Appendix D

Description and Evaluation
of Disposal Options

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Attachments

Attachment D-1 On-Site Disposal Option Information (con't)

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Acronyms and Abbreviations

Agencies	NYSDEC and USEPA
AW	Allied Waste Niagara Falls Landfill
AOC	Administrative Order on Consent
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulations
CMA	Corrective Measures Alternatives
CMI	Corrective Measures Implementation
CSX	CSX Corporation, Inc.
CMS	Corrective Measures Study
FMC	FMC Corporation
GHG	Greenhouse Gas
GMP	Groundwater Monitoring Program
GVT	Genesee Valley Transportation
HDPE	high density polyethylene
NYCRR	Compilation of the Rules and Regulations of the State of New York
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	Operations, Maintenance and Monitoring
RCRA	Resource Conservation and Recovery Act
SCOs	Soil Cleanup Objectives
USEPA	United States Environmental Protection Agency
WTP	Water Treatment Plant

1. Purpose

Appendix D describes the development of and evaluates the on-site and off-site remediation waste disposal options considered in the detailed evaluation of Corrective Measures Alternatives (CMAs) performed as part of the Corrective Measures Study (CMS) for the Suspected Air Deposition and Culvert 105 Study Areas. The on-site disposal option consists of the use of an engineered, on-site consolidation area (Corrective Action Management Unit or "CAMU") that is proposed to be constructed, in accordance with Resource Conservation and Recovery Act (RCRA) regulations, in the eastern portion of the FMC Corporation (FMC) Facility ("Facility" or "Site") for the permanent disposal of non-hazardous soil and other remediation waste. The off-site disposal option consists of two disposal options (disposal of remediation wastes in a commercial landfill facility and beneficial reuse of remediation wastes as cover at the commercial landfill), and two transportation options (truck transportation and rail transportation).

The identification and evaluation of disposal options was prepared in accordance with the requirements of Attachment II to the Administrative Order on Consent (AOC) entered into by FMC, the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) for the FMC Middleport facility (NYSDEC and USEPA are collectively referred to herein as "Agencies"), effective July 2, 1991 (USEPA et al, 1991). As an outcome of the evaluation, the on-site disposal option and the two off-site disposal options with truck transportation are included in the CMAs in the Draft CMS Report.

In this Appendix, the waste disposal options included in the CMAs are identified and comparatively evaluated using the same criteria that are used to evaluate CMAs in the Draft CMS Report. As identified in the CMS Work Plan (approved by the Agencies by letter dated September 14, 2009), and as further discussed in Section 7 of the Draft CMS Report, the evaluation criteria are as follows:

1) Technical (effectiveness, performance, reliability, implementability and safety)

2) Environmental (potential short- and long-term beneficial and adverse impacts on the environment)

3) Human Health (risks during and after implementation)

4) Institutional (consideration of federal, state, and local rules and regulations)

5) Green Remediation Practices (net environmental benefit)

6) Community/Property Owner Acceptance

7) Cost (capital, engineering and long-term operation/maintenance)

The information provided in this Appendix has been compiled to support development of this Draft CMS Report. During Corrective Measures Implementation (CMI) phase, the actual disposal details will be identified based upon approvals, permits, and other relevant actions and considerations.

The remainder of this Appendix is organized as follows:

- Section 2 Description of the Disposal Options
- Section 3 Evaluation of the Disposal Options included in the CMAs
- Section 4 Summary
- Section 5 References
- Attachment D-1 On-Site Disposal Option Information
- Attachment D-2 Off-Site Disposal Options Information

2. Description of the Disposal Options

On-Site Disposal Option

The on-site disposal option consists of placing non-hazardous soil and other non-hazardous remediation waste (collectively referred to as remediation waste) in an engineered, on-site consolidation area (Corrective Action Management Unit or "CAMU") that is proposed to be constructed, in accordance with RCRA regulations, in the eastern portion of the FMC Facility ("Facility" or "Site"). Remediation waste would be transported from excavation areas to the CAMU by truck. Attachment D-1 presents further description of FMC's proposal for the CAMU, including descriptions of the CAMU designation process, responses to comments received to date from the Agencies and community on the FMC CAMU proposal, the regulatory basis for designation of the proposed CAMU, the conceptual CAMU design, and estimated unit cost for use of the CAMU.

The proposed CAMU would be used for the permanent disposal and management of remediation waste from the CMS Study Areas and from other FMC study areas situated south of Pearson/Stone Roads (e.g., Tributary One and Floodplain South of Pearson/Stone Roads). The CAMU is proposed to be constructed to a total height of 28 feet (at its highest point from its base elevation) with a maximum footprint (i.e., area at its base) of approximately 16.9 acres. After placing the final cover atop the CAMU, the ground surface of the CAMU would be vegetated with a variety of grasses and shrubs. Trees would be planted at select locations along the perimeter to achieve an appearance consistent with the open, rural, and natural character of the surrounding area. Figure D1-1 in Attachment D-1 of this Appendix shows the proposed CAMU location and layout.

FMC had previously proposed a CAMU with a maximum height of 35 feet. In response to comments from the community, FMC lowered the proposed CAMU height to 28 feet. If a CAMU is designated (i.e., approved) for disposal of remediation waste from the CMS Study Areas currently being evaluated, FMC may propose and request approval, in the future, to increase the height of the CAMU to a maximum height of 35 feet consistent with the Town of Royalton ordinance provisions; however, the 35-foot height is not proposed as part of this current CMS. If there is a proposal for a maximum height of 35 feet, that proposal would be part of Corrective Measures Studies for other FMC study areas situated south of Pearson/Stone Roads (e.g., Tributary One and Flood Plain South of Pearson/Stone Roads).

Off-Site Disposal Options

Possible off-site disposal options considered in the CMS are as follows:

- Disposal at a Commercial Landfill
- Beneficial Reuse at a Commercial Landfill

The further options for transport for off-site disposal are as follows:

- Truck Transportation to a Commercial Landfill
- Railcar Transportation to a Commercial Landfill (with possible need for supplemental truck transport)

Attachment D-2 presents a further description of these options, including associated estimated costs.

Off-Site Disposal Option Evaluated in the CMAs

For the purposes of this CMS, the off-site disposal option included in the evaluation of CMAs consists of disposal at a commercial landfill(s) with beneficial reuse as daily landfill cover. The commercial landfill, or if needed landfills, used for remediation waste disposal would be permitted to accept non-hazardous remediation wastes in accordance with applicable rules and regulations (e.g., 6NYCRR Part 360). Remediation waste not beneficially reused for landfill cover would be disposed in the commercial landfill as non-hazardous solid waste. For the purposes of this CMS, FMC and the Agencies agreed to use of the assumption that 25 percent of FMC remediation wastes would be beneficially reused as daily cover material and 75 percent would be disposed of as non-hazardous solid waste (reference Item No. 2 in the Enclosure to NYSDEC's letter to FMC dated December 2, 2010; copy provided in Attachment D-1B).

Beneficial reuse of remediation waste at a landfill for daily cover would depend on various factors including landfill needs and permit requirements. Throughout the course of remediation, the ability to beneficially reuse remediation soil for daily cover may change based on landfill needs at the particular time. Reuse of the remediation waste as landfill cover may provide a reduced cost for disposal as compared to the cost for disposal at a commercial landfill. Accordingly, the actual amount or percentage of remediation waste that could be beneficially reused as daily cover material may vary during the CMI phase based on FMC contractual agreements with the commercial landfill facility or facilities.

The remediation waste may be transported by truck directly or indirectly (use of a temporary remediation waste staging area) to the appropriate commercial landfill. Direct loading of larger trucks (e.g., 30 ton capacity) at the excavation sites for transport to the commercial landfill may not be practicable or implementable and therefore, for purposes of this CMS use of a temporary staging area located on the eastern portion of the FMC Facility has been assumed. Remediation waste would be transported from excavation areas to the temporary staging area by a smaller truck. Remediation wastes accumulated in the staging area would be subsequently loaded into appropriately sized trucks

for transport to the commercial landfill. Truck transport of the remediation waste would follow a truck route(s) to commercial landfill(s) that would be established during the CMI phase. Transport of the remediation waste from the FMC Facility to the commercial landfill would likely follow State Route 31 and not Village Streets.

Rail transport may be accomplished by direct loading of rail containers (e.g, inter-modals) at the excavation sites which would then be transported to the FMC Facility for direct loading on rail cars or temporary staging at the facility until rail cars become available for transport subject to resolution of certain logistical issues (i.e., size of containers, physical constraints of the excavation areas, need for specialized cranes and other equipment to move the inter-modals), as further discussed in Attachment D-2. However, as also discussed in Attachment D-2, FMC determined that a better option with respect to rail transport would be to transport excavated remediation wastes by truck to a temporary staging area (i.e., temporary stockpile) located at the FMC Facility with subsequent transfer to rail cars/containers. This approach could avoid logistical problems, issues associated with presence in the community and on residential properties, and delays associated with the use of inter-modal rail containers. Remedial waste would then be transported by rail and transferred from rail to truck for short distance (e.g., ½ mile) transport or, depending on the receiving off-site landfill, directly transported by rail to the commercial landfill facility for final disposition at an appropriate disposal cell at the commercial landfill.

Rail transport of remediation wastes to the appropriate commercial landfill would occur from the FMC Facility utilizing the Falls Road Railroad mainline (owned by Genesee Valley Transportation). The FMC Facility has a rail switch to provide access to the on-site rail spurs. Rail transport would not create additional local road traffic. However, as discussed in Attachment D-2, there is currently only one local landfill (approximately 33 miles from Middleport) that can receive remediation wastes by rail. There are limitations at this landfill on container types and number of daily shipments. FMC and its experts understand that rail transport of remediation wastes to off-site commercial landfills is typically used for long-distance transport and is not cost effective for short transport distances. However, there are a number of other commercial landfill facilities within the country that will accept waste by rail, either directly or via truck transfer. Although these other facilities would require transport of FMC remediation waste over longer distances, rail transport is often more economical than truck transport over such longer distances. Based on FMC's past experience in using rail transport of remediation wastes, consultation with FMC's experts and logistical providers, and additional considerations discussed in Attachment D-2, FMC concluded that there is no advantage of transport by rail over truck transport at this time. Accordingly, for the detailed evaluation of CMAs in this CMS, including development of cost estimates, the off-site disposal option assumes that remediation wastes will be transported by truck and that commercial landfill facilities will be used. However, the CMS does conceptually evaluate rail transport. FMC will re-evaluate possible use of rail transport for some or all remediation wastes in association with off-site disposal at the time of the CMI, if appropriate.

Attachment D-2 of this Appendix provides additional information on the off-site disposal options, presents an evaluation of the off-site disposal options, and identifies FMC's rationale for the following off-site disposal option that has been included in the CMAs and evaluated in the Draft CMS Report:

- Off-site disposal at a commercial landfill(s) with beneficial reuse of a portion of the remediation waste as daily cover with transport by truck

3. Evaluation of the Disposal Options included in the CMAs

3.1 Technical

Under the technical criterion, the two waste disposal options included in the CMAs are evaluated based on their effectiveness, performance, reliability, implementability, and safety. Both the on-site (proposed CAMU) and off-site (disposal at a commercial landfill(s) with beneficial reuse of a portion of the remediation waste as daily cover) options are implementable, reliable and can effectively manage the remediation soils and other waste. The primary safety considerations under this criterion that differentiate the disposal options are potential short-term public and worker risks during remedial construction activities (e.g., potential for injury due to operation of heavy equipment and trucks) and transport of remediation wastes.

The construction and maintenance components of the proposed CAMU are implementable using readily available equipment. FMC understands these components, as well as the design, procedures and protocols for maintaining quality control, to be well established.

CAMUs and engineered on-site consolidation areas have been selected by environmental regulatory agency(ies) at numerous sites within New York State and across the country and are proven and reliable technologies for the management of remediation waste. Examples in New York State include the following:

- A CAMU with composite cover, and a soil cover over the remainder of site at the Ciba Geigy Plant in Queensbury, NY (see NYSDEC 2008, NYSDEC 2010a and USEPA 2010a)

- Consolidation and in-place containment of 500,000 cubic yards of polychlorinated biphenyl (PCB) impacted soil at a National Priorities List Site located in Massena, New York (see USEPA 1992)

- Consolidation of solid and hazardous acid tar wastes into a single on-site containment cell with a low-permeability vertical subsurface wall and a synthetic liner and vegetated soil cover at the Former Bethlehem Steel Site in Lackawanna, New York (see NYSDEC 2010b and Turnkey Environmental 2009)

- Consolidation of a majority of the estimated 2,653,000 cubic yards of contaminated dredged sediment in a Sediment Consolidation Area (SCA) for the Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site in Syracuse, New York (see NYSDEC and USEPA 2005 and USEPA 2010b)

If selected by the Agencies, the CAMU will be designed, constructed and maintained in accordance with applicable rules and regulations (6NYCRR Part 373-2.19 and 40 CFR Part 264.552), as well as

the Agencies-approved CMI work plan, to ensure long-term protection of human health and the environment. In addition, the CAMU proposed to be constructed on the FMC Facility includes an additional conservative measure through limitation of the CAMU-eligible waste to exclude hazardous waste.

As discussed in Attachment D-1, FMC determined that designation of a CAMU at the Facility for the permanent management of remediation wastes would facilitate a comprehensive Corrective Action Program for the FMC Facility, including the remediation of the Suspected Air Deposition and Culvert 105 Study Areas, Tributary One and Floodplain South of Pearson/Stone Roads and other study areas south of Pearson/Stone Roads, and is expressly allowed based on conformance with the seven criteria specified in state and federal regulations [6 NYCRR Part 373-2.19 (c)(3) and 40 CFR Part 264.552(c)]. FMC determined that the CAMU will permit FMC to manage its cleanup programs without some of the potential limitations inherent in the transportation and disposal at off-site disposal facilities. Those limitations include additional staging and managing of excavated soils prior to transport off-site (using the eastern portion of the Facility as a staging area), the hours of operation and conditions/restrictions on receipt of materials at the off-site commercial landfill, and added hauling of materials to off-site facilities 30 or more miles away. Consequently, in FMC's opinion, the use of the CAMU would be expected to shorten the implementation of the corrective measures for FMC's study areas through scheduling efficiency and flexibility.

The proposed CAMU would be designed and constructed using a phased filling plan to minimize, to the extent practical, the area used for consolidation of remediation wastes. The first phase of the CAMU construction would consist of the unlined portion and the second phase would consist of the lined portion. Use of the Phase 2 CAMU Area would require construction activities involving placement of the liner system and other preparation activities prior to placement of remediation waste. The construction of both phases is implementable. Materials, equipment, and supplies needed for construction of the CAMU are readily available.

Adequate local commercial facilities and trucking options are currently available for implementation of the off-site disposal option. The actual details for disposal of remediation wastes need to be determined during the CMI phase, as they depend on a variety of considerations that may differ from current conditions including landfill permit status, fuel/transportation costs, disposal costs, and other relevant conditions.

There are no long-term OM&M activities for FMC associated with the off-site disposal options. As discussed in Attachment D-1, the OM&M for FMC associated with the CAMU is similar to the ongoing OM&M activities being conducted by FMC (groundwater monitoring, OM&M of the Facility's Water Treatment Plant (WTP), and maintenance and monitoring of the existing Facility cover systems, etc.) and would not add significantly to the OM&M activities currently being performed at the Facility.

Remedial construction worker and public safety will be addressed in a CMI work plan that will be prepared by FMC to specify procedures to be followed during the implementation of the selected CMA construction activities. The CMI work plan will (as appropriate depending on the CMA selected): address construction and use of the CAMU or provide detailed procedures for off-site disposal, identify proposed trucking routes and/or rail lines that will be used during the construction activities, and provide contact information for project representatives from FMC and the Agencies. Community-related safety procedures will be identified and implemented to address potential safety concerns associated with truck traffic, pedestrians, student bussing and walking to/from school and use of construction areas.

Under the technical evaluation criterion, FMC perceives the following pros and cons of disposal using a CAMU and/or disposal at an off-site commercial landfill:

CAMU pros:

- Applicable design and performance criteria specified in the CAMU regulations will provide effective and reliable management of remediation wastes placed in the CAMU
- No double-management, and therefore fewer opportunities for accidents and injuries
- Avoids longer transport events, which will also reduce opportunities for accidents en route
- OM&M activities for CAMU would be similar to OM&M activities that already take place at the FMC Facility

CAMU cons:

- Heavy equipment use and other machinery/tools associated with construction of the Phase 2 Area liner installation and the CAMU final cover installation
- Worker health and safety during long-term OM&M

Off-site disposal pros:

- Management in a commercials licensed facility
- Reduced potential for long-term incidents at the FMC Facility

Off-site disposal cons:

- Need for double-management with a temporary staging area at FMC Facility or near the excavation area
- Increased public risk and worker short-term risks of accidents associated with miles needed for transporting remediation waste to an off-site landfill (a minimum distance of 30 miles per trip) and for returning empty trucks or rail cars/containers to Middleport for filling

Community air monitoring and dust control procedures would be implemented to minimize potential fugitive dust migration from remediation waste being placed in the CAMU or being managed in the

temporary staging and loading area. The time needed for the handling of remediation waste at the staging/loading area would be similar to that at the CAMU. Both waste disposal options would require the receipt and placement of remediation wastes in the CAMU or staging area. Management of remediation wastes at the CAMU may require spreading and/or compaction while management of remediation wastes at the staging area would require stockpiling and reloading. Therefore, FMC concluded that the potential for fugitive dust generation is expected to be similar for both operations.

3.2 Environmental

The environmental criterion requires an assessment of short and long-term beneficial and adverse impacts, and particularly any adverse effects on environmentally sensitive areas (i.e., ecologically sensitive areas). There are no environmentally sensitive areas on the FMC Facility. The primary considerations for this criterion are the short- and long-term potential environmental impacts associated with the respective disposal options.

Mitigative measures to address potential short-term environmental impacts (e.g., erosion and sedimentation controls) during soil handling, stockpile management, and CAMU construction/filling are well demonstrated to be effective if properly installed and maintained. FMC will prepare a CMI work plan that will specify procedures to be followed during implementation of the selected CMA including (as appropriate), construction and use of the CAMU, excavation of soil, and transportation and placement of excavated soil in the CAMU or disposal at a commercial landfill. The plans will be subject to review and approval by the Agencies.

If selected by the Agencies, the CAMU will be designed, constructed, used, maintained, closed and cared for in accordance with applicable rules and regulations to ensure long-term protection of the environment. The CAMU will be situated in the eastern portion of the Facility where there are redundant engineering and administrative controls, including existing surface water and groundwater collection and management systems, to prevent migration of remediation wastes and to control and potential groundwater migration from materials placed in the CAMU. Remediation wastes placed in the CAMU will be covered with an engineered cover system that will be vegetated. The cover system will shed rain water, prevent wind and water erosion and prevent contact with the materials under the cover. Off-site commercial landfills typically have double liner and leachate collection systems, and therefore provide environmental protection of soils and groundwater which is similar to the proposed CAMU Phase 2 Area design. The proposed CAMU Phase 1 Area will be unlined which may be less environmentally protective. However, the existing surface water controls and groundwater extraction wells and collection systems around the CAMU Phase 1 Area and the CAMU final cover system, as well as other monitoring and maintenance requirements, will provide environmental protection and minimize the potential for adverse environmental impacts with respect to the CAMU Phase 1 Area.

The potential long-term environmental impacts associated with the off-site disposal would be managed by the commercial landfill(s). Those associated with the CAMU would be addressed through development and implementation of CAMU Post-Closure Plan that will integrate the existing infrastructure of surface water and groundwater monitoring, collection and management systems, to prevent exposure to or migration of remediation wastes placed in the CAMU. The OM&M associated with the CAMU would be similar and would not significantly increase those activities currently being implemented with respect to the existing remedial systems at the FMC Facility.

Additionally, the existing vegetation and trees within the buffer zone between the CAMU and the Facility property boundary will be preserved, to the extent practicable, during construction of the CAMU. The total height of the CAMU will be 28 feet above its base elevation (at its highest point). Following construction, vegetation including trees and shrubs would be planted in the buffer area and the final surface of the proposed CAMU would be vegetated with a variety of low-maintenance grasses and shrubs, as well as trees at select locations along the perimeter.

3.3 Human Health

The human health criterion, similar to the environmental criterion, includes an evaluation of both potential short- and long-term exposures both during and after CMI implementation. Both the CAMU and the off-site disposal option involve similar engineering and institutional controls (e.g., cover design and property use restrictions) to prevent human exposure to the remediation wastes. The potential human health impacts associated with the off-site disposal would be managed by the commercial landfill(s). Those associated with the CAMU would be addressed through development and implementation of CMI work plan and a CAMU Post-Closure Plan.

FMC will prepare a CMI work plan that will specify procedures to be followed during implementation of any corrective measures construction activities. The work plan will include procedures to monitor for fugitive dust and arsenic in the air around the areas where soil is being handled (e.g., excavation area, soil stockpile/staging area and CAMU) and specify possible actions that will be taken to control fugitive dust from the construction activities. The plan will be subject to review and approval by the Agencies.

Remediation wastes placed in the CAMU will be located within FMC's security fence and will be covered with an engineered cover system that will be vegetated. The cover system will shed rain water, prevent wind and water erosion and prevent contact with the materials under the cover. In other words, the cover system will prevent the airborne and surface water migration and human exposure of soils/material placed in the CAMU. FMC will have procedures in place to minimize potential worker exposure to the remediation wastes placed in the CAMU in the case of disturbance/maintenance of the CAMU cover. In addition, FMC will have inspection, monitoring and maintenance procedures in place to monitor for potential damage to the cover system (e.g., from burrowing animals) and to maintain the

integrity of the cover system. The Facility fence and security procedures will minimize the potential for trespassers at the Facility and the CAMU.

3.4 Institutional

The institutional criterion considers the effects of federal, state and local regulations or guidance on the design, operation, and timing of the disposal option. As presented in the Draft CMS Report, applicable CAMU regulations and guidance would be identified, integrated into the design and met during implementation of each CMA (e.g., Village ordinances/requirements related to work hours, use of public roads, landfill permit requirements, etc.). State and federal regulations authorize the Agencies to designate an area of a RCRA-regulated facility, such as the FMC Facility, as a CAMU for the permanent management of remediation waste from RCRA-regulated environmental cleanups. As identified in Section 3.1, CAMUs and other consolidation areas have been selected by the regulatory agency(ies) at numerous sites within New York State and across the country to facilitate completion of environmental cleanups. In FMC's opinion, all disposal options are comparable with respect to compliance with regulations and guidance. However, use of the CAMU would require additional efforts associated with the development, and Agencies' approval of, plans associated with the CAMU design, construction, use, closure and post-closure activities. The design and use of the CAMU would be subject to applicable state and federal regulations and to the terms and conditions of the existing modified AOC among FMC, the NYSDEC and USEPA.

The use of a CAMU enables the control and isolation of excavated remediation wastes at the point of generation (at the FMC Facility), which is generally preferred by the Agencies over off-site disposal (e.g., see the NYSDEC's Hierarchy of Remedial Technologies in NYSDEC TAGM 4030 - Selection of Remedial Actions At Inactive Hazardous Waste Sites [http://www.dec.ny.gov/regulations/2622.html]).

The time required for disposal of FMC remediation wastes would be similar for both disposal options since it would be based on the volume of remediation wastes generated. However, the CAMU disposal option would require additional time for construction of the final cover system and associated landscaping.

3.5 Green Remediation Practices

The green remediation practices criterion is consistent with the Agencies' Corrective Action Objectives (Appendix A of the Draft CMS Report) and the Agencies' green remediation policies, practices and strategies, which consider the environmental consequences of remedial actions, including energy requirements, air emissions, material consumption, resource consumption and waste generation. Examples of the Agencies' green (sustainable) recommended practices and strategies are provided below (refer to USEPA and NYSDEC's website locations, including: http://www.clu-in.org/greenremedation/ and http://www.dec.ny.gov/environmentdec/64595.html).

- USEPA Region 2 Clean & Green Policy (USEPA, 2010)
- USEPA's Green Remediation: Best Management Practices for Excavation and Surface Restoration (USEPA 2008)
- USEPA's Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites (April 2008)
- USEPA's Green Remediation Best Management Practices: Clean Fuel and Emission Technologies for Site Cleanup (USEPA, 2010c)
- USEPA's Principles for Greener Clean-ups (USEPA, 2009)
- NYSDEC's DER-31/Green Remediation (NYSDEC, 2011)

A qualitative green remediation assessment was conducted on both disposal options relative to the five core elements of green remediation identified by the USEPA, which is consistent with NYSDEC's green remediation policy. The five core elements of green remediation are summarized below.

1. **Energy requirements** include direct fuel consumption for both mobile and stationary sources and the purchase of commercial energy. Mobile sources can include heavy equipment or trucks and stationary sources can include equipment and facilities used for operations, maintenance, and monitoring (OM&M) activities.

2. **Air emissions** include particulates and greenhouse gas emissions generated from mobile and stationary sources.

3. **Water requirements and impacts on water resources** include consideration of water use and source (e.g., potable water used for dust control). Impacts on water resources can include how stormwater is handled on site, how the remedial alternative affects groundwater supply and quality, and whether or not water is permanently added to or removed from the watershed.

4. **Land and ecosystem impact** considers the overall footprint of the alternative and relevant changes in the cover system, and how those changes affect stormwater generation and flora and fauna habitats.

5. **Material consumption and waste generation** considers material throughput of the system during implementation, including temporary and permanent materials.

In the following subsections, green remediation considerations were qualitatively evaluated for major site activities related to construction/use of the CAMU and the off-site disposal option.

3.5.1 CAMU

The major activities associated with the CAMU include transportation of remediation waste to the proposed CAMU location; and construction, use, and maintenance of the CAMU. The green remediation considerations associated with the CAMU are discussed below.

- Energy requirements (i.e., fuel consumption) and air emissions (i.e., particulate and greenhouse gas emissions) would be associated with the following: transporting remediation wastes from excavation areas to the CAMU; operating heavy machinery to consolidate remediation wastes in the CAMU; operating heavy machinery during construction of the base liner and leachate collection system (Phase 2 Area only) and CAMU cover; and transporting materials and waste to and from the site for CAMU construction. These impacts would be directly proportionate to the volume of soil excavated as this will dictate the size of the CAMU and volume of soil transported. Transportation impacts from movement of soil would also be dependent on the size of trucks used to transport soil, the number of truck trips required, and vehicle/equipment efficiencies (e.g., proper maintenance, idle reduction).

- Water may be required for dust control during CAMU construction and the usage would be proportionate to the volume of soil excavated.

- The Phase 2 CAMU Area construction would use approximately 6.3 acres of land, which is currently zoned for industrial use. The CAMU would have a vegetated final cover and would prohibit future development of the area.

- Material consumption would be associated with materials used for CAMU construction. As shown on Figure D1-2 in Attachment D-1, these materials would include: general and select fill (e.g., soil and sand); a low permeability final cover liner; and, for the Phase 2 area, a base liner, drainage layer, and leachate collection piping.

- Waste generation associated with long-term maintenance of the CAMU would include leachate collection and treatment, and maintenance of the CAMU cover and leachate collection system. Because of the low permeability of the final CAMU cover and the character of the flexible membrane liner material in the cover, once the final cover is complete, leachate generation and the associated waste generated from OM&M activities would be minimal.

- Stormwater runoff from the CAMU would be managed at the Facility consistent with existing procedures and controls and any additional controls that may be installed as part of the CAMU

construction. Any stormwater runoff from the CAMU and the Facility will be managed and discharged in accordance with the terms and condition of the Facility's SPDES permit.

Use of the CAMU would also include the following environmental benefits or best management practices compared to off-site disposal:

- Elimination of fuel consumption and air emissions associated with transportation of remediation wastes from the FMC Facility to a commercial landfill (a minimum one-way distance of approximately 30 miles) and of empty trucks or rail cars/containers to Middleport for filling. It should be noted that a detailed quantitative analysis was not conducted. Therefore, precise estimates of fuel consumption and air emissions associated with CAMU construction/operation/ closure and with off-site transportation are not provided. Section 3.5 of this Appendix provides a qualitative assessment of energy consumption and air emission impacts and relative impacts of the disposal options.

- Elimination of remediation waste stockpiling prior to placement in proposed CAMU, minimizing the amount of waste handling prior to disposal and reducing the associated air emissions and fuel consumption from operation of heavy machinery. In addition, removal and disposal of materials used for the construction and management of the temporary remediation waste stockpiling/staging area would be eliminated.

- The CAMU cover would include low maintenance grasses and shrubs, as well as trees along the perimeter. Low maintenance vegetation will minimize irrigation requirements and improve erosion control.

- The availability of appropriately permitted landfill space in the northeastern United States, and within New York in particular, is limited. The use of the CAMU would not consume existing commercial landfill space which could otherwise be used for other societal waste disposal needs.

3.5.2 Off-Site Disposal

Off-site disposal includes transport of remediation waste to a commercial landfill. The green remediation considerations associated with off-site disposal are discussed below.

- Energy requirements (i.e., fuel consumption) and air emissions (i.e., particulate and greenhouse gas emissions) would be associated with the following: transporting remediation wastes from excavation areas to the temporary remediation waste staging area; operating heavy machinery to manage the remediation wastes in the staging area; operating heavy machinery during transfer of remediation wastes from the staging area into trucks or rail cars/containers; and transporting

remediation wastes to the commercial disposal facility or facilities. These impacts would be directly proportionate to the volume of soil excavated and managed at the temporary staging area, and distance travelled to and from the offsite landfill. Transportation impacts from movement of soil would also be dependent on whether rail or truck transportation is employed, and if trucks were employed, it would further depend on the size of trucks used to transport soil, the number of truck trips required, and vehicle/equipment efficiencies (e.g., proper maintenance, idle reduction). Also, it should be noted that rail transport has the potential to use less fuel and produce less emissions per ton of waste than truck transport over long transport distances.

- The receiving commercial disposal landfill may beneficially reuse the remediation soil for landfill cover depending on need and the landfill permit requirements, saving on use of other soil/cover resources and landfill capacity for disposal of non-hazardous solid wastes.

- Water may be required for off-site disposal option to control dust associated with stockpiles generated to facilitate management and off-site transport of remediation waste. Water required for dust control would be proportionate to the volume of soil excavated.

- Land or ecosystem impacts for the off-site disposal option would be associated with operation of the commercial landfill. These impacts would be specific to the receiving commercial landfill and may include noise, lighting, or habitat disturbance.

- Materials usage and waste generation is expected for construction of a remedial staging area to be used prior to off-site transport to the commercial landfill. These impacts would be associated with temporarily used materials such as plastic for staging/covering soil stockpiles.

- Stormwater runoff from the staging area would be managed at the Facility consistent with procedures and controls that would be specified in the CMI Work Plan.

Based on the environmental impacts associated with off-site disposal identified above, it is FMC's opinion that transportation of remediation waste for off-site disposal would appear to have the greater impact due to the amount of waste that would need to be potentially transported off-site (ranging from tens of thousands to several hundred thousand cubic yards). These impacts would be slightly off-set since heavy equipment usage for the management of remediation wastes at the temporary staging/truck loading area would be less than the heavy equipment usage required for the CAMU construction. This is further evaluated for each of the CMAs in the Draft CMS Report.

3.6 Community/Property Owner Acceptance

This criterion compares the disposal options based on the degree to which these options are anticipated to address the concerns of the community and property owners. Based on the community

input received to date, residents are concerned with potential dust migration, truck traffic, safety, impacts to Village roads and infrastructure, proximity to the Royalton-Hartland School Property, perceived adverse impact on property values, managing the appearance of the CAMU including the height, acceptance of remediation wastes generated "outside the boundaries of the Village," and maintaining the community character. Community comments specific to the on-site disposal option (CAMU) and FMC's responses are provided in Attachment D-1.

FMC has also responded to the Village of Middleport's letter dated January 17, 2011 which advised FMC that the Village Board is opposed to placement of the CAMU at the FMC Facility. FMC's response, provided by letter dated January 26, 2011, presented FMC's position on some of the issues raised in the Village's letter, reiterated the importance of the CAMU to the overall remediation effort, and provided information regarding project status and the upcoming public participation/review. FMC's letter also identified that the conceptual design for the CAMU was being further revised based on input from the community and the Agencies. Attachment D-1 includes copies of the referenced correspondence between FMC and the Village of Middleport.

As detailed in Attachment D-1 of this Appendix, the current conceptual CAMU design includes changes from FMC's original CAMU proposal, including design changes (e.g., a lower maximum CAMU height) and clarification that the final landscaping design does include a variety of grasses, shrubs, and trees. The CAMU conceptual design will be subject to formal public review as part of the CMS process, and as detailed in the Attachment D-1 of this Appendix and Draft CMS Report.

Regardless of the disposal option selected, soil excavation on the properties identified for remediation within the CMS Study Areas would be conducted using conventional construction equipment, loaded into dump trucks, and transported to and placed within the CAMU (on-site disposal option) or a temporary staging area located on the FMC Facility (off-site disposal option). Imported backfill would be used to restore the excavated areas. Depending on the CMA selected, a few thousand to tens of thousands of trucks would traverse the community from these activities alone.

No additional transporting of materials would be required for the on-site disposal option (CAMU), as it would involve direct placement of the remediation wastes from the dump trucks into the CAMU. Placing remediation wastes in the CAMU would, however, be similar to using the FMC Facility for temporary staging of the remediation wastes for subsequent off-site shipment to a commercial landfill(s) in terms of the pace for completing the excavation activities during the CMI.

The off-site disposal option includes temporarily staging and managing remediation wastes on the eastern portion of the FMC Facility until they could be loaded into appropriately sized-trucks (e.g., 30-ton capacity) or rail cars/containers for off-site transport to a permitted commercial landfill. Truck transport to an off-site commercial landfill of remediation wastes temporarily stockpiled at the FMC Facility would likely use State Route 31, not municipal streets.

The Phase 1 Area of the proposed CAMU has been used since 1996, as approved by the Agencies (in five separate prior approvals), for temporary placement of off-site generated FMC remediation soils in conjunction with Agencies' approval of ICMs.

3.7 Cost

The following estimated unit costs for on-site and off-site disposal are discussed in Attachments D-1 and D-2, respectively:

- On-site disposal: estimated unit costs of approximately $39/ton and $49/ton for placement of remediation waste in the Phase 1 and Phase 2 CAMU Areas, respectively.

- Off-site disposal: approximately $80/ton for disposal in a commercial landfill as a solid non-hazardous waste and approximately $60/ton for beneficial reuse as landfill cover.

Appendix I of the Draft CMS Report provides detailed cost estimates for each of the CMAs.

4. Summary

The following two disposal options have been included in the CMAs and are further evaluated as part of the CMAs in the Draft CMS Report:

- **Placement and permanent management of non-hazardous soil and other remediation wastes in a CAMU with a total height of 28 feet from its base elevation.**

- **Off-site disposal at a commercial landfill(s) with assumed beneficial reuse of a portion of the excavated soil as daily cover.** This option assumes for purposes of the CMS that 25% of the remediation waste will be used as landfill cover material and 75% of the remediation waste will be placed in a landfill as non-hazardous solid waste. The material would be transported by truck or rail to the commercial landfill. Loading of larger trucks (e.g., 30 ton capacity) at the excavation sites for transport to the commercial landfill may not be practicable or implementable and therefore, for purposes of this CMS use of a temporary remediation waste staging area located on the eastern portion of the FMC Facility has been assumed.

The actual details for remediation waste disposal, including landfill(s), mode(s) of transport (truck or truck/rail), amounts of remediation waste used as daily cover, and remediation waste staging methods used during implementation of a corrective measure would be determined during the CMI phase and presented in the CMI work plan subject to review and approval by the Agencies. These details would depend on a variety of considerations, and could vary from current conditions (e.g., landfill capacity and permit status, need/requirements for landfill cover material, available rail service and logistics, fuel costs, disposal costs).

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Attachment D-1

On-Site Disposal Option Information

Attachment D-1

On-Site Disposal Option Information

Table

Figures

Attachments

Acronyms and Abbreviations

Agencies	NYSDEC and USEPA
AOC	Administrative Order on Consent
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulations
CMA	Corrective Measures Alternatives
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
ESI	Eastern Surface Impoundment
ETU	Ethylene thiourea
FMC	FMC Corporation
GMP	Groundwater Monitoring Program
HDPE	high density polyethylene
ICM	Interim Corrective Measure
IRM	Interim Remedial Measure
mg/kg	milligrams per kilogram
NYCRR	Compilation of the Rules and Regulations of the State of New York
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	Operations, Maintenance and Monitoring
RCRA	Resource Conservation and Recovery Act
SCOs	Soil Cleanup Objectives

SWMU	Solid Waste Management Unit
USEPA	United States Environmental Protection Agency
WSI	Western Surface Impoundment
WTP	Water Treatment Plant

1. Overview

Attachment D-1 describes the on-site disposal option considered in the Corrective Measures Study (CMS) for the Suspected Air Deposition and Culvert 105 Study Areas. The on-site disposal option consists of the permanent placement of non-hazardous soil and other remediation wastes (collectively referred to as remediation waste) in an engineered waste consolidation area, the Corrective Action Management Unit (CAMU), which is proposed to be constructed on the eastern portion of the FMC Corporation (FMC) Plant Site. Remediation waste from implementation of the corrective measures would be transported from the excavation areas by truck to the proposed CAMU. This attachment also includes a description of the regulatory basis for the designation of a CAMU at the FMC Plant Site, the conceptual design of the CAMU, and the technical basis for key CAMU design parameters.

1.1 Background

FMC submitted a draft CAMU Application (ARCADIS 2008) to the Agencies, with cover letter dated March 27, 2008, to request designation of a CAMU at FMC's Plant Site (or Facility). The draft 2008 CAMU Application provided information regarding the Facility and the proposed CAMU required by applicable state and federal regulations.

FMC received comments from the Agencies on the draft 2008 CAMU Application in November 2009. FMC's draft responses to the Agencies' November 2009 comments were provided to the Agencies by letter dated March 5, 2010, a copy of which is provided in Attachment D-1B of this Appendix. FMC and the Agencies discussed FMC's draft responses to the Agencies' comments and the CAMU-related information required for preparation of the Draft CMS Report during a meeting held on April 28, 2010 and during a conference call on May 5, 2010.

Based on discussions and associated correspondences between FMC and the Agencies regarding the Agencies' November 2009 comments and FMC's draft responses (see Attachment D-1B), FMC revised the conceptual CAMU design, as presented in FMC's Draft CMS Report which was submitted as a preliminary draft document to the Agencies on June 15, 2010 and as preliminary draft report appendices submitted on July 14, 2010 ("2010 Draft CMS Report"). Additional information requested by the Agencies to support the conceptual CAMU design (i.e., discussion of the effectiveness of the Facility's groundwater remedial systems relative to the proposed CAMU location) was also presented in the 2010 Draft CMS Report.

FMC received comments and directives from the Agencies on the 2010 Draft CMS Report in September 2010 and met with the Agencies on October 28, 2010 to discuss FMC's major issues and concerns (as presented in FMC's letter dated October 7, 2010) regarding the Agencies' September 2010 comments and directives. As agreed during that meeting, FMC submitted proposed revisions to the 2010 Draft

CMS Report to address the major issues and concerns by email dated November 5, 2010. FMC and the Agencies discussed this proposal during a conference call held on November 10, 2010. Following exchanges of views, the Agencies summarized their understanding of agreements reached and presented modified directives to FMC regarding changes to the 2010 Draft CMS Report. Additional discussions and exchanges ensued, resulting in issuance by the Agencies of a December 17, 2010 email communicating modifications to the December 2, 2010 directives. By letter dated December 21, 2010, FMC notified the Agencies of its intention to comply with the Agencies' directives presented in the enclosure to the Agencies' December 2, 2010 letter and as modified by the Agencies' December 17, 2010 email.

FMC has revised the conceptual design of the CAMU consistent with Agencies' revised directives, and the revised conceptual design is presented herein.

1.2 Informal Community Comments on the Proposed CAMU

Prior to and after submittal of the March 2008 draft CAMU Application (November 2006 through June 2010), FMC provided opportunities for the community, Town of Royalton and Village of Middleport officials, and other stakeholders to obtain information and provide informal comments on FMC's CAMU proposal. Based on those discussions, a list of community concerns was prepared. FMC's responses to those concerns are presented in Table 1.

The status of the Draft CMS Report and review of the correspondence was presented by FMC and the NYSDEC at the December 9, 2010 Middleport Community Input Group Meeting. FMC also received a January 17, 2011 letter from the Village of Middleport, which advised FMC that the Village Board is opposed to placement of the CAMU at the FMC Facility. FMC's response, presented in a letter dated January 26, 2011, presented FMC's position on some of the issues raised in the Village's letter and the importance of the CAMU to the overall remediation effort. FMC's letter also advised that the conceptual design for the CAMU was being further revised based on input from the community and the Agencies. Copies of the Village of Middleport letter and FMC's response are included in Attachment D-1C.

1.3 CAMU Designation Process

The proposed CAMU is one of the remediation waste disposal options considered in this CMS for the Suspected Air Deposition and Culvert 105 Study Areas. The Agencies will select the final corrective measures for the Suspected Air Deposition and Culvert 105 Study Areas that will include a waste disposal option(s) (CAMU and/or off-site disposal). If the CAMU is tentatively selected by the Agencies as a disposal option after review of the Draft CMS Report and public comments on the Draft CMS Report, FMC will submit a revised CAMU Application that will be subject to public review and comment.

After receipt of public comments on the revised CAMU Application, the Agencies will approve or disapprove the associated CAMU design, construction and operation information.

As presented in FMC's March 5, 2010 letter to the Agencies and modified based on FMC's subsequent discussions with the Agencies, the CAMU process involves the following activities:

- **CAMU Conceptual Design and Draft CMS Report:** The Draft CMS Report will provide sufficient information on the CAMU to evaluate the waste disposal options for remediation wastes generated as part of the corrective action program for the FMC Middleport Facility and the off-site study areas. Key information regarding the proposed CAMU, as well as a conceptual design for the Agencies' decision and for consideration by the community, will be presented in the Draft CMS Report and will be further supported by information contained in a revised CAMU Application.

- **CAMU Detailed Design and Revised CAMU Application:** FMC will submit a revised CAMU Application that will include information required by the applicable CAMU rules and regulations, detailed design and operational documents, and information requested by the Agencies. These documents would include (but may not be limited to) the following: engineering design drawings and specifications; operations, maintenance and monitoring (OM&M) plans (e.g., a corrective measures implementation (CMI) work plan); and a detailed post-closure plan. In these documents, details such as the following would be addressed/presented: grading for the CAMU liner subgrade; design calculations/information regarding leachate collection, CAMU slope stability, and stormwater drainage features; procedures to monitor for fugitive dust and arsenic in the air around the areas where contaminated soil is being handled; trucking routes that will be used; and revisions (if any) to FMC's existing Groundwater Monitoring Program (GMP) Work Plan (e.g., installation and monitoring of additional wells).

- **Construction and Use of the CAMU:** If the Agencies select CAMU disposal during the CMS process and approve the designation of a CAMU at the FMC Facility, the CAMU will be constructed as part of implementation of the final corrective measures for the Air Deposition and Culvert 105 Study Areas.

As discussed in Section 3, FMC is proposing a CAMU with a total height of 28 feet (from its base elevation) as part of this CMS Report. In the future, FMC may propose to increase the CAMU height to 35 feet as part of the Corrective Measures Study (CMS) for other FMC study areas situated south of Pearson/Stone Roads (e.g., Tributary One and Flood Plain South of Pearson/Stone Roads).

2. Regulatory Criteria for Designation of a CAMU

The CAMU rules were promulgated to facilitate implementation of RCRA corrective action by allowing the consolidation and management of remediation wastes (e.g., wastes generated during cleanup activities) at the associated RCRA-regulated facility. The CAMU state and federal regulations [6 NYCRR Part 373-2.19 (c)(3) and 40 CFR Part 264.552(c)] specify seven (7) criteria for designating a CAMU.

In the March 2008 draft CAMU application, FMC proposed the designation of a CAMU at the eastern portion of the FMC Facility for the permanent management of remediation waste from past interim remedial activities and future corrective measures performed under FMC's RCRA Corrective Action program. These past remedial actions include the 1987-1988 Northern Ditches IRM, the 1996 Bleacher Area IRM, 1999 Roy-Hart School ICM, 2003 Western Residential Properties ICM, 2005 North Railroad Property Phase 1 ICM, and 2007-2008 Early Action. The future corrective measures, as identified in Item No. 5 of Table 1, include those that may be associated with the Suspected Air Deposition and Culvert 105 Study Areas, Tributary One and Floodplain south of Pearson/Stone Roads study area, and possibly other FMC study areas south of Pearson/Stone Roads. The CAMU will not be used for the management of remediation wastes that may be generated in the future from the FMC study areas north of Pearson/Stone Roads. Section 3.4 further describes remediation wastes eligible for placement in the proposed CAMU.

The proposed total footprint of the CAMU is approximately 16.9 acres and would be designed and constructed using a phased filling plan to minimize, to the extent practical, the area used for consolidation of remediation wastes during soil placement. The first phase of the CAMU construction would consist of the unlined portion and the second phase would consist of the lined portion.

In FMC's opinion, the CAMU is a critical component of corrective measures for the FMC study areas south of Pearson/Stone Roads (e.g., Suspected Air Deposition and Culvert 105 Study Areas, Tributary One and Floodplain south of Pearson/Stone Roads study area). In consultation with its environmental experts and outside counsel, FMC determined that the CAMU proposed for the FMC Facility meets all of the seven objective criteria specified in the governing state and federal regulations [6 NYCRR Part 373-2.19 (c)(3) and 40 CFR Part 264.552(c)]. These criteria are discussed in the following Sections 2.1 through 2.7.

2.1 Implementation of Reliable, Effective, Protective, and Cost-Effective Remedies; 6 NYCRR Part 373-2.19 (c)(3)(i) and 40 CFR Part 264.552(c)(1)

FMC has implemented interim remedial activities that include the removal of soils containing elevated levels of arsenic from non-FMC-owned properties and from portions of the FMC property (e.g., North Railroad Property). Each interim remedial activity was determined to be necessary by the Agencies, in

consultation with the New York State Department of Health (NYSDOH). Non-hazardous remediation soil and debris (approximately 96,000 cubic yards) excavated from 36 off-Site properties and the North Railroad Property in 1996, 1999, 2003, 2005, 2007 and 2008 were placed within and adjacent to the former Eastern Surface Impoundment (ESI) at the northeastern portion of the FMC Facility (ESI Fill Area) pursuant to work plans approved by the Agencies, under the terms and conditions of the Administrative Order on Consent (AOC) entered into by FMC and the Agencies or a separate Order on Consent with the NYSDEC (1996 IRM). In addition, remedial soils from the 1987-1988 Northern Ditches IRM were placed within an encapsulated unit within the ESI Fill Area. The unit was comprised of the following:

- 40-mil high-density polyethylene (HDPE) underliner over a 12-inch-thick compacted clay layer;
- placement of a nominal 4-inch-thick layer of clay over the soil/sediment excavated from the Northern Ditches;
- 40-mil HDPE overliner placed over the 4-inch clay layer and fused to the HDPE underliner along the entire perimeter of the storage area; and
- clay and topsoil material was placed over the HDPE overliner and seeded.

The existing ESI Fill Area is located within the proposed CAMU Phase 1 Area, as depicted on Figure D1-1.

Use of the CAMU would be similar to using the FMC Facility for temporary staging of the remediation waste for subsequent off-site transport to a commercial landfill(s) in terms of the time required for completing the soil excavation activities during the CMI for the Suspected Air Deposition and Culvert 105 Study Areas.

FMC has determined that the designation of a CAMU at the Facility will facilitate the completion of reliable, protective, technically-sound, and cost-effective remedies in the Suspected Air Deposition and Culvert 105 Study Areas and other FMC study areas south of Pearson/Stone Roads. Specifically, in consultation with FMC's experts, FMC has concluded that using a CAMU for the permanent management of remediation waste from RCRA corrective actions would enhance the implementation of such remedies by:

a) Avoiding potential project delays that may result due to the use of a commercial landfill (e.g., need to obtain disposal approvals, commercial landfill capacity limitations and operating permitting limitations);

b) Providing flexibility in defining the scope of the corrective action to be performed and in developing implementation criteria for the corrective measures; that flexibility will enhance the scope of the corrective measures for FMC's study areas and accelerate overall program completion;

c) Being more cost-effective than using a commercial landfill;

d) Allowing for the permanent management of remediation soil and debris that has been placed within the ESI Fill Area in a protective manner without further handling or potential exposure; and

e) Facilitating the closure of the RCRA-regulated ESI, which was removed from service in 1988. (The Agencies classified the ESI as a RCRA-regulated unit under the interim status regulations (40CFR Part 265 and 6 NYCRR Part 373-3). FMC submitted a Plan of Closure: Surface Impoundments (Conestoga-Rovers & Associates 1988) which proposed closure activities for the ESI. Subsequently, the Agencies and FMC agreed that the closure of the ESI would be addressed as part of the final corrective measures for the FMC Facility.)

2.2 Protective of Human Health and the Environment; 6 NYCRR Part 373-2.19(c)(3)(ii) and 40 CFR Part 264.552(c)(2)

The CAMU regulations specify that the management of remediation wastes in the proposed CAMU shall not create unacceptable risks to humans or to the environment that may result from exposures to hazardous wastes or hazardous constituents. FMC has concluded that the use of the proposed CAMU will be protective of human health and the environment as detailed below and further addressed in Appendix D and in the Draft CMS Report.

The CAMU is an engineered disposal unit that will be designed, constructed, used, maintained and otherwise managed to protect human health and the environment, in accordance with the applicable CAMU rules and regulations. The CAMU will be situated at the Facility in a location where there are redundant engineering and administrative controls, including the existing infrastructure for surface water and groundwater collection and management systems, to prevent exposure to or migration of remediation soils and other remediation wastes. The remediation soils and other remediation wastes will be covered on an interim operating basis with clean soil cover materials and the completed CAMU will be closed with a low permeability final engineered cover. Accordingly, potential human exposures attributable to casual contact with the remediation soil and wastes placed in the CAMU will be minimized. The construction, use and maintenance of the CAMU will be controlled by project-specific health and safety procedures to minimize potential worker exposure and by project-specific community air monitoring and dust control procedures to minimize potential community exposures to dust generated from the remediation soils. Any remediation wastes placed in the completed CAMU will be isolated from human contact, surface water contact and wind erosion, and will have low likelihood of infiltration to groundwater. Consequently, the CAMU will prevent human exposure, isolate the remediation wastes placed in the CAMU, and prevent contaminated surface water migration, further groundwater degradation, wind dispersion and erosion that may be associated with remediation wastes placed in the CAMU.

The potential for any contaminant migration from the CAMU as a result of precipitation that may infiltrate or leach through the soils/materials placed in the CAMU is expected to be negligible for the following reasons.

a) The final cover design will include a flexible membrane liner, and will comply with the applicable CAMU regulations for the final cover. The permeability of this final CAMU cover is expected to be very low due to the character of the flexible membrane liner material. Therefore, once the final cover is complete, infiltrating precipitation coming into contact with remediation wastes in the CAMU will be substantially reduced.

b) No hazardous wastes, no liquid wastes, no municipal wastes and no wastes from the FMC plant operations will be placed in the CAMU.

c) The levels of contaminants in future soil/materials that would be placed in the CAMU and existing soil/materials within the ESI Fill Area, except for the 1987-1988 Northern Ditches IRM, are low and do not exhibit the characteristics of a hazardous waste (e.g., contaminants do not leach from the soil at a level above the regulatory limits) and also are not, by definition, a listed hazardous waste. Soils that were excavated in the course of the 1987-1988 Northern Ditches IRM generally contained higher levels of contaminants and were placed in an engineered encapsulated unit within the area subsequently identified as the ESI Fill Area.

d) Arsenic tends to bind to soil particles and is typically less mobile in the soil/materials that have been placed in the ESI Fill Area and will be placed in the CAMU.

e) Soil/materials have been/will be placed on top of the existing ground surface. Based on groundwater level measurements obtained on a quarterly basis from the late 1980's to date, and documented in periodic reports (since July 1991, in quarterly progress reports under the AOC), the existing ground surface in the proposed CAMU location is well above the saturated zone (i.e., the underground zone where groundwater saturates the soil or bedrock).

f) Rain water or snow melt that may infiltrate or percolate through soils/materials placed in the CAMU will be captured and contained by FMC's blast-fractured bedrock collection trenches and groundwater well recovery systems, which include a series of groundwater collection trenches and 14 groundwater extraction wells, most of which are located along the northern and eastern boundary of the Plant site or by the CAMU Phase 2 leachate collection system. The collected groundwater and leachate is then/will be treated at FMC's Water Treatment Plant.

g) FMC will continue routine monitoring of groundwater beneath and around the proposed CAMU under FMC's GMP. The GMP includes quarterly groundwater level measurements and quarterly,

semi-annual and biennial sampling and analysis of certain extraction wells, on-site monitoring wells and off-site monitoring wells.

The CAMU is also consistent with green remediation - "the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions" (NYSDEC January 2011). As detailed in the Draft CMS Report, in consultation with its experts, FMC submits that use of the proposed CAMU will be most consistent with green remediation practices. The construction, use, and maintenance of the proposed CAMU would include fuel consumption and air emissions (i.e., particulate and greenhouse gas emissions) associated with consolidating remediation wastes in the CAMU, operating heavy machinery during CAMU baseliner construction (Phase 2 Area only) and CAMU cover, and transporting materials and waste to and from the site for CAMU construction. The proposed CAMU would, however, eliminate fuel and air emissions associated with remediation waste transportation from excavation sites to a commercial landfill (a minimum one-way distance of 30 miles) and handling that material at the commercial facility. It should be noted that a quantitative analysis was not conducted. Therefore, precise estimates of fuel consumption and air emissions associated with CAMU construction/operation/closure and with off-site transportation do not exist. Section 3.5 of this Appendix provides a qualitative assessment of energy consumption and air emission impacts and relative impacts of the disposal options.

The proposed CAMU would also eliminate the increased public and worker short-term risks associated with the miles travelled to dispose of the materials at a commercial landfill.

Finally, the use of the CAMU will avoid using the precious limited capacity in commercial landfills necessary to handle other regulated waste streams.

2.3 Inclusion of Unaffected Areas in the CAMU; 6 NYCRR Part 373-2.19 (c)(3)(iii) and 40 CFR Part 264.552(c)(3)

The northern portion of the proposed CAMU (Phase 1 CAMU area) is an area of the Facility with significant soil and groundwater contamination and, as discussed in this Appendix (Attachment D-1A) and the draft CAMU Application, which encompass some existing SWMUs. There is an active groundwater collection system in place with respect to this portion of the Facility. However, the southern portion of the proposed CAMU (Phase 2 CAMU area) is in an area of low contamination.

As can be seen on Figure D1-1, much of the existing land area at the Facility is currently occupied by existing Site features; the amount of contiguous on-Site land area available for the construction of a CAMU in this area is essentially non-existent. The eastern and contiguous southeastern portions of the Facility, however, are largely unused, with the exception of the ESI Fill Area, which has been used

for the placement of excavated soils and debris from on-site and off-site Facility-related remediation projects and represents an area of existing contamination at the Facility.

As discussed in more detail in the draft 2008 CAMU Application, there are a number of reasons for locating a CAMU in the eastern portion of the Facility, including proximity to existing areas of contamination (e.g., the ESI and the former eastern process wastewater lagoon), the absence of existing Facility features such as utilities, buildings, or drainage ditches, and the presence of the existing groundwater collection and extraction systems.

2.4 Areas Within the CAMU, Where Wastes Remain In Place After Closure of the CAMU, Shall be Managed and Contained so as to Minimize Future Releases, to the Extent Practicable; 6 NYCRR Part 373-2.19 (c)(3)(iv) and 40 CFR Part 264.552(c)(4)

The CAMU is intended to be used for the permanent disposal of remediation waste. After closure of the CAMU and construction of the final cover, post-closure inspection, maintenance, and monitoring activities will be conducted to ensure the integrity of the unit and that the materials are contained and managed to minimize future releases. Information regarding specific post-closure activities is set forth in Section 3.7. FMC will have continuing obligations for the operation and maintenance of the CAMU, as well as for existing remedial systems at the FMC Facility and for the final corrective measures for the Facility which are enforceable under the AOC, as modified. It is anticipated that deed restrictions will be placed on the property as part of the post-closure program to control future uses of the Facility.

2.5 The CAMU Shall Expedite the Timing of Remedial Activity Implementation, When Appropriate and Practicable; 6 NYCRR Part 373-2.19 (c)(3)(v) and 40 CFR Part 264.552(c)(5)

FMC has determined that designation of a CAMU would expedite the timing of implementation of remedial actions by providing flexibility in defining the scope of the corrective action to be performed and developing implementation criteria for the corrective measures. In FMC's opinion, that flexibility will accelerate completion of the corrective action program for FMC's study areas south of Pearson/Stone Roads.

FMC believes that placing remediation wastes in a CAMU located at the Facility in Middleport would also result in less overall project duration and disruption to surrounding communities by reducing the number of trucks/rail cars (and personnel) necessary for remediation. This approach would eliminate the need for heavy truck traffic/rail cars to transport remediation waste across farther distances to off-site commercial disposal facilities and then travel back empty to Middleport over the same distance for more loads.

Placing remediation wastes in the CAMU would, however, be similar to using the FMC Facility for temporary staging of the remediation wastes for subsequent offsite shipment to a commercial landfill(s) in terms of the pace for completing the soil excavation activities during the CMI. Construction of the base liner for the Phase 2 CAMU Area will require construction activities prior to placing remediation materials in this portion of the CAMU, and will thus require planning to mitigate any delays that may be caused by construction of the liner. For example, Installation of the HDPE membrane liner may be limited by certain weather conditions (e.g., liner may not be installed if air temperatures are below 32^{o}F and during periods of precipitation), and therefore will require appropriate planning and scheduling prior to construction.

In FMC's opinion, the proposed CAMU provides critical flexibility in developing implementation criteria and for executing the corrective measures. This flexibility will accelerate completion of the corrective action program for FMC's study areas.

2.6 The CAMU Shall Enable the Use, When Appropriate, of Treatment Technologies (Including Innovative Technologies) to Enhance the Long-Term Effectiveness of Remedial Actions by Reducing the Toxicity, Mobility, or Volume of Wastes That Will Remain In Place After Closure of the CAMU; 6 NYCRR Part 373-2.19 (c)(3)(vi) and 40 CFR Part 264.552(c)(6)

The use of treatment technologies for the reduction of toxicity, mobility, or volume of wastes is not applicable or necessary for the remediation wastes proposed for placement in the CAMU (e.g., no hazardous wastes or liquid wastes). Soils and debris from past RCRA corrective actions that have already been placed within the limits of the CAMU would not be subject to treatment, and no wastes that may require treatment would be placed in the CAMU in the future. Characterization sampling of remediation wastes may be required to confirm that the wastes are non hazardous and can be placed in the CAMU or to determine whether offsite treatment/disposal may be needed.

2.7 The CAMU Shall, To the Extent Practicable, Minimize the Land Area of the Facility Upon Which Wastes Will Remain In Place After Closure of the CAMU; 6 NYCRR Part 373-2.19 (c)(3)(vii) and 40 CFR Part 264.552(c)(7)

The proposed total footprint of the CAMU is approximately 16.9 acres. Using a phased filling plan, the CAMU would be designed and constructed to minimize, to the extent practical, the area used for consolidation of remediation wastes. Phase 1 of the CAMU would be constructed to a total height of 28 feet prior to beginning construction of Phase 2.

The CAMU would be constructed on land currently zoned for industrial use, which would preclude future development of such land. Phase 2 of the CAMU would be constructed (filled) from north to south to reduce the land area affected if the volume of remediation waste does not require its use.

3. Revised Conceptual CAMU Design

Design components of the CAMU are identified in the list below, and are described in more detail (i.e., conceptual design-level detail) in the following subsections. The modifications to the draft 2008 CAMU Application are also identified.

1. **Physical Appearance of the CAMU (area, height and shape)** - the location and overall footprint of the proposed CAMU are the same as proposed in the draft 2008 CAMU Application; however, the CAMU would be constructed in two phases instead of three and to a total height of 28 feet instead of 35 feet. If a CAMU is designated (i.e., approved) for disposal of remediation waste from the CMS Study Areas currently being evaluated, FMC may propose in the future to increase the CAMU height to 35 feet as part of a CMS for other FMC study areas situated south of Pearson/Stone Roads (e.g., Tributary One and Flood Plain South of Pearson/Stone Roads), and will provide an evaluation in that CMS.
2. **Liner (or bottom) design requirements unless alternate requirements are approved -** this CAMU design component has been modified such that the first phase of the CAMU construction would consist of the unlined portion and the second phase would consist of the lined portion.
3. **CAMU remediation wastes –** consistent with the draft 2008 CAMU Application, only non-hazardous soils and other remediation waste removed as part of FMC's Middleport remediation activities would be placed in the CAMU. In response to community comments, FMC will limit the scope of remediation soils and debris to FMC study areas south of Pearson/Stone Roads. Any remediation wastes that may be generated as part of any future corrective measures for study areas north of Pearson/Stone Roads will not be placed in the CAMU.
4. **Filling procedures, including interim cover and groundwater monitoring -** same as proposed in the draft 2008 CAMU Application.
5. **Closure plans and final cover -** this CAMU component has been modified to provide for construction of a low permeability cover over the entire CAMU. The final surface of the CAMU would be vegetated with a variety of grasses and shrubs, and would include trees at select locations along the perimeter.
6. **Post-closure plan -** same as proposed in the draft 2008 CAMU Application.

As discussed in Section 1, if the CAMU is tentatively selected by the Agencies as the disposal option for the Suspected Air Deposition and Culvert 105 Study Areas after review of the Draft CMS Report and public comments on the Draft CMS Report, FMC will submit a revised CAMU Application that will be subject to public review and comment concurrent. The revised Application will take into account comments that the Agencies provided on the draft 2008 CAMU Application, the 2010 Draft CMS Report, and the final draft CMS Report. After receipt of public comments on the revised CAMU Application, the

Agencies will approve or disapprove and/or request changes to the associated CAMU design, construction and operation information.

3.1 Physical Appearance of the CAMU

Physical appearance aspects of the proposed CAMU are summarized below.

- Location - Eastern portion of Facility, which includes the area currently identified as the ESI Fill Area and the area of the Facility south of the ESI Fill Area (as shown on Figure D1-1). The Plant security fence will be extended to encompass the entire footprint of the proposed CAMU.

- Maximum footprint - approximately 16.9 acres (constructed in two phases as described in Section 3.2). A minimum 50-foot buffer would be maintained between the outer edge of the CAMU (toe of final cover) and the Facility's property boundary.

- Total height - 28 feet above surrounding grade (at its highest point). FMC may propose, and request approval, in the future to increase the height of the CAMU to a maximum height of 35 feet consistent with the Town of Royalton ordinance provisions, as part of Corrective Measures Studies for other FMC study areas situated south of Pearson/Stone Roads (e.g., Tributary One and Flood Plain South of Pearson/Stone Roads).

- Final Grades

  - *Maximum Slope:* 25%

  - *Minimum Slope:* 4%

  - *Total Height:* 28 feet (above surrounding grade and at the highest point of the CAMU)

- The final surface of the CAMU would be vegetated with a variety of grasses and shrubs, as well as trees at select locations along the perimeter to achieve an appearance consistent with the open, rural, and natural character of the surrounding area.

- Capacity - *Total Estimated Net Available Airspace*: approximately 227,900 cubic yards. This capacity is from existing grade (Phase 1 Area) or top of base liner (Phase 2 Area), to the bottom of final CAMU cover. This capacity would be occupied with a combination of remediation waste, as well as interim soil cover materials to be placed/used during filling of the CAMU in accordance with the Agencies'-approved plan. Estimated net available airspace for the Phase 1 and Phase 2 Areas is approximately 112,900 cubic yards and approximately 115,000 cubic yards, respectively.

3.2 Modified CAMU Construction Phases

The CAMU would be constructed in two phases (the three phase approach proposed in the March 2008 draft CAMU Application has been changed). The two CAMU construction phases are described below and shown on Figure D1-1.

- The proposed CAMU Phase 1 Area is the location of entire SWMU Group C, which includes the Eastern Process Wastewater Retention Basin (SWMU#3), the Eastern Surface Impoundment (ESI) (SWMU #50), and the 1987-1988 Northern Ditches Contaminated Soil Storage Area (SWMU #53) [reference RFI Report Volume I for additional information on the SWMUs]. SWMUs #3, #50 and #53 are included in SWMU Group C, as well as the soil placed in the ESI Fill Area (SWMU#54) beginning in 1996. The Phase 1 CAMU Area is situated within an area of significant levels of contamination as discussed in Attachment D-1A. The CAMU Phase 1 Area maximum footprint is approximately 10.6 acres.

- The Phase 2 CAMU Area would involve placement of remediation soil/debris south of the Phase 1 Area. Specifically, the Phase 2 CAMU Area would be south of the former unlined former wastewater basin (SWMU #3) and FMC's existing fenceline. The CAMU Phase 2 Area maximum footprint is approximately 6.3 acres.

FMC proposes to use the CAMU for the permanent placement of non-hazardous remediation waste generated from FMC's RCRA Corrective action program for its study areas including the Suspected Air Deposition and Culvert 105 study areas, Tributary One and Floodplain south of Pearson/Stone Roads, and other FMC Facility study areas south of Pearson/Stone Roads. It is anticipated that additional soil will be removed from study areas south of Pearson/Stone Roads beyond those from the Suspected Air Deposition and Culvert 105 Study Areas as part of RCRA remedial activities implemented under the AOC. However, the actual quantities of remediation waste to be generated are not currently known. Accordingly, the first phase would consist of placing remediation waste within the ESI Fill Area and SWMU Group C; the second would consist of placing remediation waste south of this area. FMC plans to construct the CAMU in phases and will utilize the capacity required by the volume of the remediation wastes that are generated in the course of completing the RCRA Corrective Action Program for study areas south of Pearson/Stone Roads. Once the maximum capacity of the CAMU (Phases 1 and 2, and possibly to include an adjustment of the height to 35 feet, consistent with the Town of Royalton ordinance provisions) has been reached, FMC will close the CAMU and alternate options will be used for the disposal of any other remediation waste that may be generated. The final surface of the CAMU would be vegetated with a variety of grasses and shrubs, as well as trees at select locations along the perimeter.

3.3 CAMU Base Liner and Leachate Collection System

The CAMU regulations [6 NYCRR 373-2.19(c)(5)(iii) and 40 CFR Part 264.552(e)(3)] specify "Minimum Design Requirements" for the CAMU, which consist of a composite liner (clay and flexible membrane liner) and leachate collection system, unless the Regional Administrator approves alternative design requirements. It is not clear that the provisions of 6 NYCRR Section 373-2.19(c)(5)(iii)('b')('2') apply where a CAMU is sited on the location of a solid waste management unit or units (SWMU Group C), inasmuch as this is not a "new, replacement, or laterally expanded unit" subject to the minimum design requirements under Section 373-2.19(c)(5)(iii)('a'). However, even if these minimum design requirement provisions are applicable, FMC submits that this area qualifies for approval of alternate design requirements, as provided in 6 NYCRR Section 373-2.19(c)(5)(iii). The Phase 1 Area of the CAMU construction would be unlined and the Phase 2 Area would be lined, as described in the following subsections and previously discussed with the Agencies during a meeting held on April 28, 2010 and a conference call on May 5, 2010.

3.3.1 Phase 1 Area - No Base Liner or Leachate Collection System

FMC proposes an alternative design for the Phase 1 CAMU Area that would not include a liner or leachate collection system. This alternative design approach is allowable based on the conditions set forth in the CAMU regulations [6 NYCRR 373-2.19(c)(5)(iii) and 40 CFR Part 264.552(e)(3)(ii)]:

1. The CAMU would be situated in an area with significant levels of soil and groundwater contamination.

2. There will not be migration of hazardous constituents from the unit that will jeopardize or adversely affect long-term remedial goals.

These conditions will be satisfied by the alternative Phase 1 Area design, as detailed in the draft 2008 CAMU Application and supplemented with the soil and groundwater analytical data and hydraulic evaluation presented in Attachment D-1A. That attachment has been prepared to address certain Agencies' comments on the draft 2008 CAMU Application, as identified in FMC's response letter dated March 5, 2010 (refer to Attachment 2 of FMC's letter, Item No. 4). Accordingly, Attachment D-1A provides the following information:

- Discussion of soil analytical data from sampling within the proposed Phase 1 CAMU Area, including a comparison to the NYSDEC Industrial Soil Cleanup Objectives (SCOs) presented in 6 NYCRR 375-6 and comparison of soil arsenic data to the Agencies' Middleport soil background delineation criterion of 20 mg/kg. Arsenic is found throughout the proposed CAMU Phase 1 Area at concentrations above 20 mg/kg, and other constituents such as lead, mercury, chlorinated

pesticides, ammonia, ethylene thiourea (ETU), rotenone and volatile organics are found at various locations distributed throughout the proposed CAMU Phase 1 Area. The maximum concentration of arsenic in these soil samples is approximately 2,000 mg/kg and the average concentration (arithmetic average of all samples) is approximately 67 mg/kg.

- Summary of groundwater chemical data associated with FMC's groundwater monitoring program and the groundwater remedial systems located on (and in use at) the Facility. These data show elevated levels of the four indicator compounds established for the site (arsenic, methylene chloride, ETU, and ammonia), as well as other constituents, that are in some cases tens of thousands times higher than the respective New York State Class GA Groundwater Standard. The average yearly arsenic groundwater concentrations for the extraction wells in/near the Phase 1 CAMU Area are also presented in Attachment D-1A. Collectively, these groundwater data demonstrate that the groundwater in/near the Phase 1 CAMU Area is significantly impacted and that the concentrations of arsenic observed in the extraction wells and the downgradient monitoring wells have not increased over time, following placement of the arsenic-impacted remediation soil in the unlined ESI Fill Area.

- Discussion of the interim corrective measures (ICMs) already implemented by FMC to contain and remediate impacted groundwater throughout the Facility, including the area where the proposed Phase 1 of the CAMU would be situated. FMC has implemented a series of ICMs designed to intercept (extract) and treat overburden and shallow bedrock groundwater before it can migrate beyond the Facility boundaries. Extracted groundwater is treated at the Facility's Water Treatment Plant (WTP). The operation and the effectiveness of the groundwater ICMs are routinely monitored, evaluated and reported to the Agencies in accordance with the Facility's Groundwater Monitoring Program (GMP) Work Plan (2002), under the terms and conditions of the AOC. These existing ICMs are effective in capturing overburden and shallow bedrock groundwater from the proposed Phase 1 CAMU footprint. FMC and FMC's environmental consultants (e.g., ARCADIS, AMEC Geomatrix) concluded that use of these ICMs in lieu of a base liner and leachate collection system would represent an effective integration of the proposed Phase 1 CAMU with the existing corrective measures in use at the Facility. This conclusion is further supported by the NYSDEC's Environmental Indicator Determination (CA750) which concludes that migration of contaminated groundwater from the Facility (including the entire proposed CAMU footprint) is under control (NYSDEC 2007). Any leachate that might be generated would be captured by the existing groundwater recovery system.

3.3.2 Phase 2 Area - Base Liner and Leachate Collection System

Consistent with 6NYCRR Section 373-2.19(c)(5)(iii)(a), the base liner for the Phase 2 Area (area south of SWMU Group C) would consist of the following (starting from the top):

- 12 inches select fill (operations layer)
- Geotextile fabric
- 12 inches granular drainage layer with leachate collection piping
- Geosynthetic drainage composite layer
- 60-mil HDPE flexible membrane liner
- Geosynthetic clay liner
- 6 inches select fill

Figure D1-2 shows a cross-section of the Phase 2 Area base liner.

A leachate collection system would be included as part of the base liner for the Phase 2 CAMU Area. The leachate collection system would be used to: 1) manage leachate water that collects within the footprint of the Phase 2 base liner system as a result of infiltrating precipitation; and 2) provide a means for removing and transferring the collected leachate water to an on-site storage facility (tank system) prior to treatment at the Facility's WTP. The Phase 2 Area base liner and the leachate collection system would be designed to maintain less than 30 centimeters (approximately 1 foot) of leachate depth on the base liner. Design of the Phase 2 leachate collection system is anticipated to include the following components.

- Perforated pipes installed on the floor of the base liner system for collection of leachate water.
- Solid pipe (sideslope riser pipe) installed on the side slopes of the base liner system for removal of leachate water and for cleanout of the collection pipes.
- Pump system installed within the sideslope riser pipe for removal of leachate water.
- Solid double pipe system (forcemain) installed outside of the Phase 2 base liner system for transfer/conveyance of leachate water to on-site storage facilities.
- On-site storage facilities, if needed, for temporary containment of leachate water removed from the Phase 2 base liner prior to treatment at the Facility's WTP.

3.4 CAMU Remediation Wastes

CAMU eligible waste is defined as follows:

"All solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris, that are managed for implementing cleanup. As-generated wastes (either hazardous or non-hazardous) from ongoing industrial operations at a site are not CAMU-eligible wastes."[6 NYCRR 373-2.19(c)(1)(i)('a') and 40 CFR Part 264.552(a)(1)]

The proposed CAMU would be approved for the permanent disposal of remediation waste already in the ESI Fill Area, and the placement of non-hazardous soils and debris removed as part of FMC's future remediation activities for FMC study areas south of Pearson/Stone Roads. The soil and debris may include non-hazardous material contaminated with remediation soils that is encountered during remedial activities (e.g., wood, demolition debris, concrete, weeds, roots, and vegetation) but would NOT include the following:

- RCRA characteristic or listed hazardous wastes
- Industrial wastes (hazardous or non-hazardous) from ongoing industrial operations at the Facility
- Intact containers containing hazardous wastes
- Liquid wastes
- Municipal waste
- Debris that is not contaminated by remediation soils
- Waste that is not generated in the course of implementation of remedial action under the RCRA Corrective Action Program
- Remediation wastes generated under FMC's corrective action program for FMC study areas north of Pearson/Stone Roads

This list of excluded waste is more restrictive than state and federal regulations, and was developed as an additional conservative protective measure relative to use of the CAMU at the FMC Facility.

Non-hazardous remediation wastes to be placed in the CAMU could be from both on-site and off-site (areas south of Pearson/Stone Roads) RCRA remedial activities. The origins of these wastes are discussed in more detail in Section 2.3 of the draft 2008 CAMU Application.

3.5 CAMU Fill Procedures

CAMU remediation soil and debris generated as part of FMC's ongoing RCRA corrective action program areas south of Pearson/Stone Roads would be placed and compacted within the proposed CAMU as outlined in the draft 2008 CAMU Application.

3.6 CAMU Closure Plans and Final Cover

The final cover component will be presented in a revised CAMU Application. The CAMU closure regulations [6 NYCRR 373-2.19(c)(5)(vi)(d)(1) and 40 CFR Part 264.552(e)(6)(iv)] specify that the final cover for the CAMU must meet the following five performance criteria or else meet alternate site-specific performance criteria:

1. Provide long-term minimization of migration of liquids through the closed CAMU
2. Function with minimum maintenance
3. Promote drainage and minimize erosion or abrasion of the final cover
4. Accommodate settling and subsidence so that the final cover's integrity is maintained
5. Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present

As previously identified (FMC's March 5, 2010 letter) and discussed with the Agencies (April 2010 meeting and May 2010 conference call), the final CAMU cover has been modified and would meet these five performance criteria. The proposed conceptual design of the final CAMU cover for the entire CAMU (both phases) is shown on Figure D1-2 and consists of the following (starting from the top):

- 4 inches vegetated top soil layer
- 20 inches general fill
- Geosynthetic drainage composite layer
- 60-mil HDPE flexible membrane liner

- 3 inches select fill (grading layer)

The permeability of this final composite CAMU cover is expected to be very low due to the use of the HDPE flexible membrane liner material. Therefore, once the final cover is complete, infiltrating precipitation coming into contact with remediation wastes in the CAMU will be substantially reduced.

The final surface of the CAMU would be vegetated with a variety of low-maintenance grasses and shrubs, as well as trees at select locations along the perimeter to achieve an appearance consistent with the open, rural, and natural character of the surrounding area. Additionally, following construction, vegetation including trees and shrubs would be planted in the buffer area between the CAMU and the Facility's southern property boundary.

3.7 CAMU Post-Closure Plan

This component has not been modified from the draft 2008 CAMU Application, including the post-closure watershed drainage plan and post-closure stormwater management plan. These plans are graphically depicted on Figures D1-3 and D1-4, respectively. As shown on these figures and described in the draft CAMU Application, the watershed area currently draining to the Western Surface Impoundment (WSI) will be significantly reduced, upon final closure of the CAMU, through a combination of mid-slope diversion swales and perimeter ditches that will redirect the drainage to the South Basin. The reduction in watershed area draining to the WSI will aid in decreasing the hydraulic loading to the WSI and the Facility's WTP. The South Basin will also serve to attenuate peak discharge flows to the South Culvert during storm events.

As also described in the draft 2008 CAMU Application and in Section 2.4 of this Appendix, a detailed post-closure plan would be prepared during the CMI phase and submitted for review and approval by the Agencies. Post-closure would include (but not be limited to) the following activities:

- Periodic inspection of the CAMU final cover for signs of erosion and/or damage, and maintenance as required
- Periodic inspection and maintenance of the CAMU leachate collection system (e.g., maintenance of the pumps and cleanout of the collection pipes)
- Pumping/treatment of CAMU Phase 2 leachate, if any
- Continued pumping/treatment of contaminated groundwater
- Continued OM&M of the Facility's groundwater extraction and treatment system

- Continued groundwater monitoring

It should be noted that whether or not a CAMU is designated at the Facility, FMC would continue to pump and treat contaminated groundwater; operate, maintain and monitor the Facility's groundwater extraction and treatment system; inspect and maintain the ESI Fill Area and North Site Cover, and implement FMC's groundwater monitoring program.

4. Estimated CAMU Costs

FMC's total estimated cost (capital and OM&M) for the CAMU with a total height of 28 feet is approximately $15 million, as detailed in Appendix I of the Draft CMS Report. This estimated cost is based on full utilization of the estimated net available airspace (227,900 cubic yards), which yields an estimated unit cost of approximately $39/ton and $49/ton for permanent placement of remediation wastes in the Phase 1 and Phase 2 CAMU Areas, respectively. The estimated costs include costs for the construction and filling of the CAMU as well as long term maintenance, leachate collection, inspection and environmental monitoring of the CAMU for a period of 30 years.

Financial assurance is expected to be included for any CAMU that is designated by the Agencies.

As previously identified, FMC would construct the CAMU in two phases and would only utilize the capacity required by the volume of the remediation wastes that are generated in the course of completing the RCRA Corrective Action Program. This phased construction approach would meet the Agencies' criteria (NYCRR Part 373-2.19 (c)(3)(vii) and 40 CFR Part 264.552(c)(7)) that the CAMU shall, to the extent practicable, minimize the land area of the facility upon which wastes will remain in-place after closure of the CAMU.

5. References

AMEC Geomatrix. 2009. Corrective Measures Study Work Plan for Suspected Air Deposition and Culvert 105 Study Areas (August).

ARCADIS. 2008. Draft CAMU Application (March).

Conestoga-Rovers & Associates (CRA). 2002. Groundwater Monitoring Program Work Plan for Remedial Systems Effectiveness Monitoring, Revision No. 5 (March).

NYSDEC. 2007. Documentation of Environmental Indicator Determination – RCRA Corrective Action Environmental Indicator RCRA Info Code (CA750) – Migration of Contaminated Groundwater Under Control. FMC Corporation, 100 Niagara Street, Middleport, NY 14105, Facility EPA ID # NYD002126845. (March 14, 2007).

NYSDEC. 2011. DER-31/Green Remediation. January.

USEPA, et al. 1991. Administrative Order on Consent [Docket No. II RCRA-90-3008(h)-0209] entered into by FMC, NYSDEC and USEPA, effective July 2, 1991.

TABLE 1 - FMC's RESPONSES TO COMMENTS ON THE PROPOSED CAMU
ATTACHMENT D-1
DRAFT – MAY 2011
CMS REPORT FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION – MIDDLEPORT, NEW YORK

Item No.	Comment from the Agencies or the Community	FMC's Response
	Comments from the Agencies	
1.	Agencies' letter dated November 23, 2009 (see copy included in Attachment D-1B) which provided comments on FMC's draft Corrective Action Management Unit (CAMU) Application, dated March 2008.	FMC's draft responses were provided to the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) (collectively, "the Agencies") by letter dated March 5, 2010 (see copy included in Attachment D-1B). FMC and the Agencies discussed FMC's responses during a meeting with Agencies in Albany, NY on April 28, 2010 and subsequent teleconference with the Agencies on May 5, 2010 (discussions on-going). It was agreed that FMC would submit a revised CAMU Application after the Agencies have made a preliminary decision on the designation of the CAMU and the selection of correctives measures for the Air Deposition and Culvert 105 Study Area.
	Prior to (beginning in November 2006) and after submittal of the March 2008 CAMU Application (through June 2010), FMC provided numerous opportunities to local residents, Village of Middleport and Town of Royalton officials, the Middleport Community Input Group (MCIG) and other stakeholders to obtain information and to provide informal comments on FMC's proposed CAMU. Some of the community comments received to date indicate that there are some opposition to the proposed CAMU. The informal comments received are summarized below with FMC's responses to the comments.	
	Summary of Informal Community Comments Received During Information Sessions and Meetings	
2.	<u>Short term health and environmental concerns</u> • Dust migration and potential for re-contamination of nearby properties • Truck traffic • Safety of school students and community members during its use	During the design phase of the Corrective Measures Implementation (CMI), FMC will prepare a work plan that will specify procedures to be followed during the construction and use of the CAMU and implementation of any corrective measures construction activities, including excavation of soil and transportation and placement of excavated soil in the CAMU. The work plan will include procedures to monitor for fugitive dust and arsenic in the air around the areas where contaminated soil is being handled (e.g., excavation area and CAMU) and specify possible actions that will be taken to control fugitive dust from the construction activities. Community-related safety procedures will be identified in the work plan and implemented to address potential safety concerns associated with truck traffic, pedestrians, student bussing and walking to/from school and use of areas of construction. The work plan will also identify proposed trucking routes that will be used during the construction activities and contact information for project representatives from FMC and the Agencies. The work plan will be reviewed and approved by the Agencies, in consultation with the NYSDOH.

TABLE 1 - FMC's RESPONSES TO COMMENTS ON THE PROPOSED CAMU
ATTACHMENT D-1
DRAFT – MAY 2011
CMS REPORT FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION – MIDDLEPORT, NEW YORK

Item No.	Comment from the Agencies or the Community	FMC's Response
3.	Long term health and environmental concerns • Leaching into groundwater and potential for off-site migration of contaminants • Impacts to surface water quality • Potential for human exposure to materials placed in CAMU • Reliability of CAMU final cover, surface water controls and groundwater remedial systems	As required by the CAMU rules and regulations, the proposed CAMU has been conceptually designed, and will be constructed, used, maintained, closed and cared for post-closure to ensure that human health and the environment are protected. The CAMU design, associated plans and activities will be subject to review and approval by the Agencies, in consultation with the NYSDOH, Remediation soils/materials placed in the CAMU will be covered with an engineered cover system that will be vegetated. The cover system will shed rain water, prevent wind and water erosion and prevent contact with the materials under the cover. In other words, the cover system will prevent the airborne and surface water migration and exposures to soils/material placed in the CAMU. FMC will have procedures in place to minimize potential worker exposure to the soils/materials placed in the CAMU in the case of disturbance of the CAMU cover. In addition, FMC will have inspection, monitoring and maintenance procedures in place to monitor for potential damage to the cover system (e.g., from burrowing animals) and to maintain the integrity of the cover system. FMC does not expect migration of contaminants from the CAMU as a result of precipitation that may infiltrate or leach through the soils/materials placed in the CAMU for the following reasons. a) No hazardous wastes, no liquid wastes, no municipal wastes and no wastes from the FMC plant operations will be placed in the CAMU. b) The levels of contaminants in the soil/materials that would be placed in the CAMU are low and do not exhibit the characteristics of a hazardous waste (e.g., contaminants do not leach from the soil at a level above the regulatory limits). c) Arsenic tends to bind to soil particles and is typically immobile, especially at the low levels found in the soil/materials that have been placed in the ESI Fill Area and will be placed in the CAMU. d) Soil/materials have been/will be placed on top of the existing ground surface, well above (and not in contact with) the below grade level where groundwater saturates the soil or bedrock. e) The engineered final cover for the CAMU will include a hydraulic barrier that will shed rainwater and prevent infiltration of rain water.

Item No.	Comment from the Agencies or the Community	FMC's Response
		f) Rain water or snow melt that may infiltrate or percolate through soils/materials placed in the CAMU will be captured and contained by FMC's blast-fractured bedrock collection trenches and groundwater well recovery systems, which include a series of groundwater collection trenches and 14 groundwater extraction wells, most of which are located along the northern and eastern boundary of the Plant site. The collected groundwater is then treated at FMC's Water Treatment Plant. g) FMC will continue routine monitoring of groundwater beneath and around the proposed CAMU under FMC's Groundwater Monitoring Program (GMP). The GMP includes quarterly groundwater level measurements and quarterly, semi-annual and biennial sampling and analysis of certain extraction wells, on-site monitoring wells and off-site monitoring wells.
4.	<u>Potential Concerns Related to Middleport Economics, Reputation and Aesthetics</u> • Businesses and people may not want to move into Middleport • Potential negative consequences to local economy and property values • It will be ugly and visible • Negative image for the community and threat to "peace of mind" ("psychological" impact) • Trees, shrubs or other vegetation should be planted to camouflage the CAMU. • Adverse news coverage	FMC does not expect any adverse impact to the long term economics, reputation and aesthetics of the surrounding community resulting from the construction and use of a CAMU at the FMC Plant site for the following reasons: a) One of the goals used for identification and selection of corrective measures for the CMS Study Areas is to minimize disturbance and disruption to the community. The use of a CAMU would help towards this goal, as further discussed in Appendix D of the Draft CMS Report. b) The proposed CAMU would be situated on the FMC Plant Site, a large industrial site, and would be suitably landscaped. c) On a voluntary basis FMC has implemented a Property Price Protection Program and more recently a Home Value Assurance Program to ensure that residential property values are not adversely affected d) The Multiple Listing Service (MLS) data that FMC has shared with the Village and community on a number of occasions do not reflect that property values in Middleport have been depressed relative to those in nearby communities in Western New York. Based on the MLS data and consultation with local real estate professionals, FMC determined that property prices for residential properties within the FMC study areas have been comparable to neighboring communities in recent years.

Item No.	Comment from the Agencies or the Community	FMC's Response
		e) The Draft CMS Report includes the use of a CAMU as one of two waste disposal options included in the detailed evaluation of corrective measures alternatives. The CAMU waste disposal options consists of the construction of a CAMU with a total height of 28 feet at the FMC Facility. (In the March 2008 Draft CAMU Application, FMC proposed a CAMU with maximum height of 35 feet. FMC lowered the proposed height in Draft CMS Report in response to comments received from the community). Remedial soils/materials will be placed in the proposed CAMU and a final cover constructed over and on top of the placed materials (total height of 28 feet). As a reference point, 25 feet is the approximate height of the soil pile that is currently present at the FMC property. The CAMU final cover will include planting of vegetation (e.g., grass and shrubs) on or around the perimeter of the CAMU, as appropriate, and planting of shrubs, trees and/or other vegetation at select locations around the perimeter of the CAMU. FMC may propose, and request approval, in the future to increase the height of the CAMU to a maximum of 35 feet, consistent with the Town of Royalton ordinance provisions, as part of Corrective Measures Studies for other FMC study areas situated south of Pearson/Stone Roads (e.g., Tributary One and Flood Plain South of Pearson/Stone Roads).
5.	<u>CAMU Eligible Wastes</u> • CAMU should not receive remediation wastes from outside of the community • Finite time limit for adding materials to the CAMU • No plant production wastes or wastes from other remediation sites should be placed in the CAMU • Perception that wastes placed in the CAMU are hazardous	Under RCRA and state regulations, CAMU-eligible wastes generated from all the corrective action study areas may be disposed in a CAMU. However, in order to address community concerns, only non-hazardous remediation wastes generated from the Suspected Air Deposition and Culvert 105 study areas and other FMC study areas south of Pearson/Stone Roads (e.g., Tributary One and its Flood Plain) will be placed in the CAMU. FMC currently cannot predict when the environmental programs will be completed for the study areas south of Pearson/Stone Roads. FMC voluntarily proposed to exclude the placement of any hazardous wastes (as defined in the state and federal hazardous waste rules and regulations) in the CAMU. FMC proposes to use the CAMU only for the disposal of non-hazardous remediation wastes. No plant production wastes, garbage, trash, and/or hazardous wastes will be placed in the CAMU.

TABLE 1 - FMC's RESPONSES TO COMMENTS ON THE PROPOSED CAMU
ATTACHMENT D-1
DRAFT – MAY 2011
CMS REPORT FOR SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS
FMC CORPORATION – MIDDLEPORT, NEW YORK

Item No.	Comment from the Agencies or the Community	FMC's Response
6.	Long term Responsibility and Financial Assurance • What happens if FMC goes bankrupt? Who will maintain the CAMU and be responsible for the associated costs?	FMC will have continuing obligations for the operation and maintenance of the CAMU, as well as for existing remedial systems at the FMC Facility and for the final corrective measures for the Facility which are enforceable under the AOC, as modified. Financial assurance that will include maintenance of the CAMU, is expected to be included for any CAMU that is designated by the Agencies. The details and timing of this financial assurance are currently under discussion with the Agencies. The financial assurance will address the hypothetical scenario in which FMC goes bankrupt. FMC would be required to provide the Agencies with a financial mechanism specified in the regulations (through a bank letter of credit, trust fund, surety bond or insurance). If FMC goes bankrupt, the Agencies will use the financial mechanism provided by FMC to pay for those costs. FMC will continue to be responsible if the Middleport Plant is closed.
7.	Miscellaneous CAMU Design • Increase the buffer zone between the southern limits of the CAMU and the southern FMC property boundary to 100 feet to preserve existing trees in the buffer area. • Will the CAMU be designed to withstand an earthquake or extreme flood event? • What are the potential impacts to storm water runoff from the CAMU?	FMC will maintain a minimum 50-foot wide buffer area between the CAMU and the Facility's southern property boundary. This area currently consists of various types of native vegetation, including trees, shrubs and grasses. To the extent practicable, the native vegetation will be preserved during construction of the CAMU and the perimeter access road, which would be located within the northern portion of the buffer area. Following construction, vegetation including trees and shrubs will be planted in the buffer area. Consistent with the state and federal CAMU rules and regulations, design of the CAMU liner and cover systems will be evaluated to determine that acceptable minimum factors of safety for stability of the CAMU exist which include those associated with design seismic (i.e., earthquake) events. In addition, the design stormwater event for the CAMU drainage features will be the 25-year, 24-hour storm event which is consistent with New York State landfill design requirements. As discussed above in FMC's Response to Item 3, the engineered cover system will prevent direct contact of precipitation with soils/materials placed in the CAMU. As a result, storm water runoff from the cover system (which will have vegetated clean fill as its uppermost component) will not be considered impacted and can be managed as non-contact, surface drainage.

ALFRED ST.

CULVERT

CAMU APPROXIMATE EXTENT OF PHASE 1 (GREEN)

EXISTING ESI FILL AREA (WITHIN DASHED LINE)

FMC FACILITY

CAMU APPROXIMATE EXTENT OF PHASE 2 (PURPLE)

(ROUTE 31)

ROCHESTER ROAD (ROUTE 31)

LEGEND:

- LIMIT OF PROPOSED CAMU
- FMC PROPERTY BOUNDARY
- EXISTING FMC SECURITY FENCE

NOTES:

1. BASEMAP INFORMATION BASED ON APRIL 15, 2002 AERIAL SURVEY PROVIDED BY ABRAMS AERIAL SURVEY CORPORATION AND INFORMATION COMPILED FROM FIELD SURVEYS PERFORMED BY MCINTOSH AND MCINTOSH, P.C. ON SEPTEMBER 18, 1999; MARCH 28, 20001; APRIL 29, 2004; AUGUST 13, 2004; APRIL 7, 2005; SEPTEMBER 9, 2005; OCTOBER 12, 2005; JUNE 16, 2007; MAY 10, 2007; DECEMBER 13, 2007; OCTOBER 6, 2008; AND OCTOBER 8, 2008. THE HORIZONTAL DATUM IS NORTH AMERICAN DATUM 1983 (NAD83). ELEVATIONS AREA BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29).
2. PROPOSED CORRECTIVE ACTION MANAGEMENT UNIT (CAMU) WOULD BE CONSTRUCTED IN TWO PHASES (PHASE 1 AND PHASE 2). PHASE 1 CONSISTS OF CONTINUED USE OF THE ESI FILL AREA AND SOLID WASTE MANAGEMENT UNIT (SWMU) GROUP C; AND PHASE 2 CONSISTS OF PLACEMENT OF REMEDIATION SOIL/DEBRIS WITHIN THE AREA SOUTH OF THE ESI FILL AREA AND SWMU GROUP C.
3. THE TOTAL HEIGHT OF THE PROPOSED CAMU IS 28 FEET (ELEVATION 565.0 FEET).
4. THIS FIGURE IS AN UPDATE OF FIGURE 7 OF THE DRAFT CAMU APPLICATION (MARCH 2008).
5. ALL LOCATIONS ARE APPROXIMATE.

0 100' 200'
GRAPHIC SCALE

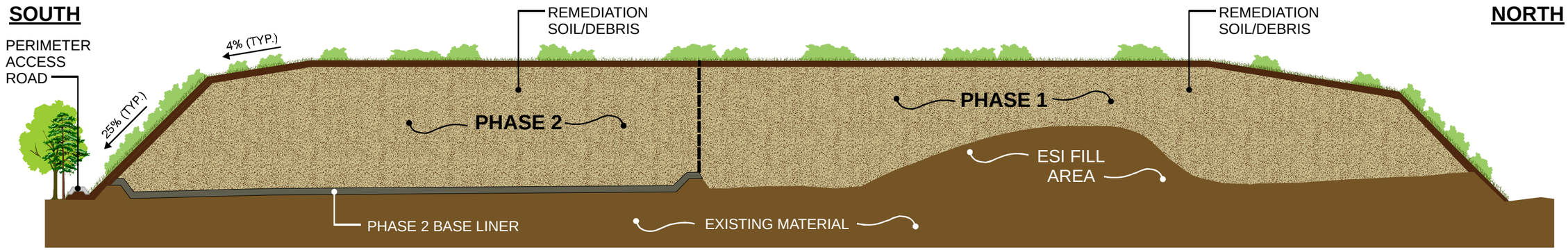
DRAFT - MAY 2011

FMC CORPORATION - MIDDLEPORT, NEW YORK
CORRECTIVE MEASURES STUDY REPORT SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS

PROPOSED CAMU LOCATION AND LAYOUT

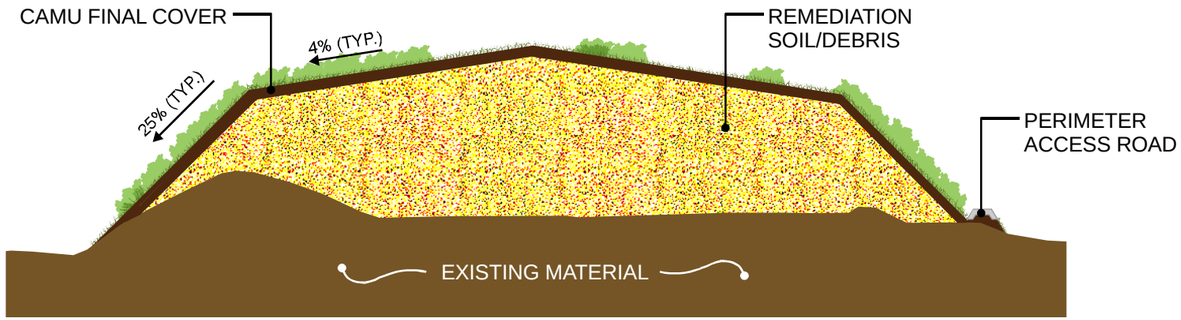
ARCADIS

FIGURE
D1-1



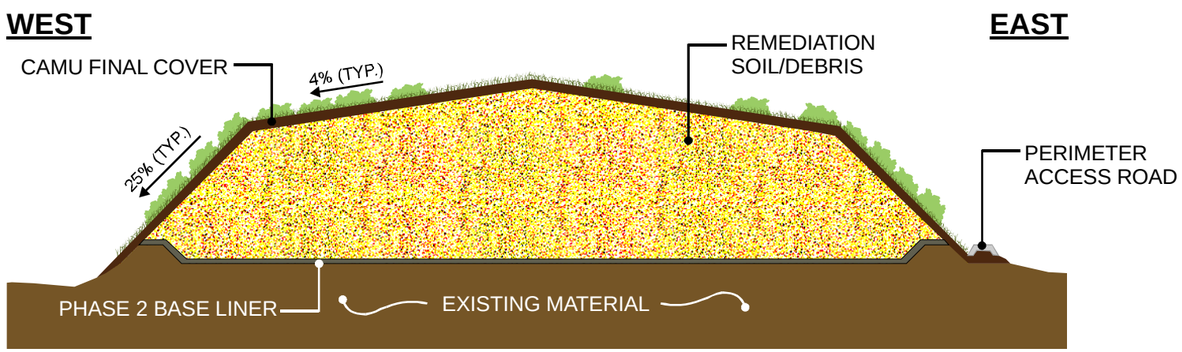
NORTH - SOUTH CROSS SECTION THROUGH PROPOSED CAMU

NOT-TO-SCALE
4X VERTICAL EXAGGERATION



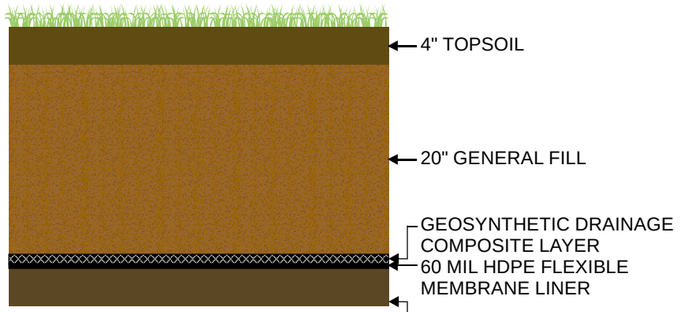
PHASE 1 CROSS SECTION

NOT-TO-SCALE
APPROXIMATE 4X VERTICAL EXAGGERATION



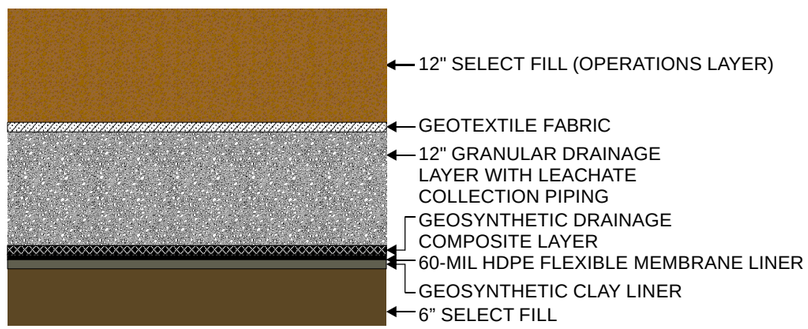
PHASE 2 CROSS SECTION

NOT-TO-SCALE
APPROXIMATE 4X VERTICAL EXAGGERATION



CAMU FINAL COVER

NOT TO SCALE



PHASE 2 BASE LINER

NOT TO SCALE

DRAFT - MAY 2011

NOTES:
1. TOTAL HEIGHT OF CAMU IS 28 FEET ABOVE SURROUNDING GRADE (AT ITS HIGHEST POINT).
2. FINAL SURFACE OF THE CAMU WOULD BE VEGETATED WITH A VARIETY OF LOW MAINTENANCE GRASSES AND SHRUBS, AS WELL AS TREES AT SELECT LOCATIONS ALONG THE PERIMETER OF THE CAMU.

FMC CORPORATION - MIDDLEPORT, NEW YORK
CORRECTIVE MEASURES STUDY
REPORT SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS

PROPOSED CAMU CROSS SECTIONS

ARCADIS

FIGURE D1-2

05/10/2011 SYRACUSE, NY-ENV/CAD DJHOWES
B0037736\0000\0027\CDR\37736g01.CDR

CEMETERY ST.

ALFRED ST.

SOUTH VERNON ST.

EXISTING CULVERT
105 INLET

WESTERN
SURFACE
IMPOUNDMENT
(WSI)

FMC FACILITY

STORMWATER
ATTENUATION AREA
DIVERSION BERM

STORMWATER
ATTENUATION
AREA OUTLET

EXISTING SOUTH
CULVERT INLET

ROCHESTER ROAD (ROUTE 31)

AERIAL FIELD

H.P.

525 530 535 540 545 550 555 560 565

LEGEND:

- PROPOSED PERIMETER ACCESS ROAD
- PROPOSED STORMWATER ATTENUATION AREA
- PROPOSED STORMWATER DIVERSION
- PROPOSED CULVERT
- H.P. HIGH POINT
- 540 PROPOSED GRADE INDEX CONTOUR
- 565 X PROPOSED SPOT ELEVATION
- PROPOSED GRADE BREAK
- PROPOSED FENCE
- AERIAL FIELD LIMITS OF FIELD/AERIAL SURVEY
- PROPOSED OUTLET APRON

NOTES:

1. BASEMAP INFORMATION BASED ON APRIL 15, 2002 AERIAL SURVEY PROVIDED BY ABRAMS AERIAL SURVEY CORPORATION AND INFORMATION COMPILED FROM FIELD SURVEYS PERFORMED BY MCINTOSH AND MCINTOSH, P.C. ON SEPTEMBER 18, 1999; MARCH 28, 20001; APRIL 29, 2004; AUGUST 13, 2004; APRIL 7, 2005; SEPTEMBER 9, 2005; OCTOBER 12, 2005; JUNE 16, 2007; MAY 10, 2007; DECEMBER 13, 2007; OCTOBER 6, 2008; AND OCTOBER 8, 2008. THE HORIZONTAL DATUM IS NORTH AMERICAN DATUM 1983 (NAD83). ELEVATIONS AREA BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29).
2. PROPOSED CONTOUR INTERVAL EQUALS 5 FEET.
3. PROPOSED GRADES SHOWN REPRESENT APPROXIMATE TOP OF CAMU FINAL COVER (I.E., TOP OF VEGETATED SOIL).
4. LIMITS OF GRADING FOR PERIMETER ACCESS ROAD NOT SHOWN FOR CLARITY PURPOSES.
5. PROPOSED DRAINAGE FEATURES SHOWN MAY VARY BASED ON FINAL DESIGN AND SITE CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION.
6. THIS FIGURE IS A REVISED VERSION OF FIGURE 13 OF THE DRAFT CAMU APPLICATION (MARCH 2008) AND HAS BEEN UPDATED TO REFLECT A 28-FOOT TOTAL CAMU HEIGHT.

0 100' 200'
GRAPHIC SCALE

XREFS:
37736X02
37736X05
37665X02

IMAGES:

PROJECTNAME: ---

DRAFT - MAY 2011

FMC CORPORATION - MIDDLEPORT, NEW YORK
CORRECTIVE MEASURES STUDY REPORT
SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS

PROPOSED CAMU POST-CLOSURE STORMWATER MANAGEMENT PLAN

ARCADIS

FIGURE
D1-3

CEMETERY ST.

ALFRED ST.

SOUTH VERNON ST.

EXISTING CULVERT
105 INLET

SUMP 1
SUMP 2
SUMP 3
SUMP 4
SUMP 5
SUMP 6
SUMP 7
SUMP 8
SUMP 9
SUMP 10
SUMP 11
SUMP 12
SUMP 13
SUMP 14
SUMP 15
TANK SUMP

WATERSHED OUTLET

WESTERN SURFACE IMPOUNDMENT (WSI)

WATER TREAT. PLANT

FMC FACILITY

STORMWATER ATTENUATION AREA DIVERSION BERM

WATERSHED OUTLET

EXISTING SOUTH CULVERT INLET

STORMWATER ATTENUATION AREA OUTLET

PROPOSED CAMU LOCATION

ROCHESTER ROAD (ROUTE 31)

AERIAL FIELD

FIELD AERIAL

530 525 540 545 550 555 560

LEGEND:

- APPROXIMATE LIMIT OF CAMU
- PROPOSED GRADE INDEX CONTOUR
- LIMIT OF FIELD/AERIAL SURVEY
- PROPOSED FINAL WSI WATERSHED
- PROPOSED FINAL SOUTH CULVERT WATERSHED
- PROPOSED STORMWATER ATTENUATION AREA
- WSI WATERSHED AREA DIVERTED TO SOUTH CULVERT
- ADJACENT WATERSHED AREA DIVERTED TO SOUTH CULVERT
- EXISTING DITCH/SWALE
- APPROXIMATE LOCATION OF BURIED CULVERT
- EXISTING SUMP LOCATION
- EXISTING FORCEMAIN
- PROPOSED STORMWATER DIVERSION
- PROPOSED CULVERT
- PROPOSED OUTLET APRON

XREFS:
37736X02
37736X05
37665X02

NOTES:

1. BASEMAP INFORMATION BASED ON APRIL 15, 2002 AERIAL SURVEY PROVIDED BY ABRAMS AERIAL SURVEY CORPORATION AND INFORMATION COMPILED FROM FIELD SURVEYS PERFORMED BY MCINTOSH AND MCINTOSH, P.C. ON SEPTEMBER 18, 1999; MARCH 28, 20001; APRIL 29, 2004; AUGUST 13, 2004; APRIL 7, 2005; SEPTEMBER 9, 2005; OCTOBER 12, 2005; JUNE 16, 2007; MAY 10, 2007; DECEMBER 13, 2007; OCTOBER 6, 2008; AND OCTOBER 8, 2008. THE HORIZONTAL DATUM IS NORTH AMERICAN DATUM 1983 (NAD83). ELEVATIONS AREA BASED ON NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29).
2. PROPOSED CONTOUR INTERVAL EQUALS 5 FEET.
3. THIS FIGURE IS A REVISED VERSION OF FIGURE 14 OF THE DRAFT CAMU APPLICATION (MARCH 2008) AND HAS BEEN UPDATED TO REFLECT A 28-FOOT TOTAL CAMU HEIGHT.

0 100' 200'
GRAPHIC SCALE

DRAFT - MAY 2011

FMC CORPORATION - MIDDLEPORT, NEW YORK
CORRECTIVE MEASURES STUDY REPORT
SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS

PROPOSED POST-CLOSURE WATERSHED DRAINAGE PLAN

ARCADIS

FIGURE
D1-4

CITY:SYRACUSE, NY GROUP: ENVCAD DB: A. SAMONS, P. LISTER LD: P. LISTER PW: D. WRIGHT LYRON*OFF*REF, (FRZ)
G:\ENVCAD\SYRACUSE\ACTIVE\03773690\0000\0027\DWG\MSR\37736G10.DWG LAYOUT: D1-4 SAVED: 3/14/2011 8:44 AM ACADVER: 18.0S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/10/2011 9:24 AM BY: LISTER, PAUL