove references to liner and leachate system requirements. However, Omya disagrees with the VTDEC's statement that Omya was merely asserting that the Kane & Drake and Loveland Quarries were being used as TMAs prior to July 1, 1987 -- rather, statements in the Application to this effect are factual. As noted in the Application, Omya was utilizing the Kane & Drake and Loveland TMAs long before July 1, 1987. Because those areas were in use for receipt of the tailings product, they are not new facilities or new discrete operational units placed in operation after July 1, 1987. Those facts are not irrelevant but are meaningful to the consideration of the Application and also to an understanding of the operations at the facility. Furthermore, that longevity of use is directly relevant in light of the data demonstrating that, despite long term placement of tailings product in those locations, process chemicals (including those not associated with tailings product) are not detected in groundwater or, if detected, are well within the applicable regulatory requirements. Accordingly, and as stated in the supporting documentation, the facility has been and is operated in a manner that will not create an unreasonable risk to public health or the environment.

Necessity and Public Benefits (2.0) - Omya asserts (1) that the tailings are an unavoidable byproduct of the calcium carbonate refinement process, given present methodology, (2) that transporting the tailings to an alternative disposal facility is impractical, expensive,

and environmentally damaging, if feasible at all, and (3) that the continued operation of the Verpol Plant is economically beneficial to the Rutland region and Vermont as a whole.

The Program does not require any additional information under this portion of the application.

<u>Assessment of Currently Available Management Methods (3.0)</u> - Omya states that in the future they will alter the process to (1) discontinue the use of the initial settling cells for dewatering, (2) discontinue the use of the Kane & Drake Quarry for dewatering, (3) reduce the liquid fraction of the tailings, (4) institute "paste technology," and (5) continue to explore the markets for beneficial uses of the tailings. The Program agrees that these changes are constructive by resulting in less process water potentially entering the environment and making for a more manageable material. And, of course, finding a market for some percentage of the tailings would be an economic plus. Conversely, paste technology does not reduce the volume of tailings needing to be managed. See comment in (4.0) below.

<u>Response</u>:

Section 3.0 (i.e., Assessment of Currently Available Methods) was included in Part A-10 to provide VTDEC information on how Omya has and will continue to refine its production process to reduce its dependence on water through reclamation and reduce the volume of tailings product generated. By the time the Application was submitted, Omya had only initiated its evaluation of paste as a potential technology that could be incorporated into the Verpol plant production process. While paste does not reduce the volume of tailings product generated, it does reduce the total volume of material to be handled because of the reduced water content of the final product. In addition, the dewatered material is expected to be easier to handle than tailings product in the current consistency.

Regarding paste technology, we recognize the benefit of the process in regards to materials handling, but there is insufficient information to determine why the amended tailings would be more marketable as a product.

- ***Please provide the Program with information on the benefits to tailings that contain a low percentage of bentonite, other than a drier consistency.***

<u>Response</u>:

The use of amendments, including bentonite, has not been determined to be necessary. As stated in the Application, Omya is evaluating paste as a technology and as a marketable product, whether or not inclusive of bentonite or other amendments. Because of the timeframe necessary to perform that evaluation, Omya is not able to describe fully the potential benefits as part of the Application. At the outset, a dewatered, or paste, product will be easier to handle. Further, such product is expected to be easier to apportion for various cementitious or similar applications and admixtures. The reduction in water content will avoid altering the bonding characteristics of

such products that excessive water could cause. In the event the market for tailings product calls for a dry product, the reduction of water content will facilitate (and reduce energy consumption required for) further drying. As further evaluations are performed, and Omya has decided how best to proceed, VTDEC will be informed how paste will be incorporated into the overall management of the tailings product as part of future certification and permit applications.

- ***Explain whether not having clay in the mix would detract from the marketability of the material.***

Response:

As noted in the Application and in the comment above, bentonite may or may not be a component of a paste product. The addition of bentonite may or may not detract from the marketability of the material and that will depend largely on the market use, the quantity of bentonite that may be utilized, and other factors.

Assessment of Reasonable Alternatives (4.0) - For "reasonable alternatives" Omya cites the high cost of off-site disposal, the lack of landfill capacity, and the environmental consequences of remote disposal. These are all legitimate validations for disposal in the existing areas, but there was no discussion of increasing the efficiency of the calcium carbonate process, and thus decreasing the volume of tailings produced. Waste prevention is always preferable to reuse or recycling.

- ***Please provide the Program with information explaining whether there is any expectation of reducing the volume of tailings produced at some future time.***

Response:

Omya continually evaluates its production process to identify methods to improve efficiency. However, improved efficiency does not automatically relate to a reduction in the amount of tailings product that is generated. Indeed, increased flotation efficiency could result in an increased removal of impurities. Conversely, to the extent that new technologies will permit the reclamation of the calcium carbonate fraction of the tailings product, those technologies may have a greater volume reducing impact. Also, as previously noted, the expectation is that markets for the tailings product will be identified, thereby enabling the sale of and reducing the need to manage the material.

- ***Please provide the Program with information discussing potential technological changes to the beneficiation process that would reduce in less waste produced.***

Response:

Omya has, and continues to, expend significant resources toward improving its beneficiation process. Over time, these improvements have increased the efficiency of the production process resulting in reduced tailings product generation. Omya also continues to investigate potential alternate beneficiation technologies that may decrease or eliminate the need for flotation reagent and/or result in reduced tailings product generation.

Schedule to Close or Obtain Full Certification (5.0) - This portion of the application states that Omya will use the interim certification period to pursue new technologies for improving the operations and for marketing the tailings. The application also states that a full certification application will be submitted for the remaining capacity in the Kane & Drake, Loveland, and Dolomite Quarries but variances are not discussed nor is there other information demonstrating that full certification would be plausible in two years.

Response:

Pursuant to Commissioner Wennberg's June 20, 2005 letter to Omya President Jim Reddy, Omya was required to submit either: (i) an application for Interim Certification pursuant to 10 V.S.A. §6605b; or (ii) an application for Facility Certification pursuant to 10 V.S.A. §660. Considering the time constraints imposed by the proceedings as well as site limitations and the requirements for full certification, Omya submitted an Application for Interim Certification. As noted in an earlier comment, Section 1.0 of Part A-10 of the Application does identify the variances that will need to be obtained for Facility Certification of the TMAs. Particular details regarding how Omya will address the variances was not provided in the Application because: (i) such information is not specifically required by the VSWMRs or by 10 V.S.A. §6605b, which requires that an interim certification shall specify the schedule to achieve full certification; (ii) Omya is in the process of evaluating how to approach the variances; and (iii) information related to how the variances will be addressed will be part of the Facility Application for the TMAs, assuming Interim Certification is granted. Furthermore, considering that the Mining Waste portion of the VSWMRs became effective on June 12, 2006, the need for variances may have been obviated.

Notwithstanding the foregoing, Section 5.0 of Part A-10 of the Application has been revised to include a section on how Omya would anticipate proceeding toward full certification, assuming that Interim Certification is issued by VTDEC.

The schedule to obtain full certification, or closure, needs to be detailed with definitive actions and timeframes for each. Omya cannot simply continue to operate the TMAs as accustomed for an interim certification period, if one is issued, then re-apply for second two-year period. In accordance with the provisions in 10 V.S.A. §6605b, the application must contain specific information concerning how Omya will meet all requirements for full certification or proper closure after the initial interim certification period, and we need to

find the information sufficient and realistic, in order to issue the interim certification. This is a major omission in the application.

Response:

As noted in the response to the comment above, Part A-10 of the Application has been revised to include information related to the schedule that Omya proposes to meet the requirements for full certification or proper closure, assuming that Interim Certification is issued by VTDEC.

- ***Please provide the program with amendments to the application that show a schedule to obtain full certification under existing rules, or closure for the facility, and definitive actions and timeframes for each activity.***

Response:

Please see response to the comment above.

Monitoring (6.0) and Risk Evaluation (7.0) - Both of these topics are detailed in later sections of the application and the comments will track those sections.

PART B – Facility Management Plan
The Facility Management Plan is a condensation of many of the other sections of the application. Comments on the FMP are included below, but may be detailed or repeated in related sections.

Introduction (1.0), General Site Information (2.0), Site Characterization (3.0) - No comments on these subsections of the FMP. Specific comments on risk, hydrogeology, tailings characteristics, environmental monitoring will be made in the later review of Volume II of III of the application.

Facility Design (4.0) - Subsection 4.1 repeats the assumption that the Kane & Drake quarry is exempted from the statutory and Rule requirement that landfill be lined. See comment under Part a-10 above.

- ***Please delete the language referencing the Kane & Drake Quarry as exempt from the liner requirements.***

Response:

Please see the response to comment under Part A-10 above.

Subsection 4.1 contains a brief discussion of the potential for gas generation from the tailings. Omya's conclusion that the inorganic nature of the tailings will preclude the generation of significant decomposition gases appears reasonable. A gas monitoring plan is required under the interim certification section of the Rule §6-306(b)(4).

- ***Does Omya contend that a gas monitoring plan is unnecessary? If so, please make this position clear in the application***.

Response:

As stated in the Application, the tailings product in the TMAs is not anticipated to generate decomposition gases. As such, it is Omya's contention that a gas monitoring plan is unnecessary and Omya does not intend to install gas extraction system infrastructure. Section 4.1 of the Facility Management Plan (Part B of the Application) has been revised to reflect this position.

Subsection 4.2 briefly discusses the final grading plan, which is then presented (and will be reviewed) in depth in the later Engineering Design and Operations Plan. Supplementing the final grading plan is the slope stability assessment that is also presented in the Engineering Design and Operations Plan. That stated, the subsection relates that some existing final slopes are steeper than the 3H:1V slope allowed by Rule §6-606(b)(2)(N). Omya is contending that these slopes are stable and is proposing not to regrade them to conform to the Rules. The Program has comments on the slope stability analysis, but does not disagree with these conclusions. As such, under the allowances of an interim certification, the currently finished slopes may remain as they are; however, this area of non-compliance must be corrected during the interim certification period, or a variance must be obtained, in order to gain full certification.

Response:

It is Omya's intention to apply for a variance to the VSWMRs with respect to the side slope requirement. Information regarding the issue and the need for a variance has been incorporated into Part A-10, Section 5.0 of the Application.

Subsections 4.3, 4.4, and 5.0, regarding stormwater management, the final cover system, and facility operations are detailed further in Volume III of the application, and will be commented on later in this letter.

Volume II of III – Site Characterization Report, Monitoring Plan, and Supporting Data:

Part C-1, Site Characterization Report

Much of the information and data that is incorporated into this Part of the application has been submitted and reviewed previously during the original solid waste rule exemption determination, then the Commissioner's Final Determination process, then the reconsideration of that determination, and finally during the planning of the numerical

modeling and environmental monitoring program. Over time, the information has been augmented and refined, and additional data have been collected and validated. In the process, many site and tailings characterization issues have been raised and addressed. In general, the Program has accepted Omya's and the consultants' site characterization efforts and work products thus far. Those efforts now have to be linked to the certification requirements including the additional justifications for issuing an interim certification.

Executive Summary
Any comments on the Executive Summary are withheld to correspond to specific sections of the Site Characterization.

I. Introduction
No comments.

II. Tailings Characterization Methods
"Worst Case" design concentrations for several of the substances listed in Table 1 were derived from mass balance equations. These include TOHI, Polyacrylates, and Phosphorus.

- ***Please provide copies of the mass balance equations referenced above and discuss the contents of those equations.***

Response:

Omya will provide VTDEC with a copy of the mass balance equations but, because of the confidentiality of the information, this information will not be included as part of the open Application available for public review. The information provided to the VTDEC will have to be maintained as confidential in accordance with the legal requirements for such information.

A Draft Discharge Permit from the Wastewater Management Division was issued for the OMYA facility in Florence on April 10, 2006. Appendix A of the draft permit includes a list of chemicals used in the industrial processes at the facility. The list in Appendix A of the draft permit does not match information provided to the Program in the Application. On page 3 of the Site Characterization Report there is a table with a column showing "substances Listed on the NPDES Permit". There is no reference in the table to the date of the NPDES Permit referenced in the Application. In order to characterize the tailings, the list included in the application should be updated to include all chemicals used at the OMYA plant. It is understood that chemicals with different names may have the same chemical composition depending on the supplier or concentration. However, it is important for the purposes of reviewing this application to have a complete list of the chemical compounds used in calcium carbonate processing at the OMYA plant.

- ***Please provide Material Safety Data Sheets (MSDS) for chemicals used at the OMYA Plant.***

Response:

Omya has included the MSDS as part of Appendix 3 of Site Characterization Report (SCR) and has revised the text on page 3 of the report to identify the location of the MSDS in the Application. The SCR also has been revised to explain that although the list in the draft NPDES permit appears different than table 1, it indeed does list the same compounds, which merely are being provided by different vendors or under different trade names.

- ***Provide an explanation for the differences in the list of chemicals in the August 2005 Application submittal and the list in the March 2006 submittal to the Wastewater Management Division. Identify any chemicals on the list which are not currently used in the process.***

Response:

As noted above, the SCR has been revised to make clear that no new chemicals are used. Rather, differences are trade names or proposed dispersants that have not yet been used and that are not materially different than current chemical formulations.

- ***Historically, were there any chemicals used in the process which are not included in analytical test methods used by OMYA in recent years on tailings samples or water quality samples? If so, provide information about these chemicals.***

Response:

The historic use of process chemicals at Omya's Florence, Vermont facility was reviewed and analytical tests for those chemicals were incorporated into the routine sampling program. As a result, all process chemicals used at the facility are tested, except for those chemicals for which test methods are not available and for which mass balance results are utilized as described in Section II of the SCR (polyacrylamide, polyacrylate, and phosphorus).

III. Site Characterization Methods

No comments. This section is basically a description of geologic methods, monitoring well installations and the resulting well network, and past water quality sampling and analyses.

IV. Tailings Description

Section A., Physical Description, states that tailings particle size ranges from 1 to 100 micrometers, based on past testing performed by GeoDesign. That represents a large range in size, and the reference in Appendix 3 shows this graphically.

The samples were taken at one time in different surficial locations of one settling basin, and therefore may not represent older tailings, or homogenous tailings. We are aware that Omya has done extensive characterization of the recent tailings in an effort to market the material for a beneficial use.

- ***Please provide the conclusions of the Geodesign tailings size study, particularly in regard to particle size variability.***

Response:

Pages 1 and 2 of Appendix 3 to the SCR contain the available information provided by GeoDesign regarding grain size information of the tailings product.

- ***Please provide other available grain size data, and compare with the range presented in the application.***

Response:

Grain size analysis on tailings product was performed by Golder Associates as reported in their report entitled *Paste Technology Evaluation for Tailings Product Resulting From Mineral Processing*, which is provided as an attachment in Part A-10 of the Application.

Both the second and third bullets of the discussion of tailings permeability should have references included.

Response:

Section IV of the SCR has been revised to include references for the second and third bullets.

- ***Please provide the Program with copies of the GeoDesign, GeoTesting Express, and Golder Associates permeability data.***

Response:

Permeability information for the tailings product has been incorporated in Parts A-10 and D of the Application (see the attachment to Part A-10 for the Golder data, and Part D-4 for the GeoDesign and GeoTesting Express data).

Section B, Chemical Profile. Perhaps this issue should have been addressed before, as "typical" chemical concentrations of the tailings and their leaching characteristics have been presented for quite some time. The Program does not agree that the use of a 95% confidence level is appropriate in this instance for typical TOHI leachate concentrations.

Parameters in Table 7, the concentrations of contaminants in the tailing themselves, are presented as "worst case." The Groundwater Rules require, with exception, the calculation of the 95% confidence level when comparing groundwater quality data (the mean, specifically) to a known standard. But that is different from a calculation of the theoretical design concentration.

Using TOHI as an example, H&N calculated the mean as 203 ppb, and a 95% confidence interval of 178 to 228 ppb. Interpreting the statistics, the data indicate that we are 95% confident that the true mean falls between 178 and 228 ppb. The upper confidence level does not indicate that, for instance, 95% of the samples will be below that concentration, which seems to be the implication from the application. This is quite obvious from the TOHI leachate results on page 12 of Appendix 3, where 20 out of 49 sample results were greater than the 228 ppb upper confidence limit.

- ***The Program believes that worst case numbers should be applied in consideration of leachate data or Omya should provide a detailed explanation on why worst case numbers should not be applied, taking into account the information contained in the above paragraph.***

Response:

Table 8 of the SCR has been revised to show a Leachate Design Composition of 0.053 – 0.467 parts per million (ppm), where the upper limit of 0.467 ppm represents the single highest concentration data point.

Initially, EPA Method 8270C was employed for the analysis of TOHI. Questions arose about the suitability of this method due to the instability of the compound at the high temperatures of a gas chromatograph. The Program concluded that Method 8270C was not suitable for accurately quantifying TOHI. Commissioner Jeff Wennberg, in a June 20, 2005, letter to James Reddy, specified a strategy and timeframe by which OMYA needed to develop and validate an acceptable method for TOHI analysis. This work progressed through the summer of 2005 and culminated in the Department's acceptance of Method AG-24 as performed by Endyne Inc., for water samples being analyzed for tailings floatation reagents.

We have not received additional information or communication on the analytical methodologies since Dr. Gerald DiVincenzo's letter of August 11, 2005, which is included in Appendix 9. Therefore, it remains our understanding that the Initial Demonstration of Capability (IDOC) process for the LC/MS method is incomplete, as is the IDOC for solid samples using AG-24.

- ***Please provide the Program with a validated method that will be used for sampling tailings solids if such testing were required as a condition of the certification, if issued, and how will they be analyzed.***

Response:

An independent laboratory is currently validating the method for testing for flotation reagent on solids.

Section C., Tailings Evaluation. In the discussion of Flocculent, it is stated that the acrylamide monomer is biogradeable and has a half-life in moist soils of less than two days. Evidence has shown that the half-life of TOHI deep in the tailings mass is much greater than predicted under ideal conditions. Given this uncertainty:

- ***Please provide the Program with information on the degradation of acrylamide monomer in an anaerobic environment such as the buried tailings, and whether the acrylamide monomer's degradation in an anaerobic environment will make a difference in groundwater quality.***

Response:

The SCR has been revised to note the fact that anaerobic degradation of acrylamide occurs as follows:

> "However, it is reported to biodegrade rapidly in the environment both aerobically and anaerobically. Aerobically, half-lives of 18 to 45 hours have been reported for moist soils (not unlike the tailings), and similar breakdown rates have been reported for river water; anaerobic degradation rates of up to 55% have been measured in experiments over a two-week test period. Therefore, any acrylamide that might exist in the tailings would not be expected to persist in the environment. While actual rates of degradation may be slower in the tailings management areas than under laboratory conditions, nonetheless acrylamide has not been detectable in groundwater or surface water at or near the site; all 68 samples to date have shown it to be non-detectable (detection limit of 0.0005 mg/L)."

There were detections of other contaminants in groundwater samples not listed in the site characterization report but included in the Appendix 5.

- ***Please provide the Program with additional information on the following contaminants found in groundwater samples and explain why they were not considered in the site characterization report:***

    - **Isopropyl Benzene**
      Detected in Well #2
      Sample Date: 7/27-8/20/01
      Concentration: 1.8 ppb
      VGES: none

- **Bis (2 ethyl hexyl) phthalate**
  Detected in Well 96-1
  Sample Date: 7/26/01
  Concentration: 5.3 ppb
  VGES: none

Response:

The substances listed above were considered in the analyses. The following text has been added to the SCR for clarification:

> "Following the OPP spill, some compounds that are believed to be breakdown products of the OPP biodegradation were found in groundwater. For example, Isopropyl Benzene was found in well #2 during March and July of 2001 at 1.3 and 1.8 ppb; during this time OPP was also being detected in the well and was the likely source of the isopropyl benzene. Similarly, bis (2 ethyl hexyl) phthalate found in well 96-1 on 7/26/2001 may also be related to the OPP degradation. These compounds have not been detected in groundwater at the site since the remediation of the OPP spill was completed."

Page 20 states that acetone concentrations in groundwater are below standards. However, on 3/30/01 acetone concentration in Well B exceeded the VGES (700 ppb) at a concentration of 780 ppb.

- ***Please make the appropriate modifications to the text regarding acetone concentrations in groundwater or provide a detailed explanation on why such changes are not necessary.***

Response:

The SCR has been revised to provide background information about acetone concentrations detected at the Verpol plant. On pages 21 through 23 of the SCR, a more explicit explanation has been provided to the effect that the March 30, 2001 detection of acetone was an unidentified peak (using method 8260) and therefore was uncertain. Subsequently, a different laboratory method (8260B), selected because it is specific for acetone, was used to test for acetone. Acetone was detected twice by method 8260B, both times within the groundwater enforcement standard. To date (last sampling event: October 2005), acetone has not been detected in 89 on-site groundwater samples, 28 offsite groundwater samples, and 21 surface water samples.

After acetone was detected in well B in 2001, Omya investigated the source of the acetone and determined that it originated as an impurity in the dispersant used at the plant. Modifications to the Verpol plant process water system were implemented so that water from the dispersant system was captured and reused in the plant, reducing the chances for release of acetone to the environment. Following this process change, no acetone has been detected in groundwater or surface water at the site.

The SCR accurately states "Acetone levels in groundwater are within the 0.700 ppm Vermont Groundwater Enforcement Standard." This statement is based on a proper analysis of groundwater data as specified by Vermont's Groundwater Protection Rule and Strategy. The report explains the data analysis requirements of the Groundwater Protection Rule.

Although one single data point from over five years ago may have exceeded the standard, that exceedance is not certain and every single sample collected from groundwater and surface water since May 2001 has been below the standard for acetone, or a non-detect. It would be inconsistent with the Groundwater Protection Rule to deem the groundwater "not in compliance" based on one single test result out of 117 total samples on and off the site. The one possibly offending result was an unidentified peak, which was footnoted in the report with the statement "Identification and quantification are not confirmed" (see page 16 of Appendix 5 of the report).

Furthermore, after the collection of the subject sample, Omya redesigned and changed the water circulation system to capture and re-use more of the process water that may contain acetone, rather than disposing of it with tailings. The 89 subsequent tests from on and off-site all have shown no detectable levels of acetone in groundwater. Therefore, it is correct to say that acetone levels in groundwater are below the standards, and have been below the standards for five years.

Section D., Results of Testing of Old Tailings Product, contains a brief discussion and several graphs of the results of thermogravimetric analysis (TGA) of the tailings. Detailed information is lacking, so it is difficult to interpret the results. For instance, there is no discussion about how, or if, TGA accounts for the differences in moisture content in the original samples. While there is some indication from the TGA that the volatile fraction of the tailings is less at greater depth, the results are not consistent. Further, given the variability of TOHI analytical results in solids, there is no way of knowing what the original concentration of chemicals was in any particular core sample. As written the TGA results are interesting, but unless the information presented can be elaborated upon, or confirmed with additional research, the Program does not believe the data provides supplementary evidence that is particularly useful in the tailings evaluation or supportive of the application.

The same conclusions are applicable to the TOHI testing that was performed on the core samples. While the Program believes that TOHI biodegrades in the tailings, the coring analytical results are not consistent, the original concentrations are unknown, and the relationship between anaerobic and aerobic decomposition is not well established. Also, the correlation between bacteria counts and the concentration of TOHI at the various depths is not well understood. Without additional confirmatory work, the conclusions presented are of limited value in the application review.

Response:

The thermo-gravimetric analysis ("TGA") is a standard procedure utilized in laboratories for testing the organic content of soils and similar materials. TGA measures the gross amount of organics in a sample by heating it to combust all the organic matter. The weight of the sample

before and during combustion at varying temperatures are measured and compared in order to perform the measurement. First, the samples are dried at a relatively lower temperature, to eliminate moisture or pore water from being a nuisance variable. Any adsorbed water on the surface of the tailings particles will be evaporated in the beginning of the TGA test. This water is measured as a mass loss up to a temperature of 110° C (because water boils at 100° C.) As the sample presented to the TGA has already been dried, there is no pore water. There simply may be a small amount of adsorbed moisture, which will be identified as water because of the temperature (under 110° C) at which it is lost from the sample. Above 110° C, the curve of temperature vs. mass will show mass losses that are the result of the oxidation (burning) of the organic compounds in the sample. Omya's laboratory has run TGA on the neat process chemicals (TOHI included) in order to recognize their decomposition temperatures and patterns.

Omya has verified that the tall oil levels in the tailings product has been consistent since the commencement of operations at the site. Therefore, the observed general decrease in tall oil concentrations between the top of the TMA and the bottom does indeed indicate bacterial degradation. Other than bacterial degradation, no other process would explain the approximately 50 percent decrease in tall oil concentrations; leaching to groundwater is not a likely cause because groundwater sampling results from the many bedrock wells on the site do not show TOHI in the groundwater.

V. Site Description

On Page 27 of the Site Characterization Report, there is a reference to a 1997 Geomapping Associates Report.

- ***Please provide a copy of the 1997 Geomapping Associates Report to the Program.***

Response:

A copy of the 1997 Geomapping Associates Report is enclosed with this response document.

The assumption of this section is that all groundwater underlying the site discharges on the Omya property or close by.

- ***Please provide the program with information showing how Omya excluded the possibility that some or all groundwater may not be discharged at the surface features listed and measured but may continue to travel through bedrock fractures off-site to the north or northwest in the general direction of groundwater flow.***

The application discusses the north plunging fractures in bedrock that bedrock flow is to the north - northeast. Also, according to the discussion on page 29, bedrock fractures occur from 20 to 420 feet below the ground surface.

- ***That being the case, is it accurate to assume that all groundwater discharges along these surface features near the property boundary?***

- ***Could groundwater migrating further than the proximal discharge points also account for the difference between the calculated discharge rates on Page 34 (122 and 156 GPM) and the measured discharge rate of 31 to 33 GPM?***

Response to the above three comments:

Although VTDEC's notes that "The assumption of this section is that all groundwater underlying the site discharges on the Omya property or close by," this statement does not accurately reflect the information in the SCR. It would be more accurate to say, "The assumption of this section is that groundwater underlying the site discharges primarily to the regional topographic low point along Smith Pond Tributary, north of the Omya property, and a small amount of the groundwater discharges on the Omya property."

The SCR does not exclude the possibility that groundwater may not be discharged at the surface features listed (the Hendee Spring, the tributary to Smith Pond and associated wetlands, and the swale near Well E). The report does conclude that the majority of the groundwater from the site flows beyond the property line to the north. As described in pages 31 through 35 of the SCR, it is estimated that approximately 3 to 6 percent of the groundwater in the flow system at the TMAs discharges at the Hendee Spring location on the Omya property. The remainder of the groundwater flow is believed to continue north, off the Omya property, and discharge along the tributary to Smith Pond.

It is not likely that groundwater continues to flow northward past the Smith Pond tributary, because the topography north of the tributary slopes uphill significantly (refer to the USGS map on Page 1 of Appendix 1 of the SCR). For this reason, we expect that the Smith Pond tributary is the regional groundwater discharge location. Additionally and as described in the SCR, piezometers installed adjacent to the Smith Pond tributary confirmed that groundwater discharges there.

As far as the measured and calculated groundwater discharge rates are concerned, the difference in these rates indicates that the assumptions in the flow estimates are reasonable, as the flow rates are within an order of magnitude. The calculated rate for the entire flow system is an annual average, approximated based on assumed recharge rates. In contrast, the measured flow rates were made specifically in the month of July, when flows are at their lowest. Therefore it is expected that rates of groundwater discharging to the tributary in July of 2005 would be less than the annual average groundwater discharge rate. The fact that the flow rates are within an order of magnitude indicates that the assumptions are reasonable.

Additionally, the fact that the measured discharge rates were lower than the estimated groundwater discharge rate suggests that additional groundwater discharge may occur at locations upgradient from the tributary, including the Pittsford-Italian Quarry (water pumped into the Verpol plant), and at the identified discharge locations on the northwest portion of the flow

system and the swale near well E (flow was not measured in these areas because the diffuse flow of the swampy areas is not amenable to standard gauging procedures).

The SCR has been updated to include additional discussion of the methods, assumptions, and appropriate interpretation of this analysis.

VI. Conceptual Model

With two exceptions, the Program agrees with the factors presented in the model and generally accepts the conclusions presented in the geologic and hydrogeologic site investigation, including groundwater seepage rates, the areal extent groundwater flow system, the groundwater flow pattern, the relationship between gravel and bedrock aquifers, and groundwater discharge points and rates. The two areas where additional questions arise are related to the discharge of groundwater (noted above) and the biodegradation of TOHI (noted below).

At the bottom of Page 36 is another discussion of the biodegradation of TOHI. While it is accepted that TOHI decomposes in the environment, and it is likely that decomposition has been experienced in the older tailings at the base of the TMAs, there is not adequate evidence justifying an approximate 50% reduction in TOHI concentrations over time.

VII. Compliance with the Siting Standards for the Vermont Solid Waste Management Regulations

A. Prohibited Areas

Based on the evidence submitted, the Program concurs that the Verpol Plant and TMAs are not in any of the prohibited areas listed in Rule §6-502.

B. General Performance Standard

The application asserts that surface water and groundwater sampling data have shown that *all* groundwater at the site in compliance with applicable groundwater standards. This subject will be discussed further in the review of the contaminant transport model, but that statement is somewhat misleading since it is impossible to completely monitor the groundwater over the entire site. The program would agree that groundwater currently being monitored, and groundwater at compliance points is currently in compliance with established groundwater standards. No off site wells have shown detectable concentrations of tailings-related compounds, and similarly, no off site surface waters have had detectable concentrations of tailings-related compounds. However, please note the following comments below on the various subsections of the General Performance Standard.

1. Groundwater and Surface Water Monitoring Results

The discussion involving the 95% confidence level should be revised as discussed on page 9 above.

- ***Please revise Table 9 to include a column for "highest concentration detected" and exclude "highest 95% CL."***

Response:

As previously noted, the SCR has been revised to explain the following:

- The fact that the one apparent exceedance of the acetone groundwater standard was an unidentified peak;

- The fact that the 95 percent confidence level is the correct statistical analysis of the groundwater data;

- The fact that Omya has modified its process water circulation system to reduce acetone levels; and

- The fact that no acetone has been detected in groundwater or surface water since the change was made.

Consistent with an earlier response to this issue, it is appropriate to use the 95 percent confidence levels for analysis of groundwater data. Although one can argue that the 95 percent confidence level should not be used for a "theoretical design concentration," regarding tailings product leachate, this calculation is the most suitable statistic when there are years of existing groundwater data as is presented in Table 9 of the SCR.

As specified in §12-706 of the Groundwater Protection Rule and Strategy (1/27/2005), the 95 percent confidence level should be calculated to evaluate whether a groundwater standard is exceeded. The Rule makes exceptions from use of this statistic when not enough data are available for the statistical analysis, and when sampling clearly indicates an exceedance. Neither of these cases for exceptions exist at Omya; there are more than ten data points (the minimum for the statistical calculation that is accepted by the VTDEC), and the data do not clearly indicate any violations because most analyses have shown all chemicals to be non-detectable.

- ***The table would then reference the 780 ppb of acetone detected in Well B on 3/30/01, a result that was above the 700 ppb groundwater enforcement standard.***

Response:

The SCR has been revised to clarify the single result identified. However, there are several reasons why it would be misleading to revise the table to highlight that single data point as the comment suggests. First, as discussed above, characterizing groundwater data by focusing on the single highest detection, out of dozens of tests spanning over five years, would be unsound scientifically and confusing. Second, the March 30, 2001 detection at Well B was reported as an "unidentified peak, as identified in spectral analysis. Identification and quantification are not

confirmed" (see Page 16 of Appendix 5 of the SCR). Third, the March 30, 2001 data point represents site conditions before Omya made changes to the water circulation system designed to capture and re-use more of the water that may contain acetone. The 89 subsequent acetone tests from on and off-site all have shown no detectable acetone in groundwater. Therefore, the 95 percent confidence levels for groundwater data will be used, consistent with the Groundwater Protection Rule and Strategy.

According to Table 13 in Appendix 5, secondary groundwater standards for Total Dissolved Solids have been exceeded in three monitoring locations. The source of this information is the 2001 Johnson Company, Inc., Waste Characterization Investigation Report.

- ***Please provide the Program with the identity of the wells sampled for TDS.***

Response:

The wells are identified in Table 13, Page 1 of Appendix 5 in the SCR as Well 5 (CDP Well), Well 96-1, Well 96-2, and Gravel Well 1. Of the four wells sampled, TDS exceeded the secondary standard in wells 96-1 and 96-2; TDS was equal to the standard in Gravel Well 1. On the original lab reports from the Johnson Company (Addendum A), these wells are referred to as WC GW1, WC GW-3, WC GW-2, and WC GW-4, respectively.

2. Fate and Transport Modeling

Results of the Golder Associates work, referenced in this section and included in Appendix A are similar to the results of the Sanborn, Head and Associates "Numerical Groundwater Fate and Transport Modeling Report," which is reviewed separately below. Golder Associates' report corroborates the conclusion of SHA that the flotation reagent's affinity to the tailings and its biodegradability greatly limit its transport in the groundwater. The Golder report concludes that TOHI, and Amine Acetate, two of the components of the floatation reagent, will biodegrade to below detection level nearly within the footprint of the tailings disposal areas. The third component, Aminoethyl-ethanolamine (AEEA), is present in initial concentrations at below detection levels.

Response:

Omya appreciates the recognition of the modeling results and the consistency between the two work efforts. Please note that "the flotation reagent's affinity to the tailings" product is expected to limit its leachability from the TMAs, whereas its highly sorptive and readily biodegradable properties "limit its transport in the groundwater" as reflected in the modeling.

- ***Please revise the application to remove references to the 95% confidence level and use the "highest concentration detected" as the input parameter for the partitioned floatation reagent.***

Response:

Golder's analytical modeling efforts were preliminary and intended to provide an initial analysis of the flow and transport of the components of the flotation reagent under base conditions. Rather than revise Golder's preliminary analytical model, Sanborn Head and Associates (SHA) prepared a model that incorporates the single highest concentration detected for the flotation reagent.

Golder used 95 percent upper confidence levels of the arithmetic mean concentrations to represent the potential leachate from the TMAs in a simple analytical fate and transport model. Subsequent work completed by SHA did include a sensitivity analysis to assess flow and transport that used the highest concentrations detected as the concentrations specified for the leachate from the TMAs. Therefore, revising Golder's preliminary work is considered unnecessary because it is only a precursor to SHA's analytical and numerical modeling, which did, as the request states, "use the 'highest concentration detected' as the input parameter for the partitioned floatation [sic] reagent."

C. Specific Standards

1. **Isolation distances from high seasonal water table, bedrock, and waters - The TMAs do not meet the numerical standards for groundwater (6') and bedrock (10') separation distances of Rule §6-503, Table A, as the tailings are being disposed in an unlined quarry, at times directly against bedrock, and originally in groundwater. (The TMAs do meet the required 300' separation distance to surface water.) The failure to conform with these two minimum siting requirements are two of the reasons why the Omya facility does not qualify for a certification. Omya has presented siting evidence that regardless of the lack of buffer distance to groundwater and bedrock, "that the an emission or discharge from the facility will meet all applicable environmental quality and public health standards and rules" as required by Rule §6-503(b)(1).**

- ***Please revise the application to address how this section will ultimately be complied with, and provide a schedule to obtain compliance or note your intention of closing the facility at the end of the two year period. Further, the Program does not believe that reliance on the proposed amendments to the Solid Waste Rule is an appropriate justification for how the facility will come into compliance. The proposal needs to be based upon the rules in effect on the date the application was determined administratively complete.***

Response:

As requested, Section A-10 of the Application has been revised to include information related to the steps that Omya will take to obtain closure and Full Certification. Omya also agrees that it is the rules in effect at the time its Application was determined to be administratively complete that

govern. The Application simply was pointing out the fact that the precise path to be followed was uncertain in view of the fact that revisions to the SWMR were pending.

2. Isolation distances to public and private drinking water sources – The distance from the closest edge of a TMA (Kane and Drake) to a water supply (the Sandillo well) is approximately 1600', greater than the minimum required distance in Table A of 1000'. Further, as noted in (1) above, Omya has presented evidence that off site groundwater is not being adversely affected by leachate from the tailings, and that contamination is not, and will not be, present beyond a short distance from the footprint of the TMAs.

- ***What is the distance and identity of the closest water supply to the TMAs in the presumed downgradient direction?***

Response:

Although no water supplies exist in the direct groundwater flowpath from the TMAs as far as the identified groundwater discharge location along Smith Pond Tributary (see groundwater contour maps, Appendix 1 of the SCR), the closest drinking water supply in the general northwest direction from the TMAs is the O'Keefe private well, which is about 2,500 feet from the closest TMA, the Loveland Quarry. The VELCO well and Omya's gravel Wells #1 and #2 are closer to the TMAs than the O'Keefe well in the north-northwest direction, but are not drinking water supplies. These three wells are 1,250, 1,800, and 1,500 feet from the closest TMA, respectively. The SCR has been updated to include this information.

3. Isolation distances to property lines, residences, schools, day care facilities, hospitals, and nursing homes – Isolation distances to property lines (300') and occupied buildings (1000') are intended to ensure that the facility does not result in objectionable odors, unreasonable noise or visual impacts, or otherwise adversely affect public health. Although these standards appear in the Siting subchapter of the Rules, the design and operation of the facility ultimately dictates whether or not there is an odor, noise, aesthetic, or other nuisance or public health impact.

While there has been some concern about odors, the concerns are focused on the OMYA manufacturing operations, which are not regulated by the Program and are not a part of this review. As the application states, there is no evidence that odors are associated with the tailings or TMAs.

- ***Please expand upon the discussion of the visibility of the TMAs and screening by topography and vegetation. For example, from which direction(s) are the TMAs concealed by landforms, and from which direction are they concealed by vegetation only. Explain whether screening will remain effective throughout the theoretical design life of the facility, or will there be a point in time when the TMAs are visible above the ground surface or treeline, particularly considering the closest property***

boundary is only 110' away. Explain whether the TMAs are or will be visible when the leaves are off the trees?

Response:

As noted in Section VIIC(3) of the SCR, the TMAs are well screened from public view by topography and trees. As discussed in Parts D-4 and E of the Application, the existing slopes of the TMAs, which may be visible from some nearby locations, are well vegetated. Likewise, the proposed TMA development will be similarly vegetated. As such, the TMAs would not cause an unreasonable visual impact, even when the trees are void of vegetation.

The Rule addressing noise mandates that a facility not unreasonably increase the level of noise detectable off site of the facility. There is obviously some noise attributable to the management of the tailings: dump truck and earth moving equipment engines, back up alarms, pumps, etc. There are also noises associated with transportation of the raw ore, and production and transportation of the finished calcium carbonate. The Program considers any noise resulting from the production process as background, and noise resulting from tailings management as the potential "increase" cited in the Rule. This section of the application is silent – no pun intended – on noise from the tailing management operation, and thus a positive finding on this cannot be made.

- ***Please provide convincing evidence that tailings management does not unreasonably increase noise levels.***

Response:

As noted in Part E of the Application, movement of tailings product occurs over two distinct six-week periods each year (typically in the fall and spring). The level of noise generated during the movement of the tailings product is below the background noise from the plant, which is well below the 70-decibel level limitation in the facility's Act 250 permit.

4. **Table A criteria – The Program is in agreement with the distances referred to in Table 11, with the following exception. The closest property line is approximately 110' from the southeast corner of the Kane and Drake quarry, but from the phased operations plan it does not appear that any fresh tailings will be disposed of this close to the line as the lower perimeter of the disposal area is at final grade. Scaling off the map, it appears that the new tailings will be placed no closer that 200' from the boundary.**

- ***Please clarify whether the nearest adjoining property is 110 feet from the non-operating perimeter of the disposal area, or from the area which future disposal will occur.***

Response:

The SCR has been revised to reflect the actual distance from the Kane & Drake TMA and the nearest property line of 120 feet, which is discussed on page 2 of Part A-10 (i.e., Statutory and Regulatory Response) of the Application. The proposed TMA grading plan presented on Drawing 2 of 12 (Part D-2 of the Application) shows that the new tailings would not be placed within 300 feet of the property line in accordance with §6-503(b)(4) of the VSWMRs. For clarity, the drawing will be revised to note the 300-foot setback.

- ***Please include in the application a schedule and strategy for obtaining compliance with this provision of the solid waste management rule.***

Response:

Because of reasons cited throughout the Application, stability being a primary consideration, Omya does not propose to reduce the footprints of the existing TMAs. As previously noted herein, Part A-10 of the Application has been revised to address schedule and strategy to obtain full certification.

5. Serious development limitations – No comments.

6. Access from highways – No comments

7. Distance to airports – Not applicable as the tailings are not attractive to birds.

VIII. Conclusions

This section is a brief compendium of the previously detailed sections of this Volume of the application. Although the Program has numerous comments and requests for additional information on the site characterization and associated information, nothing in the Conclusion section requires explanation or revision.

Omya, Inc., Verpol Plant Tailings Monitoring Plan (dated August 15, 2005)

An earlier version of the Omya site monitoring plan was submitted on June 29, 2005. This plan was in response to the requirements of the Commissioner's June 20, 2005, letter referenced above, and was treated as an interim monitoring plan to be implemented while the application for certification was being prepared and processed. The interim plan was commented on, revised, and approved by the Program. One round of environmental monitoring was performed at the Omya site in accordance with the revised plan, and those monitoring results were submitted and reviewed by the Program.

The August 15th version of the Omya, Inc., Verpol Plant Tailings Monitoring Plan was also included in the application for certification package. Although the original plan was intended as short term guideline to allow a rapid development of site monitoring, much of

the document is applicable to future routine monitoring, if a certification is issued. Also, with one round of monitoring having been completed, and the data assessed, we know where the plan is adequate, and where there may be gaps. In all, there are no major issues with this monitoring plan, but specific comments include:

Response:

The monitoring plan recently was revised on February 24, 2006 in response to written State comments dated January 7, 2006 and a follow-up memorandum from the State dated February 20, 2006. An e-mail from the State on April 7, 2006 accepted the revisions to the Monitoring Plan. A few of the comments in the April 18, 2006 review letter either are redundant or contradictory to the revisions that recently were approved. The comments are discussed one at a time below.

1. **On page 9, footnote 4, there is a discussion of the pending Liquid Chromatography/ Mass Spectroscopy (LC/MS), and its use in lieu or in conjunction with Method AG24. Because the LC/MS method has not been approved, and may not even be necessary, the footnote may be deleted. *If the method is approved and its use is warranted, the plan can be revised at that time*.**

Response:

The Monitoring Plan has been revised by deleting this footnote so that Method AG-24 is the only method mentioned for analysis of water samples. At such time or times it may be appropriate to modify the Monitoring Plan, Omya will contact the Program to do so.

2. **With the Fall 2005 Monitoring Report, there were some questions about the process for gaining permission to sample off-site wells, and providing that information to the program, and follow up if permission was denied. The property owners who are included in the regularly scheduled monitoring program but who declined testing will have it offered again prior to each sampling event. The monitoring results report should include a description and/or table that explains the process of asking permission, whether permission was granted, and, if not any reason that was given. The report should also indicate any changes to the off site water supplies, e.g., reported problems, new well, new property owners, etc. *Please revise the plan as necessary.***

Response:

The requested revisions have been made.

3. ***Please revise the plan to require collection of field data (pH, temperature, conductivity, oxidation reduction potential) for off-site locations.***

Response:

As discussed during the meeting of May 4, 2006, Omya will include one-time measurement of pH, conductivity, and temperature during sampling. However, low-flow purge monitoring cannot be performed at the off-site locations as previously explained.

On February 23, 2006, Omya explained that connecting the low-flow sampling apparatus to the permanent plumbing installations at the homeowner wells would not be practical and would be disruptive to the residents and their use of the sources:

> "Omya explained that the off-site wells and well #5 all contain permanent submersible water pumps and plumbing. Because of the permanent pump and plumbing installations, it is not necessary to collect the low-flow data, because the wells are pumped frequently, which causes fresh groundwater to circulate through the wells, unlike a monitoring well which sits undisturbed for months."

VTDEC's April7, 2006 reply indicated that VTDEC was in agreement on the issue:

> "The SWMP realizes that low flow sampling techniques will not be used at Well #5 and the off-site sampling locations. We raised the issue because it seemed simple and would be help [sic] for the SWMP to have information related to the collection of the off-site water supply well samples. Examples of field data that could be collected at a water supply site include: (1) which tap was the sample collected from, (2) how long was the tap run before collecting the sample, (3) does the water supply have treatment and how was it by-passed for the purpose of collecting the water quality sample."

In response to the above comment from the VTDEC, Omya is collecting and reporting information regarding: (1) sample location; (2) purge rate and duration; and (3) treatment.

4. ***Please revise the plan to coincide with the QA/QC provisions of the Program's Groundwater Quality Monitoring Procedure.*** **This includes the collection of duplicate samples, the use of trip blanks, and the collection of equipment blanks.**

Response:

The requested revisions previously had been made and approved in February 2006. No further changes have been made to this section.

5. **The timeframes for reporting the monitoring results was also an issue with the first sampling event.** ***Assuming a 30-day turnaround time from the laboratory, we are suggesting that routine results be submitted to this office within 60 days of completed***

***sample collection, which is the standard for landfills that we regulate*. Reporting for abnormal results should be identical to the procedures outlined in Section 7 – Contingency Plan.**

Response:

The requested change has been made. However, as discussed during the May 4, 2006 meeting, the turnaround time may take longer if the laboratory's QA/QC standards are not met, and analyses of the samples need to be repeated, for example. Therefore we have included the provision that we may contact the VTDEC and request an extension if such a situation occurs.

6. **The monitoring plan includes no provisions for analyzing the tailings themselves. *Representative samples from representative locations must be collected and analyzed for total and leachable contaminants of concern, during each semi-annual monitoring event*. This is particularly important to track any process changes that may result in different levels of chemicals in the tailings. As noted in an earlier comment, our continued understanding is that Method AG-24 has not been accepted for use with solid matrix samples. *Please provide additional information on how tailing samples be collected and analyzed.***

Response:

Because the VTDEC has not approved or confirmed a validated method for testing for flotation reagent in solids, Omya does not propose to collect solids samples at this time. At such time as a method is validated, Omya will consider revising the monitoring plan, or making other provisions for analyzing tailings product solids.

Volume III of III – Engineering Design and Operations Plan

Part D: Engineering Design

***Sections 1.0 – 4.0*. No comments on these sections.**

***Section 5.0*, TMA Development, contains fill progression plans for each year for the first eight years of operation. For the record, according to the narrative and confirmed by the plan sheets, the tailings will continually be graded to between 5% and 33%. As such, final closure could occur at any time in that eight year period; for example, after one or two two-year interim certification periods. Further, at least through year eight, no tailings will be placed on virgin areas, therefore the footprints of the TMAs will not be expanded beyond the present limits of waste.**

Section 5.3, Final Grading: No regrading of the existing finished 2.5:1 tailings slopes are proposed in the application. These steep slopes do not comply with Rule §6-606(b)(2)(N), and this represents another area of non-compliance that needs to be addressed during the

interim certification period. While the proposed "mining waste" subchapter of the rules may alleviate such a requirement, these rule revisions are not finalized.

- ***If Omya has no future plans to regrade these slopes, the application must clarify this and contain a schedule for a variance application.***

Response:

As previously stated herein and in the Application, Omya does not intend to regrade the existing TMAs slopes, which could reduce their stability, of the in order to comply with §6-503(b)(4) or §6-606(b)(2)(N) of the VSWMRs. Furthermore, the Application clearly states that new tailings product placed in the TMAs will be in compliance with §6-503(b)(4) and §6-606(b)(2)(N) of the VSWMRs. As noted previously in this response document, Omya will address variance issues in an application for Facility Certification during the Interim Certification period. A schedule for addressing Facility Certification has been incorporated into Part A-10 of the Application.

Section 5.4, Slope Stability. Omya performed a slope stability evaluation as outlined in the "Seismic Procedure." Although this procedure only applies to Municipal Solid Waste Landfills, the methodology for determining stability is applicable to other solid waste facilities.

Material property parameters for the stability calculations are contained in the Appendix entitled "Slope Stability Calculations," Table 1, which in turn references the August 2005, Golder Associates report on paste technology for unit weight, friction angle, and cohesion of various materials used in the calculations.

- ***Please provide a reference to a page in the Golder report for these parameters or any other document from which these parameters come.***

Response:

Contrary to the comment above, Table 1 of the Slope Stability Calculation does not address the tailings product subjected to paste technology. Rather, Table 1 addresses the measured or published engineering properties of the tailings product, compacted soil, and rock. The reference to the Golder report (i.e., *Paste Technology Evaluation for Tailings Product Resulting from Mineral Processing*), which is included in the Application as Appendix 1 to Part A-10 (i.e., Statutory and Regulatory Response) is incorrect, and the calculation narrative has been revised to indicate the correct reference. The Golder report provided only the unconfined compressive strength of the paste, which was used to define the cohesion of the material; the friction angle was assumed to be zero (see Table 2 of the Slope Stability Calculations). The unit weight of the paste was assumed to be the same as the tailings product measured by GeoDesign.

- ***Further, regarding specific parameters: the tailings are assigned a friction angle of 0 to 45^o and cohesion of 0 to 250 psf. Please explain the range on these parameters and supply a report page reference.***

Response:

Table 1 of the Slope Stability Calculations is entitled "Possible Material Strength Properties." This information was provided so that a reviewer could see a summary of the range of possible values for the various materials. Table 2 of the Slope Stability Calculations is entitled "Selected Material Strength Properties" and hence provides the actual values used in the analyses. Justification for these values used is presented in the narrative portion of the calculation.

In the Slope Stability Calculations section of Appendix D-3, since the existing 2.5:1 slopes are not currently sloughing, SHA assumes that they have a factor of safety of greater than 1.0. From that assumption, lower bound internal friction angle was calculated for the factors of safety of 1.1 to 1.5. The assumptions are reasonable.

Appendix "Slope Stability Calculations" – The slope stability analysis states that the disposed tailings "have a relatively dense outer shell" likely as the results of compactive equipment, and that the tailings density decreases with depth. One would think that the tailings in the TMAs were spread and compacted similarly over time, and that assumed densities observed during the borings were only a function of moisture content. The upper surface of the TMA was dry, seemingly denser, while beneath the crust were wet tailings, seemingly less dense.

Response:

The placement of the tailings product is described in the comment above is incorrect. Placement of tailings product in the TMAs is described in Section 3.4 of the Operations Plan (Part E to the Application). In summary, Omya manages the TMAs by constructing an outer shell from drier tailings product, which is amended with stone and compacted (i.e., higher strength material). The wetter tailings product (i.e., lower strength material) is placed in the center of the TMA, and the material is allowed to dry through evaporation and solids settlement. Decant water is collected and reused in the plant. Accordingly, the observation of a dense outer core from the borings corroborates Omya's management practices.

Two tailings samples were collected to characterize the internal strength of the in-situ tailings, and the samples were to represent the range of in-situ relative densities of the tailings. *There are notes on three of the boring logs (2, 3, and 8) and it is not clear which of these were the samples used for the direct shear testing.* All three were collected from deep in the waste mass (16-18', 28-30', and 33-35') and it is not explained how these are representative of the different apparent densities of the tailings. *Please clarify that these samples are representative of the different apparent densities in the tailings, and if they are not please explain why they are not.* Regardless, does it matter what the apparent density of the

particular samples were if the tailings themselves are homogenous over time. ***That is, should not a sample of older tailings from the bottom of the TMA be identical to a fresh sample out of the discharge pipe if the moisture content and compactive effort during remolding is the same?***

Response:

Although the boring logs indicate discrete sampling intervals within certain borings, samples of the tailings product were obtained throughout each boring. For clarity, the calculation narrative has been revised to identify the samples that were obtained for testing. In response to the comment, the following samples were subjected to geotechnical testing:

- One sample was obtained from Boring B-2 from the Kane & Drake TMA. The sample was obtained from a depth of 28 to 30 feet below ground surface (bgs) and represented the lowest strength material encountered in the Kane & Drake TMA (based on blow counts, which are presented on the boring logs).

- A composite sample was developed to represent the lowest strength material encountered in the Dolomite TMA (based on blow counts, which are presented on the boring logs). This sample combined material obtained from Boring B-8 (33 to 35 feet bgs) and Boring B-9 (10 to 20 feet bgs).

The "older tailings product at the bottom of the TMA" is not "identical to fresh tailings out of the discharge pipe" because they have different moisture contents and only the tailings product in the TMAs have been subjected to compaction. Please see Section 3.4 of the Operations Plan (Part E to the Application) for a description of how Omya manages the tailings product from the discharge pipe to placement in the TMAs.

Appendix "Slope Stability Calculations" – Contains an excerpt (Attachment C) from a 2002 Geodesign study of the OMYA tailings. Findings from this study form the basis of some of the physical properties of the tailings used in the slope stability calculations. Geodesign estimated the "compacted tailings" (tailings in the disposal area that were worked with compactive equipment) have 100% percent solids. ***Please provide additional information on how 100% solids are achieved and any additional sampling of compacted tailings to determine this figure.*** **Recompacted tailings samples molded to mimic field conditions were tested at 13% moisture.** ***Please provide additional information on how this was determined.***

Response:

Although the GeoDesign reference indicates that compacted tailings product is estimated to be 100 percent solids, Omya realizes and does not portray the tailings product placed in the TMAs to be in such a state. By definition, 100 percent solids would imply that the tailings product has a zero moisture content. Rather, in the development of the slope stability calculations, Omya

tested remolded tailings product to "mimic" the results of three compaction tests performed by GeoDesign, which indicated that optimum moisture content ranged between 10 and 13 percent. Therefore, the samples of tailings product obtained from the TMAs were remolded to a moisture content of 13 percent.

The Program requested that the VTrans Geotechnical Engineer review the Slope Stability Calculations, and ultimately the Program's findings. Although some of his comments likely stem from his unfamiliarity with the overall project; but so that no questions remain unanswered*, the Program is forwarding the comments verbatim, and would ask that each be addressed:*

1. ***The boring logs provide no information about the relative moisture content in the materials encountered during the boring operations. It also appears that no groundwater measurements (sic) made during the subsurface investigation. Were piezometers installed to measure seasonal fluctuations in the water table? Were the split spoon samples tested?***

Response:

The boring logs do indicate relative moisture contents of the tailings product encountered during drilling. Qualifiers such as "dry", "slight moisture", "moist", "wet", and "saturated" are included in the sample descriptions.

The reviewer is correct that no groundwater measurements were made. Groundwater contour maps of the area prepared by Heindel & Noyes (see Appendices 1 and 8 of Part C of the Application) indicate that the groundwater table is not present in the Kane & Drake or Loveland TMAs, and is present below the location for potential failure planes in the Dolomite TMA. Measurements of seasonal fluctuations of the groundwater table were performed by Heindel & Noyes and are described in Part C of the Application. Although split spoon samples of the tailings product were obtained, only bag samples of tailings product were tested.

2. ***No mention of ground water conditions is provided in the report and no water table boundary has been shown on the schematics depicting the minimum factors of safety. What assumptions were made in the computer model? This should be clearly stated and data provided to support the assumptions.***

Response:

As noted in the response to Comment 1 above, groundwater was not considered to be a factor in the stability analysis because the groundwater table is not present in the Kane & Drake and Loveland TMAs, and is present below the location for potential failure planes in the Dolomite and Loveland TMAs. However, to address VTrans' concern, the measured groundwater table has been incorporated into the slope stability computer model and the calculation narrative has been revised to reflect the inclusion of the groundwater.

3. It would seem that the tailings placed in a slurry would have a very high moisture content. Has this material been dewatered? If not, how has the moisture content been accounted for in the modeling?

Response:

As previously noted, the tailings product placed in the TMAs is not a slurry, but rather a dewatered material. Please refer to Section 3.4 of the Operations Plan (Part E to the Application) for a description of how Omya manages the tailings product from the discharge pipe (i.e., slurried tailings product) to placement in the TMAs. In summary, except for the tailings product below the groundwater table in the Dolomite TMA, the tailings product does not exhibit a very high moisture content.

4. The color coding on the computer generated sections from the slope stability analysis should be keyed to the legend identifying the soil and rock properties.

Response:

The color output files from Slide have been modified to include labels for the various materials.

5. ***The 3rd reference listed on sheet 1 of 5 has a 1967 publishing date. Attachment "B" which is supposed to have been excerpted from this reference has a footnote which refers to NAVAFAC DM 7 (1971). Which is correct?***

6.

Response:

The reference list has been revised to provide the correct reference for Attachment B.

The slope stability analyses indicate that the factor of safety for static stability of the finished disposal areas will be greater than 1.5, which meets our standard from the (non-applicable) Seismic Event Procedure, and that the FS under seismic conditions will be greater than our standard of 1.0. Unless the comments above radically change these conclusions, it appears that the existing and proposed finished disposal areas are stable under static and seismic conditions.

Response:

The slope stability of the Dolomite TMA was reevaluated incorporating the measured groundwater table. The results of the re-evaluation do not change the conclusions presented in the Application. In short, acceptable factors of safety are maintained.

6.0 Stormwater Management – The stormwater management plans indicate a series of stormwater channels almost surrounding the Kane and Drake, Loveland, and Dolomite Quarries. The system is designed to control surface water run-on and run-off from a 25 year, 24- hour storm event. Surface water collected from runoff from the Loveland Quarry will be directed to an adjacent settling basin. ***Is it correct to assume that runoff from the Dolomite and Kane and Drake Quarries will be directed to an existing culvert that discharges to the Pittsford-Italian Quarry?*** **This transition from the proposed collection system to the existing culvert is not well detailed. The existing culvert is 1800' long.** ***Why is a culvert conveying this water rather than an open channel? In what condition is the culvert and what and where is the outfall?***

Response:

VTDEC is correct in its assumption that the stormwater runoff from the Kane & Drake and Dolomite TMAs is directed to the on-site Pittsford Italian Quarry (PIQ). The Engineering Report text and the Drawings have been revised accordingly.

A culvert was selected to convey the stormwater runoff from the TMAs to the PIQ because of the relatively large amount of area an open channel would have required. The existing culvert appears to be in good condition, but, as noted in the stormwater management calculations (Part D-3 of the Application) the existing culvert will be replaced by a pair of 36-inch diameter corrugated polyethylene (PE) culverts, each about 1,800 feet long. The actual location of the 36-inch diameter PE culverts and the outfall into the PIQ will be coordinated with other site-wide stormwater management system modifications proposed at the plant.

Please contact the Water Quality Division for information regarding other stormwater related permits that may be needed for the facility.

- ***Please confirm with the Solid Waste Program that this has been accomplished.***

Response:

Omya has in place a stormwater discharge permit (No. 3512-9010) that relates to the plant area as well as the immediate vicinity. Omya will be submitting an Application for General Permit to the Water Quality Division, which will be developed giving consideration to the VTDEC comments contained herein. Omya will notify the VTDEC when the Application for General Permit is submitted to the Water Quality Division.

Part D-4 Closure/Post-Closure Plan

Sections 1.0 – 4.0: There are no specific comments that need to be addressed on these portions of the plan narrative. The plan is advantageously designed with a yearly phased closure plan for years 1 – 8, meaning that the facility can be closed at any point during that timeframe without modification to the plan, including after this interim certification, or the next, if issued.

Section 5.0 Closure Design: The closure plan specifies using tailings as the "barrier layer" and as the "vegetative layer" in the TMA capping system. The Rules require an earthen material for these layers in the final cover system for an unlined landfill, or an approved alternative that is demonstrated to achieve equivalent performance. Omya's tailings have been determined to be "earthen material" in accordance with Commissioner Wennberg's, April 29, 2005, declaratory ruling. That determination also indicates that the tailings are not an alternative material, but that they would only need to meet the performance standards of the Rules. The application infers that data indicate that the tailings should have an in-place hydraulic conductivity of <1 x 10^{-5} cm/sec, but the data are not readily presented, and the range that is cited from three different studies is quite broad, and is not sufficient evidence that the 1 x 10^{-5} cm/sec standard will be met. Rule 6-606(b)(2)(M) also requires that the capping soil be less permeable than the facility base soils. Because the tailings at the bottom of the quarries reside on bedrock the Program interprets this Rule section to mean that the capping soils must be less permeable than the bedrock. In the "Numerical Groundwater Fate and Transport Modeling Report," the bedrock hydraulic conductivity parameter used is the geometric mean of 4 x 10^{-5} cm/sec or slightly "faster" than the standard for capping soils.

- ***Please provide clearer information demonstrating that the tailing used as a barrier layer will have a permeability of less than 1 x 10^{-5} cm/sec.***

Response:

Based on the discussion in the comment, it appears that the tailings product, placed and compacted in a manner that exhibits an in-situ hydraulic conductivity of 1 x 10^{-5} cm/sec or less, would meet the VTDEC barrier layer requirements. Subsequent to the submission of the Application, Omya collected samples of tailings product from the Loveland and Kane & Drake TMA for hydraulic conductivity testing. Based on the testing performed on remolded samples of tailings product from the Kane & Drake TMA, an in-situ hydraulic conductivity of 1 x 10^{-5} cm/sec or less can be obtained. As such, Omya believes that the tailings product can be placed and compacted on the TMAs such that an in-situ hydraulic conductivity of 1 x 10^{-5} cm/sec or less can be met. Test data demonstrating these results has been incorporated into the Closure/Post-Closure Plan of the Application.

OMYA is also proposing to use tailings as the vegetative layer, citing the physical evidence of the grassed-over previously capped slopes that the tailings will support vegetation. OMYA also contracted with Heindel & Noyes to perform a laboratory study of the tailings' ability to sustain plant growth. The Grass Growth in Tailings Study Report, dated February 28, 2005, concluded that unadulterated tailings (as well as those mixed with 1 and 2% bentonite) would sustain grass growth, and therefore, no imported vegetative medium is needed. The study was short term and performed in a greenhouse setting, and in those very controlled conditions, it would appear that the tailings performed similarly to the control soil in respect to germination and plant growth. Because of the timeframe and tightly controlled conditions, if the study was the only evidence presented that the tailings would perform in the field, it would be inadequate, but grass cover has been established on

the TMAs, and this vegetation has prospered through the change in Vermont seasons, and varying weather changes we have experienced in that time. The greenhouse study, much like the groundwater model, is a confirmation of site specific data and observations.

The vegetative growth on the capped areas of the TMAs will be monitored as this growing season progresses regardless of the status of interim certification, and our observations will be large factor in ultimately determining whether the tailings can act as the vegetative layer or not, or need to be amended.

In most instances, capping a landfill involves importing a large quantity of topsoil from some distance source. Soil is a precious and finite resource, and landfill capping is not considered its highest and best use. Based on past field conditions, and augmented by the results the H&N grass growth study, we will accept the use of tailings as a vegetative layer during capping. However, the H&N study concludes that fertilizer does not need be added to the tailings to sustain vegetation, while the closure cost estimate contains a line item for fertilizer.

- ***This section needs additional specificity, specifically amendments should include whether fertilizer or any other additive will be incorporated into the material used as a cap, it should specify whether there will be an organic fraction, and if so what percentage, and specify the seed type and seeding rate.***

Response:

References to soil amendments have been removed from the Application text, drawings, and cost estimates.

The proposed CQA testing methods and frequency during placement of the capping "soils" is acceptable.

6.0 Post – Closure Plan - Section 6.2 states that post-closure monitoring consists of the surface water and groundwater sampling and testing found in the Monitoring Plan of Part C-2.

- ***The post-closure modeling discussion should read surface water, groundwater, and drinking water.***

Response:

Section 6.2 of the Closure/Post-Closure Plan has been revised to include monitoring of drinking water.

- ***The Post-Closure maintenance plan does not include regularly scheduled vegetation cutting. Please amend the post closure plan to include the frequency of mowing. The Plan should further detail what the quarterly inspection will consist of, and what the responses will be if a deficiency or problem is discovered. Examples include poor vegetation growth, eroded areas of the cap, and siltation of drainage appurtenances.***

Response:

Regularly scheduled vegetation cutting is not proposed for the TMAs; however, Section 6.2 of the Closure/Post-Closure Plan has been revised to include specifics related to the frequency of inspections, including assessments of vegetation, and the potential responses to identified deficiencies.

Closure Cost Estimates (Attachment A) include 3600 feet of 36" CPP culvert. It is not clear what this is for, but it is assumed that it is the culvert that collects most of the TMA surface water drainage for discharge into the PIQ quarry.

Response:

The reference to 3,600 feet of 36-inch diameter CPP refers to the proposed dual 1,800-foot long 36-inch diameter culvert that will carry stormwater runoff from the Kane & Drake and Dolomite TMAs to the PIQ.

Closure Cost unit costs and quantities appear reasonable, although it is not clear whether the cost estimate applies to full capacity of the site, or site conditions after the two year interim certification period, or if that distinction matters.

Response:

The Opinion of Probable Costs presented as Attachments A and B to the Closure/Post-Closure Plan conservatively reflect the proposed full capacity of the Verpol plant TMAs.

Post-Closure Cost unit costs and quantities appear reasonable.

- ***Does "Project Management" include the cost of re-certifying the facility? If not, please include a line item for this cost.***

Response:

Project Management in the Closure Construction Opinion of Probable Cost table refers to Omya's internal costs related to the TMAs at the end of the two year Interim Certification period. However, this table was revised to include an estimated cost for providing the VTDEC

with a Notice of Closure and an Application for Certification of Closure in accordance with §§ 6-1002(g) and (i) of the VSWMRs. Furthermore, Omya revised the Post-Closure Care Opinion of Probable Cost table to include post-closure re-certification of the TMAs.

Part E – Operations Plan:

General: An interim certification period is, at most, two years. ***Please consider revising the management plan to take into consideration operational changes that would maximize the use of one quarry for disposal activities. For example, transporting dry tailings from the Kane & Drake Quarry to the Dolomite Quarry in an effort to fill one quarry as much as possible, rather than spread tailings over two areas. Provide the Program with information that explains whether the dewatering berm configuration of the Kane & Drake Quarry would hamper closure if the operation was forced to closure after one interim certification period. Please describe any other operational areas or operational changes that should be considered during the term of an interim certification that will result in the facility achieving or moving towards full compliance with the solid waste management rules.***

Response:

It is unclear how implementing "*operational changes that would maximize the use of one quarry for disposal activities*" would "*result in the facility achieving or moving towards full compliance with the solid waste management rules.*" The Operations Plan and the proposed filling sequence presents the best management procedures that Omya has developed over the past 20 plus years of managing the tailings product. The procedures employed by Omya provide for safe and effective on-site storage of the tailings product and limits unnecessary double handling of material, which reduces truck traffic and the potential for dust and noise. Furthermore, the proposed grading plans were developed to demonstrate how Omya would close the TMAs in accordance the requirements of the VSWMRs. The various berms in the Kane & Drake TMA are used to create individual dewatering cells, which need to be closed in a phased manner in order to achieve the final grading requirements of the VSWMRs. As shown on the Engineering Drawings (see Part D-2 of the Application), the final grading requirements of the VSWMRs can be achieved by the end of the second year of interim certification. At this time Omya has no plans for altering its operational procedures as part of the process to achieve Facility Certification.

Section 3.2 Dewatering – The operations plan states that the tailings slurry is pumped into one of two settling cells. On the "Existing Conditions" plansheet, it is very difficult to distinguish these cells from the Loveland Quarry.

- ***Please inform the Program whether the settling cells are part of the quarry that has been bermed off in some manner.***

Response:

As described in the application and shown on the Engineering Drawings, there are two settling basins within the limits of the Loveland TMA. The two settling basins are separated from the remainder of the Loveland Quarry area by an earthen berm.

Section 3.3 Dewatering - This section states that "the dewatered tailings in the setting cells is periodically excavated and transferred to the TMAs."

- ***Please provide the Program with additional information on the frequency of excavation of tailings from the settling cells. This should include the number of trucks transferring material during a transfer and the amount of material transferred.***

Response:

Sections 3.2 and 3.3 (i.e., Transportation to TMAs) has been revised to include information relative to the frequency that the tailings product is removed from the settling cells, the number of trucks typically used, and the amount of tailings product transferred.

Section 3.4 Placement in TMAs

- ***Provide an approximate percentage of the tailings that are lower moisture and sent to the Dolomite Quarry versus what is higher moisture content tailings and sent to the Kane & Drake Quarry. If tailings are moved from the Kane & Drake to the Dolomite Quarry please detail the process, amount, timing, etc.***

Response:

Information related to the approximate amount of drier tailings product to wetter tailings product is provided in Section 3.3. Specifically, about 40 percent of the tailings product excavated is coarser-grained and exhibits a lower moisture content. Tailings product is not transferred from the Kane & Drake Quarry to the Dolomite Quarry.

The slope stability analysis that was presented concluded that the tailings management areas are stable, and yet made no mention of incorporating a stone layer.

- ***Please provide additional clarifying information on the purpose of the incorporation of a six-inch stone layer into the tailings at the Dolomite Quarry. This information should include whether this stone layer is incorporated at the surface and what size stone is used.***

Response:

As stated in Sections 3.4.2 and 3.4.3 of the Operations Plan, the purpose of the 6-inch thick layer of stone is to increase the strength and the erosion resistance of the compacted tailings product. The size of the stone varies from 3 to 4 inches in largest dimension, and is incorporated as part of the overall 2 to 3-foot thick lift of compacted tailings product. As noted on the boring logs (see Attachment D to Part D-3 of the Application), rock and gravel were encountered during drilling and several borings encountered drilling refusal on rock or gravel within 20 feet. Furthermore, in an effort to be conservative, the stone layer was not specifically modeled in the slope stability analysis. Rather, the evaluation incorporated only the physical properties of the tailings product encountered in the TMAs. Accordingly, no change to the Application are required, although the approximate stone size will be incorporated into the applicable section of the Operations Plan.

- ***Please explain in detail how the residual decant water and stormwater which is ponded in drying cells in the Kane and Drake TMAs are conveyed back into the process water system.***

Response:

Decant water and stormwater are conveyed back to the process water system through a pump system and gravity conveyance structures that have been on site and used for the purpose for many years.

The Operations plan indicates that seed, mulch and fertilizer is placed "within days" of reaching final elevations of any portion of a TMA, which is beneficial from an erosion control standpoint. The Operations Plan also states that the fertilizer will be added regularly due to the alkaline nature of the tailings.

- ***Please clarify whether fertilizers will be added regularly during the post-closure period. If this is the case, such a statement should be added to the closure or post-closure plan.***

Response:

As noted earlier in this document, references to fertilizers and amendments have been removed from the application.

Numerical Groundwater Fate and Transport Modeling Report, Sanborn, Head & Associates, dated December 22, 2005:

SHA performed a three dimensional groundwater flow and transport model encompassing the Verpol Plant site. The modeling was performed in response to Rule §6-603 that requires that the site characterization "allow modeling with a resolution sufficient to determine compliance with applicable environmental quality standards…". Generally

speaking, for disposal facilities, this requirement has meant the development of a contaminant transport model that indicates the concentrations of contaminants of concern at the Design Management Zone over time. The model is another tool by which the Program determines whether the facility poses a risk to the environment or public health.

The model was based on information originally developed by others, most notably, site characterization information previously presented by Heindel & Noyes. As you know, a schedule for the model was established, the Program had been reviewing H&N's work prior to its use by SHA in the model development, and had met on several occasions with SHA staff during development of model inputs and parameters as explained below.

It is understood that the model is a simulation of flow conditions at the site and not a calibrated flow model. Further, the model represents macro scale groundwater flow in bedrock, and not micro scale flow of individual fractures as this level of effort becomes immensely complicated and the results increasingly uncertain. Given what the Program knows about the character of the site and the nature and concentrations of the contaminants in the tailings, the model as presented is sensible.

SHA developed input parameters and a preliminary model and submitted these to Program staff on October 14, 2005. The Program responded in writing and both parties met on November 7, 2005, to discuss the results. An interim summary of the simulations and sensitivity analysis was submitted to the Program on November 22, 2005, and the parties met again on December 5, 2005. The Program informed Omya that final comments would be forthcoming as an element of the certification application review process. The result of all these communications is that we have recognized the work SHA has done to date, and the conclusions that have been reached regarding the fate of tailings' contaminants in the groundwater at the Verpol Plant site. The model corroborates the early numerical model that H&N developed, as well as provides added evidence that detectable concentrations of contamination from the tailings will not migrate very far from the TMAs; certainly well within a DMZ or 1/3 the distance from the TMA to a property line. Although the model supports the other evidence presented in the application that the risk to groundwater is low, there remain a number of specific issues with the model that need to be clarified. Please address the following:

Response:

Please note that SHA's model does not encompass the entire Verpol plant site; rather, the model domain is smaller as required to provide sufficient spatial discretization to simulate expected limited transport distances and steep concentration gradients. (In other words, a model of the entire site would not be clear or helpful because the transport distances are so small compared to the site of the site.) Also, please note that a numerical model was not developed previously by H&N or others. The comment reference is likely to Golder's previous analytical modeling.

On Page 11 it is stated that "In keeping with the Groundwater Protection Rule and Strategy (2000), "Base Case" values representing 95% confidence levels…"

- ***The reference to the Groundwater Protection Rule and Strategy is outdated, the most recent rule was adopted 2/25/05.***

Response:

The reference to the Groundwater Protection Rule and Strategy is unnecessary in the context of the modeling objectives and has been removed from SHA's report text. The text has been amended accordingly and, to help clarify, a footnote has been added to describe what the 95% UCL represents.

- ***As noted in several instances above, §12-706 of the Groundwater Protection Rule and Strategy refers to using the 95% confidence level to determine if a groundwater quality standard has been exceeded and it is at the discretion of the Secretary when it is applicable. The statistic is not meant to be used in predictive scenarios. Please revise accordingly.***

Response:

As noted above, the reference to the Groundwater Protection Rule and Strategy is unnecessary in the context of the modeling objectives and has been removed from SHA's report text. However, the specific performance goal established in the VTDEC Solid Waste Management Procedures is no exceedance of "any groundwater quality standard at the DMZ boundary at any point in time" for the base condition of the model. As such, the "Base Case" values represent the baseline conditions, or probable values for concentrations within the TMAs, and it is SHA's opinion that the 95% UCL of the arithmetic mean is an appropriate representation of probable concentrations of "leachate" from the TMAs for the purposes of modeling fate and transport under base case conditions.

Furthermore, SHA's "Sensitivity Range" spans from the lowest to highest concentrations reported for each individual species within the TMAs, and SHA did include a sensitivity analysis to assess flow and transport using the highest concentrations detected from tests of tailings pore water as the constant concentrations specified for the "leachate" from the TMAs.

- ***If the actual results of the preliminary analytical modeling are available please provide them for our review.***

Response:

The results of the preliminary analytical modeling are depicted in SHA's report on Figures 4b, 5b, and 6d for "Base Case" parameter assumptions, and on Figures 7b, 8b, and 9d for

"Sensitivity Range" parameter assumptions. To help clarify, specific reference to these figures have been added to Section 5.0 of SHA's report.

Table 2 in the SHA report shows Fetter, 1993, as the reference for the estimated retardation factor.

- ***Please explain why SHA did not use retardation factor data previously determined by Heindel and Noyes (2005) and Golder (2005).***

Response:

The reference to Fetter, 1993 shown in Table 2 of SHA's report is provided for the equation used to calculate the retardation factors. The large range in estimated retardation factors stems from the large range in organic carbon partitioning coefficients used in the calculations. The organic carbon partitioning coefficients shown in Table 2 do indeed include reference to Heindel & Noyes (2005), and Golder (2005) used values for organic carbon partitioning coefficients similar to those used by Heindel & Noyes.

As such, the resulting range of SHA's estimated retardation factors includes those presented by Heindel & Noyes (2005) and Golder (2005) for the limestone bedrock aquifer. Indeed, SHA's sensitivity analysis uses estimated retardation factors lower (i.e., more conservative) than those presented by Heindel & Noyes (2005) and Golder (2005) for the limestone bedrock aquifer.

- **A table in Appendix 8 - page 2 and page 3 of the Application, H&N shows retardation factor calculations much lower then the values presented in Table 2 for TOHI and amine acetate. The table on Page 3 shows estimated retardation factors for TOHI at 144.6 and amine acetate at 130.7. This is in contrast to the base case values used in the SHA modeling report of 5860 for TOHI and 54,400 for amine acetate. *Please explain the differences between these values, and why SHA used these factors and not the H&N retardation factor calculations.***

Response:

There are actually two tables on Pages 2 and 3 of Appendix 8 of the Application. These tables present Heindel & Noyes' retardation factor calculations for transport of the constituents within the limestone bedrock aquifer and within the tailings product, respectively. The specific retardation factors cited above from the table on Page 3 of Appendix 8 were estimated by Heindel & Noyes for transport of the constituents within the tailings product.

The modeling completed by SHA is focused on transport within the limestone bedrock aquifer downgradient of the TMAs, not within the tailings product. Therefore, the retardation factors presented by Heindel & Noyes for transport of the constituents within the tailings product are not pertinent to SHA's modeling objectives and were not used in the modeling analysis.

As noted above, the range of SHA's estimated retardation factors includes those presented by Heindel & Noyes in the table on Page 2 of Appendix 8 for the limestone bedrock aquifer. Indeed, SHA's sensitivity analysis uses estimated retardation factors lower (i.e., more conservative) than those presented by Heindel & Noyes for the limestone bedrock aquifer.

The tables in Appendix 8 also reference bulk density data for tailings from the Omya Proctor Laboratory.

- ***Please provide references to this information within the application or supplement the application with this information. Please explain why SHA choose to use 2.6 kg/L for a bulk density value in Table 2 when H&N presented two values for bulk density of 1.6 and 2.565 kg/L.***

Response:

Specific reference to the location of the bulk density data has been added to Section 4.2.3 of SHA's report.

As mentioned above, the tables on Pages 2 and 3 of Appendix 8 of the Application present Heindel & Noyes' retardation factor calculations for transport of the constituents within the limestone bedrock aquifer and within the tailings product, respectively. The bulk density of 1.6 kg/L is from the table on Page 3 of Appendix 8 and represents the bulk density of the tailings product, whereas the bulk density of 2.565 kg/L is from the table on Page 2 of Appendix 8 and represents the bulk density of the limestone bedrock aquifer.

SHA used a bulk density of 2.6 kg/L (which is consistent with the value of 2.565 kg/L reported by H&N) because the modeling completed by SHA is focused on transport within the limestone bedrock aquifer downgradient of the TMAs, not within the tailings product. Therefore, the bulk density of 1.6 kg/L presented by Heindel & Noyes for the tailings product is not pertinent to SHA's modeling objectives and was not used in the modeling analysis.

The tables in Appendix 8 also show porosity values ranging from .05 to 0.4.

- ***Please compare these values to the total porosity values used in the SHA report. What is the difference between total porosity according to the SHA report and the porosity values presented in Appendix 8 conducted by GeoDesign?***

Response:

As mentioned above, the tables on Pages 2 and 3 of Appendix 8 of the Application present Heindel & Noyes' retardation factor calculations for transport of the constituents within the limestone bedrock aquifer and within the tailings product, respectively. The total porosity of 0.4 is from the table on Page 3 of Appendix 8 and represents the total porosity of the tailings product

based on testing by GeoDesign, whereas the total porosity of 0.05 is from the table on Page 2 of Appendix 8 and represents the total porosity of the limestone bedrock aquifer based on a literature value.

SHA used a total porosity of 0.1, which was the approximate midpoint of the range of literature values for limestone/dolomite reviewed by SHA (this range, 0.05 to 0.15, is consistent with the value of 0.05 reported by H&N), because the modeling completed by SHA is focused on transport within the limestone bedrock aquifer downgradient of the TMAs, not within the tailings product. Therefore, the total porosity of 0.4 presented by Heindel & Noyes for the tailings product is not pertinent to SHA's modeling objectives and was not used in the modeling analysis.

- ***Provide the data for porosity calculations presented in the Application.***

Response:

The data for the porosity calculations made by GeoDesign are for the tailings product, not the limestone bedrock aquifer, and as such, are not pertinent to SHA's modeling objectives and are not referenced in SHA's report.

Table 2 also references Fetter, 1993 for the Organic Carbon Partitioning Coefficient (K_{oc}).

- ***Please explain why SHA did not include the values for K_{oc} developed by H&N (2005) in Appendix 8.***

Response:

Table 2 of SHA's report does not reference Fetter, 1993 for organic carbon partitioning coefficients, rather it references the USEPA; Meylan et al., 1992; and Heindel & Noyes, 2005. Aside from minor rounding of significant figures, the range of SHA's organic carbon partitioning coefficients spans those presented by Heindel & Noyes, 2005.

Furthermore, as previously mentioned, the large range in SHA's estimated retardation factors stems from the large range in organic carbon partitioning coefficients used in the retardation factor calculations. The range of SHA's estimated retardation factors includes those presented by Heindel & Noyes, 2005 for the limestone bedrock aquifer. Indeed, SHA's sensitivity analysis uses estimated retardation factors lower (i.e., more conservative) than those presented by Heindel & Noyes for the limestone bedrock aquifer.