NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

FINAL STATEMENT OF BASIS
FOR

AIR DEPOSITION AREA #1 (OU2 AND OU4) AND CULVERT 105 (OU5)

FMC CORPORATION
MIDDLEPORT, NEW YORK

USEPA ID NO.: NYD002126845

DER SITE NO. 932014

INTRODUCTION

This document presents the final corrective measure for the FMC Corporation Operable Units 2/4 and 5 in Middleport NY. The final corrective measures were selected in accordance with 6NYCRR Part 373 and Part 375. This decision is based on the Administrative Record for the New York State Department of Environmental Conservation (DEC) for the FMC Corporation facility (See Appendix E) and the public's input to the proposed corrective measures presented in the Draft Statement of Basis.

PUBLIC PARTICIPATION AND RESPONSE TO COMMENTS

As part of the remedial investigation process for OUs 2/4 and 5 a number of Citizen Participation activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted by the Agencies for the site:

- A repository for documents pertaining to the site was established.
- Site mailing lists were established which included nearby property owners, local political officials, local media, local environmental groups, and property owners in the Roy-Hart school district.
- A public meeting was held on June 10, 2009 which included a presentation of the Remedial Facility Investigation (RFI) and distribution of fact sheets; an associated public comment period was held from May 18, 2009 thru July 2, 2009. A responsiveness summary was issued in September 2009.

- A public meeting was held on June 14, 2011 which included a presentation of the Corrective Measures Study (CMS) and distribution of fact sheets; an associated public comment period was held from May 17, 2011 to July 1, 2011. A responsiveness summary was issued in June 2012.
- A public meeting was held on June 27, 2012 which included a presentation and discussion of the proposed remedy (Draft Statement of Basis) and distribution of fact sheets; an associated public comment period was held from June 15, 2012-August 13, 2012. The responsiveness summary for these events is being issued as part of this Final Statement of Basis.
- Two availability sessions were held on June 28, 2012 and July 26, 2012 in Middleport to discuss the remedy.

FINAL CORRECTIVE MEASURES

The major elements of DEC's selected remedy Corrective Measure Alternative 9 (CMA 9) are as follows:

1. Excavation and removal of soils at all locations and depths within the OU area to achieve an arsenic remedial goal of 20 parts per million (ppm) with some flexibility to be employed by the DEC on a case-specific basis to allow for limited confirmation samples to exceed this level, based on the location and/or depth of the sample exceeding 20 ppm and the implementability of the removal and exposure potential, while still achieving sufficient removal to assure a protective cleanup for which a no further action determination is appropriate. In addition this consideration will also be applied to accommodate property owner concerns related to preservation of their property with respect to specific features such as mature trees, sheds, decorative plantings, or other features of significance to the property owner where possible.

2. On-site management of contaminated soils in a Corrective Action Management Unit (CAMU) if the conditions described in this document (Section 8.1) are met. If these conditions are not met, contaminated soil will be disposed of at a permitted off-site facility or beneficially reused pursuant to a DEC beneficial use determination as set forth in 6 NYCRR Part 360, as approved by DEC, with the option of temporary on-site staging, with a preference towards beneficial use as commercial landfill daily cover and transport via rail. Soil or waste exhibiting hazardous waste regulatory levels will be disposed off-site at a permitted hazardous waste disposal facility.

3. The Interim Corrective Measures (ICMs) and Interim Remedial Actions (IRMs) within the Study Areas set forth in Section 5 are accepted as final remedies, including those properties/areas where the Agencies have previously issued "no further action" letters and the Wooded Parcel.

4. Final disposition of soils from the ICMs which are currently temporarily stored in the ESI will be in the ESI as part of an approved remedy for this area, if the conditions described in this document are met. If these conditions are not met, contaminated soil will be disposed at a permitted off-site facility or beneficially reused pursuant to a DEC beneficial use determination as set forth in 6 NYCRR Part 360, as approved by the DEC, with a preference towards beneficial use as commercial landfill daily cover and transport via rail. Soil or waste exhibiting hazardous waste regulatory levels will be disposed off-site at a permitted hazardous waste disposal facility.

DECLARATION

The corrective measures are protective of human health and the environment, comply with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and are cost-effective. This remedy utilizes permanent solutions and alternative treatment, or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

MAY 24, 2013

Date

Robert W. Schick, P.E., Director
Division of Environmental Remediation

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EXECUTIVE SUMMARY

The purpose of this Final Statement of Basis (FSOB) is to inform the public of the New York State Department of Environmental Conservation's (DEC) decision, in consultation with the New York State Department of Health (NYSDOH), in the selection of a remedy to address certain environmental contamination related to FMC's past operations in Middleport New York. Specifically, the contaminated areas that are the subject of this FSOB are identified as the Air Deposition Area #1 (hereafter also referred to as "Operable Unit ("OU2"), the Royalton-Hartland School property ("OU4"), and the Culvert 105 area ("OU5") all of which are primarily located in the Village of Middleport. (See Figure 1) Because of their close proximity to each other, OU2 and OU4 will generally be grouped together as OU2/4. None of these study areas are located within the boundaries of the FMC Facility.

The FMC Facility occupies approximately 102 acres and is located in the southeast corner of the Village of Middleport in Niagara County. It is surrounded by commercial properties to the south, agricultural properties to the east, and residential, commercial, and industrial properties to the north and west. The Royalton-Hartland (Roy-Hart) School is located to the north of the FMC facility.

This FSOB provides background information regarding the FMC facility and summarizes the interim corrective actions which have been conducted by FMC to date at OUs 2/4 and 5, as well as the corrective measures alternatives evaluated by FMC for OU2/4 and OU5. The FSOB then sets forth the DEC's and the United States Environmental Protection Agency ("USEPA") (jointly the "Agencies") media specific cleanup objectives and identifies the corrective measure (or "remedy") that DEC, in consultation with the NYSDOH is selecting.

As detailed in this document, DEC's remedy for OUs 2/4 and 5 generally requires the removal of soil with arsenic concentrations above 20 part per million (ppm) at all locations/depths with some case-by-case flexibility to accommodate preservation of certain property specific features (e.g., trees) where possible. The remedy provides for either (1) on-site disposal (at the FMC facility) to be allowed if certain technical, regulatory, and time requirements are met or (2) disposal of these soils in a secure commercial land disposal facility with a preference towards beneficial use as daily cover and rail transport. The DEC is also approving previously conducted interim corrective measures as final remedies for properties or areas where the Agencies have issued letters indicating that no further action is necessary.

The remedy is intended to protect human health and the environment from the arsenic and other contaminants present in the soil in OUs 2/4 and 5. The other contaminants of concern which may be present will be removed if the goals for removing arsenic are achieved. Details regarding the remedy are set forth in the Selection and Evaluation of Remedies section of this FSOB. In addition it is the intention of the DEC that this FSOB also constitutes the "Record of Decision (ROD)" required for these OUs under New York States Inactive Hazardous Waste Disposal Site program regulations.

Section 1 INTRODUCTION

As a result of past operations at the FMC Corporation Facility in Middleport arsenic has impacted soil on the facility (on-site) as well as in off-site areas. Three such off-site areas (jointly referred to as "Study Areas") are: Air Deposition Area #1 (OU2) including the Roy-Hart School property (OU4) and the Culvert 105 (OU5) Study Area. The DEC is selecting corrective measures under the Resource Conservation and Recovery Act, as amended (RCRA), to remediate the contaminated soil in these OUs. The purpose of this FSOB is to codify the remedy selection process and the remedy selected for the OUs. It contains a brief summary of the investigations which were performed to date at the site to identify the nature and extent of the arsenic contamination in the above referenced Study Areas. It also describes the Corrective Measures which the DEC considered and the remedy ultimately selected. The DEC anticipates that implementation of the Corrective Measures will be accomplished through an Order on Consent with FMC.

1.1 Scope of Document

This document:

- provides a brief overview of the site history and site investigations which were conducted by FMC in certain off-site areas (OUs 2/4 and 5) impacted by FMC operations;
- describes interim corrective measures previously conducted related to arsenic contamination from the Facility at OUs 2/4 and 5;
- describes the remedial goals and other remedies that were considered for OUs 2/4 and 5; and
- identifies the remedy for the referenced Study Areas and the rationale supporting this selection.

Section 2 SITE DESCRIPTION

Location: The FMC Corporation Facility (the Site) is located at 100 Niagara Street in a developed area in the Village of Middleport and Town of Royalton, New York. The location of the facility is shown on the site location map presented as Figure 1.

Site Features: The site encompasses approximately 102 acres and is located in the southeast corner of the Village of Middleport in Niagara County. It is surrounded by commercial properties to the south, agricultural properties to the east and residential properties to the north and west. The Royalton-Hartland (Roy-Hart) School is located to the north of the site. The majority of the northern half of the site (approximately 63 acres) is covered with a clay/asphalt cap (the North Site Cover) and buildings.

Current Zoning/Use(s): The western two-thirds of the site (approximately) is presently zoned industrial and operated as an industrial facility, with the remaining eastern one-third zoned as a business district. Current operations at the FMC Facility are limited to pesticide formulation and packaging.

Historic Use: Between the 1920s and 1980s the plant site was used for the manufacture of a number of chemicals used as pesticides and herbicides. In the mid-1980s the plant shifted from manufacturing to only formulating pesticides (i.e., mixing and packaging) and is presently operating in this capacity. During its manufacturing period the plant disposed of hazardous and non-hazardous wastes on-site in a landfill and in a number of surface impoundments. In addition contaminants were released to the environment through vent stacks associated with the manufacturing process, via surface water run-off

from hazardous waste disposal areas and the direct discharge of manufacturing wastes to off-site water bodies. Pesticide manufacturing operations ceased at the site in 1985.

RCRA Status: The FMC Facility is subject to the Resource Conservation and Recovery Act, as amended (RCRA) and its implementing regulations including New York State's authorized hazardous waste program. FMC does not presently have an operating permit but is subject to what are called "interim status" requirements. The Facility has closed one surface impoundment, a second impoundment is being used to store soils generated from previous ICMs and will need to be closed. FMC has retrofitted a third northern impoundment for continued use in managing surface water. That impoundment is regulated under the Facility's SPDES permit and is authorized under the Administrative Order on Consent. A post-closure permit or order will be required. Five container storage areas have been certified "clean closed" meaning that no contamination remained after they were closed. The FMC Facility will be the subject of one or more future Statements of Basis that will select remedial actions necessary to address environmental concerns on the FMC facility and on other off-site areas that are not the subject of this FSOB. Pursuant to RCRA, FMC has an obligation to address contamination off-site (e.g., the areas subject to this FSOB).

Inactive Hazardous Waste Disposal Site (IHWDS) Status: The site is a class 2 site on the New York State's Registry of IHWD sites, also known as the State Superfund (SSF) program. A class 2 site is a site where hazardous waste disposal has resulted in a significant threat to human health and the environment. Under this program a Record of Decision was issued in February 1999 for an interim remedial measure (IRM) to address arsenic contaminated soils in the bleacher area (part of OU4). This FSOB under RCRA for the Study Areas also constitutes a "Record of Decision (ROD)" for these OUs under New York State's Inactive Hazardous Waste Site statutes and regulations.

Operable Units: The corrective action program for the site was divided into operable units or OUs. An operable unit represents a portion of a remedial program for a facility that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The number and subject of operable units at the FMC Facility have changed over time. Currently the operable units related to the FMC Facility are defined as follows:

OU1: On-Site (all environmental media except groundwater)
not including the eastern most parcel (OU11)

OU2: Air Deposition Area 1, South of Erie Canal and West of Niagara/Orleans County Line

OU3: Air Deposition Area 2, On/North of Erie Canal and East of Niagara/Orleans County Line

OU4: Royalton-Hartland School Property (within OU2)

OU5: Culvert 105 and Flood Zone

OU6: Tributary One (South) Stream and Flood Zone

OU7: Tributary One (North) Stream and Flood Zone

OU8: Jeddo and Johnson Creeks and Flood Zones

OU9: Southwest Commercial Property (Former FMC R&D Facility)

OU10: Groundwater (on-site and off-site)

OU11: The eastern most parcel of the FMC facility

This document addresses OUs 2/4 and 5, also referred to as the Study Areas, which are primarily residential areas that include private homes, agricultural property, school grounds, a park and some commercial/industrial zoned properties. They are not located on the FMC Facility.

Site Geology and Hydrogeology: The Middleport area lies north of the Niagara Escarpment which is the dominant landform of the area. The elevation of the of the top of the escarpment is approximately 600 feet above mean sea level (AMSL) and the face slopes gently to the north to an elevation of approximately 500 feet AMSL at the Village of Middleport.

The soil and unconsolidated material overlying the bedrock (overburden) in the vicinity of the FMC Facility ranges in thickness from about 4 feet to a depth of over 16 feet. The overburden mainly consists of glacial deposits that in areas have been reworked or may contain fill materials. The glacial deposits consist of end moraine (deposits at the edge of a melting ice sheet) materials along a narrow band north of Middleport and ground moraine deposits that covers most of the area. The end moraine material consists of silty-clay to sandy-silt and is moderately to abundantly stony. The ground moraine deposit (lodgment till) consists of reddish-brown, silty-clay with some sand, cobbles, and boulders. This lodgment till is very dense and overlays the top of bedrock as a discontinuous sheet. The bedrock geology beneath the area is composed of alternating units of shale, sandstone, and limestone rock that dips toward the southeast.

The overburden materials due to their high clay content are relatively impermeable limiting horizontal groundwater flow in the overburden. Horizontal groundwater flow to wells does not yield appreciable quantities of water although groundwater will slowly leak to the underlying bedrock. The depth to overburden groundwater is approximately 2.3 feet below ground surface (bgs) north of the FMC Facility and between 1-6 feet bgs at the FMC Facility. The Erie Canal may have a local effect on the groundwater system by contributing water to the overburden.

Groundwater flow in the shallow bedrock unit occurs primarily at the top of the bedrock surface where glacial action has increased fracture density. The permeability of the shallow bedrock varies depending on the type of rock and fracture density.

Section 3 REGULATORY OVERVIEW

FMC is a "generator" of "hazardous waste" and the "owner" and "operator" of an interim status hazardous waste "facility" as those terms are defined at 40 C.F.R. § 260.10 and 6 NYCRR § 370.2, located in Middleport, New York, hereinafter "the Facility." "Facility," as defined in 40 C.F.R. 260.10 and 6 NYCRR Part 370.2 means all contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing, or disposing of hazardous waste. A Facility may

consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, container storage areas, or any combination thereof).

On August 18, 1980 FMC notified EPA that it managed "hazardous waste," as that term is defined by Section 1004(5) of the Act, 42 U.S.C. S 6903(5) and at 40 C.F.R. § 260.10 at the Facility. In this notification FMC identified itself as a generator of hazardous wastes and an owner and operator of a hazardous waste storage and disposal facility. FMC received "interim status" based upon its notification submission. Interim status facilities are subject to the numerous sets of regulations promulgated pursuant to RCRA including 40 C.F.R. Parts 265, 268 and 270, and 6 NYCRR Part 373 regulations promulgated by New York State.

Based on the disposal of hazardous waste at the Facility which the DEC determined represents a significant threat to human health and the environment the DEC listed the Facility as a class 2 site on the NYS Registry of Inactive Hazardous Waste Disposal Sites as a NYS State Superfund site on December 12, 1986. FMC performed investigations at the site and off-site under the direction of the DEC in the 1980s, as well as an interim remedial measure along the northern railroad ditches under the terms and conditions of an Order on Consent (File No. 87049) between the DEC and FMC. Under the State Superfund program FMC entered into a Consent Order with the DEC in 1990 to perform an off-site Remedial Investigation (RI) and Feasibility Study (FS) with regard to environmental contamination from their Middleport facility. FMC also entered into an IRM Consent Order (Indx#B9-0221-96-6) with the DEC for an interim remedial measure in the Bleacher Area of the Royalton Hartland School on July 2, 1996.

The Agencies issued an Administrative Order on Consent to FMC (Order) in 1991, which is jointly administered by the Agencies, under the federal and State RCRA authorities [EPA 3008(h) (Docket No. II RCRA-90-3008(h)-0209) and NYS Section 71-2727(3) of the New York State Environmental Conservation Law]. This Order requires FMC to conduct a comprehensive on-site and off-site RCRA Facility Investigation (RFI) and if determined necessary a Corrective Measures Study (CMS). The Order also requires FMC to perform Interim Corrective Measures (ICMs) if deemed necessary by the Agencies. The scope of this Order includes all of the ten operable units identified above.

Section 4 RCRA FACILITY INVESTIGATIONS

The RCRA Corrective Action process at the FMC Facility began with an initial RCRA Facility Assessment (RFA) conducted by the Agencies which determined that hazardous wastes and/or hazardous constituents had been released from the facility causing contamination of various environmental media (e.g., soil, groundwater, etc.). Based on that assessment the Agencies required FMC to conduct a RCRA Facility Investigation (RFI) to determine the nature and extent (both on and off-site) of the releases from its Middleport facility. This investigation included Air Deposition Area 1 (OU2) including the Roy-Hart school property (OU4), and the Culvert 105 (OU5) Study Area.

In 2003 FMC conducted a background study to determine background arsenic concentrations (see 2003 Report on the Development of Arsenic Background in Middleport Soils (CRA 2003)). Based on the FMC study the agencies determined that an arsenic level of 20 parts per million (ppm) was representative of the upper end of the local background range ("local background"). The arsenic background concentration range established during the background study was then utilized to further aid in the investigation and delineation of arsenic contamination from the FMC facility.

In 2008 FMC submitted a Draft RFI Report Volume II for the Air Deposition Area 1 (OU2) including the Roy-Hart School property (OU4) and Volume IV for the Culvert 105 Area (OU5) which summarized the analytical results from soil sampling in these areas and defined the nature and extent of soil contamination. These RFI Reports were approved by the Agencies in 2009. Based on the sampling results in the RFIs the Agencies determined that a Corrective Measures Study was required.

A summary of findings from the investigations for OUs 2/4 and 5, including contaminants and areas identified for a corrective measures study, are described below:

- the primary contaminant in the soil in the OUs is arsenic;
- the soil in the OUs also contains elevated levels of other metals (lead) and pesticides (DDT, DDE, and Dieldrin) comingled with the arsenic contamination;
- arsenic is a naturally occurring element present in soils, however soil concentrations of arsenic identified indicate an anthropogenic (human-made) source; and
- arsenical pesticides were manufactured and packaged at the FMC facility.

The table below presents current maximum arsenic concentrations in soil at the 190 sampled properties within OUs 2/4 and 5. It shows that 50 residential properties and six non-residential properties have arsenic levels of greater that 60 ppm in the soil. It also shows that a total of 159 properties have arsenic concentrations that are greater than 30 ppm in the soil and a total of 182 (174+8) are greater than 20 ppm. Only eight residential properties sampled had arsenic levels less than 20 ppm.

Arsenic Distribution on Properties in the (Study) Areas

Ranges of Maximum Arsenic Level	# of Residential Properties[1] With Maximum Arsenic Levels Within Indicated Range	# of Non-Residential Properties With Max. Arsenic Levels Within Indicated Range
20-25 ppm	7	0
25-30 ppm	16	0
30-40 ppm	48	0
40-50 ppm	28	2
50-60 pm	25	0
>60 ppm[2]	50	6
TOTAL Properties	**174**	**8**

[1]The residential column also includes public properties such as the school.
[2]Of the properties with arsenic levels exceeding 60 ppm the levels ranged up to 636 ppm (residential) and 744 ppm (overall).

Section 5 INTERIM CORRECTIVE MEASURES

The existing RCRA Order requires FMC to propose Interim Corrective Measure(s) (ICMs) upon notification by the Agencies that an ICM is deemed necessary. ICMs are short-term actions taken to

mitigate a release of hazardous waste or hazardous waste constituents from a facility. Generally interim measures are conducted while developing a long-term comprehensive corrective action strategy.

In addition to an Interim Remedial Measure (IRM) conducted pursuant to the NYS Inactive Hazardous Waste Disposal (State Superfund) Program (see below) FMC has implemented six ICMs in the Study Areas to remove and/or control off-site human exposure to contaminated soil. Additional ICMs to address on-site conditions were also undertaken at other OUs, but are beyond the scope of this document and are not discussed below.

The remedy set forth in this document includes the approval of the IRM and ICMs implemented on certain properties or areas within the Study Area where the Agencies previously provided property owners with "no further action" letters.

5.1 Interim Remedial and Corrective Measures as Final Remedies

The DEC is accepting the following seven (7) interim measures as final remedies:

1) 1996 Roy-Hart School Bleacher IRM (OU4)

The DEC entered into a consent order for an IRM under the State Superfund Program designed to eliminate the potential exposure to arsenic contaminated soils in the bleacher area of the Roy-Hart School by removing approximately two feet of the existing soil and replacing it with clean fill. The IRM was conducted in two phases. The first phase was conducted between July 15 and August 6, 1996 and the second phase on August 28th and 29th 1996.

This IRM resulted in the removal from the bleacher area of an estimated 2200 cubic yards of soil and a black material encountered during the excavation. The excavated material was placed in the Eastern Surface Impoundment (ESI) on the FMC property pursuant to a temporary approval for this disposal. The determination that no further action was necessary to remediate this area was made in a Record of Decision issued by the DEC in February of 1999. During this IRM further sampling of school yard soil lead to the Agencies requiring the 1999 ICM described below.

2) 1999 Roy-Hart Soil Removal ICM (OU4)

In 1998 an ICM was required to remove soil with high levels of arsenic from the athletic field area in the southern portion of the Roy-Hart School Property. In 1999 FMC excavated approximately 39,000 cubic yards of soil to various depths from the athletic fields. The excavations were sampled and backfilled with soil which met soil cleanup guidelines for all sampled constituents including arsenic concentrations below 5 ppm. Data from pre-excavation sampling of the surface and subsurface soils in the ICM area indicates arsenic concentrations generally at/below 20 ppm. The excavated soil was, and presently remains, deposited in the ESI Fill Area on the FMC property pursuant to a temporary approval for this placement. FMC restored the ICM area and constructed new athletic facilities in the summer of 2000. This ICM area is shown on Figure 2.

By a letter dated May 26, 2000 the Roy-Hart School District was informed that the entire ICM area of the school yard is suitable for both athletic and non-athletic uses by all school children in terms of their exposure to known school yard soil arsenic concentrations with final remedial decisions subject to the completion of the RFI and CMS process. The *ICM Construction Report, Roy-Hart School Football*

Field Area Excavation Project (2000) was approved by the Agencies and summarizes the completed ICM activities.

3) 2003 West Properties ICM (OU 2)

In 2003 FMC excavated soil from the West Properties ICM Area which included 10 residential properties on the east side of Vernon north of Niagara Street. In addition FMC excavated and removed a former FMC process discharge pipe which ran through four residential properties (2 properties on Vernon Street and 2 properties on Main Street). Approximately 15,000 cubic yards of soil were excavated within the ICM Area from depths of 0.5 to 7 feet below ground surface (bgs). The excavated areas were sampled and backfilled with soil which met soil cleanup guidelines for all sampled constituents including arsenic. The excavated areas were restored in conformance with property-specific restoration plans. Data from pre-excavation sampling of the surface and subsurface soils in the ICM area indicates arsenic concentrations generally at/below 20 ppm. The excavated soil was deposited, and presently remains, in the ESI Fill Area on the FMC property pursuant to a temporary approval for this placement.

The Agencies issued letters to the owners of the 14 residential properties and to the Village of Middleport stating that the arsenic concentrations in the areas addressed by the ICM did not require any restriction on the use of the properties. The completed ICM activities are described in the *Construction Report for the West Properties Soil and Former Sewer Removal ICM* (November 2004) which was approved by the Agencies.

4) 2007-2008 P-Block Properties ICM (OU2)

The P-Block Properties ICM initiated in 2007 addressed 12 residential parcels that are bordered by Park Avenue to the north and by the Wooded Parcel and/or Elizabeth Street to the south. This ICM excavated soil from 3 to 24 inches bgs from the Park/Maple Avenue properties with data from pre-excavation sampling of the surface and subsurface soils in the ICM area indicates arsenic concentrations generally at/below 20 ppm. The excavations areas were backfilled with soil which met soil cleanup guidelines for all sampled constituents including arsenic. All properties were restored according to property-specific restoration plans. The excavated soil was deposited, and presently remains, in the ESI Fill Area on the FMC property pursuant to a temporary approval for this placement.

The Agencies issued letters to the owners of the 12 properties that were addressed by this ICM which stated that the remaining soils have arsenic concentrations that are generally within the range of local background and that concentrations outside of this range may represent normal sampling variability. In addition the letters stated there was no need for the owners to restrict the use of their properties and that no further sampling or other actions were necessary at the properties. The completed activities for this ICM are described in the *2007 Early Action Construction Report* (2010).

5) 2007 Wooded Parcel ICM (OU2)

The Wooded Parcel ICM includes the property east of the North Commercial/Industrial Area. This 2007 ICM excavated a minimum of 24 inches of soil at the Wooded Parcel and 48 inches of soil from an approximately 20-foot wide strip along the southern and eastern property lines of the Wooded Parcel. The excavated area was covered by a geosynthetic demarcation layer, backfilled with soil which met soil cleanup guidelines and re-vegetated. In addition this ICM involved abandonment of a section of the

Culvert 105 pipe, the extension of the North Ditch, and installation of a new inlet section of Culvert 105. The North Ditch was extended approximately 250 feet west along the railroad tracks and the old culvert inlet was sealed off. A new Culvert 105 inlet and about 100 feet of new pipe was installed which connected to the existing pipe on the Wooded Parcel. Data from pre-excavation sampling of the remaining subsurface soils in the ICM area indicates arsenic concentrations generally at/below 20 ppm in some locations. The excavated soil was deposited, and presently remains, in the ESI Fill Area on the FMC property pursuant to a temporary approval for this placement.

Future use of the Wooded Parcel has been restricted to commercial use since arsenic levels remaining in the subsurface require that the site cover be maintained. A deed restriction was placed on this parcel which includes provisions relative to disturbance and maintenance of the soil cover system that run with the land. FMC has signed an access agreement with the property owner to allow it to perform cover system maintenance and is obligated under the approved ICM to perform such maintenance in accordance with an Agencies' approved Site Management Plan. The Site Management Plan for the Wooded Parcel includes inspection/maintenance of the Wooded Parcel soil cover system and monitoring of the portion of Culvert 105 located within the Wooded Parcel, which included the Culvert 105 inlet and two catch basins.

6) 2007 Culvert 105 Area ICM (OU5)

The Culvert 105 ICM addressed arsenic contaminated soil on eight properties along the open ditch sections of the Culvert 105 storm sewer system between the Erie Canal to the north and Sleeper Street on the south. These eight properties included two publically owned properties and six residential properties where ditch segments of Culvert 105 pass through the properties. The Culvert 105 ICM included the following actions:

- removal and disposal of accumulated soil within the manholes and catch basins of Culvert 105 south of the Erie Canal;
- flushing of the Culvert 105 buried pipe sections north of the Erie Canal to Sleeper Street and removal of soil from these sections; and
- excavation of 12 to 24 inches of soil from and along the three existing open ditch sections of Culvert 105 between the Erie Canal and Sleeper Street and installation of new buried storm sewer pipes and manholes to replace the three open ditch sections (resulting in no open ditch sections remaining south of Sleeper Street).

The excavated areas were backfilled with soil which met soil cleanup guidelines for all sampled constituents including arsenic. Data from pre-excavation sampling of the surface and subsurface soils in the ICM area indicates arsenic concentrations generally at/below 20 ppm with the exception of one property where the requested preservation of a tree by the property owner precluded excavation of soils in the root zone with arsenic concentrations well above 20 ppm. The excavated soil was deposited, and presently remains, in the ESI Fill Area on the FMC property pursuant to a temporary approval for this placement.

The Agencies issued letters to the owners of seven of the eight properties that were addressed by the Culvert 105 ICM. The letters stated that the remaining soils have arsenic concentrations that are generally within the range of local background and that concentrations outside of this range may represent normal sampling variability. Further the letters state that there is no need for the owners to restrict the use of their properties and that no further sampling or other actions are necessary at these

seven remediated properties. The owner of the eighth property was not provided such a letter due to arsenic concentrations in remaining soil that are well above 20 ppm.

For the Culvert 105 ICM monitoring and maintenance of sediment chamber at MH-N9 and manhole MH-N8B was instituted to evaluate the potential of contaminants surrounding up-gradient pipe sections migrating into down-gradient remediated ICM areas via storm water flow. Sediment chamber MH-N9 is located along Culvert 105 and within Margaret Droman Park immediately north of the Erie Canal. Manhole MH-N8B is located approximately 50 feet north of and downstream from sediment chamber MH-N9. The maintenance and monitoring activities include; collecting and analyzing storm water samples, monitoring the thickness of sediment in the base of the structures, collecting and analyzing samples of the sediment and removing sediment when necessary. Details on these activities are provided in the *Culvert 105 Sediment Chamber MH-N9 at Margaret Droman Park 2007 Early Actions Monitoring and Maintenance Plan Relative to Remedial Work* (June 2011).

7) 2011 Culvert 105 Properties AD1 and AE1 Partial ICM (OU 5)

This ICM undertaken in the fall of 2011 addressed an undeveloped area consisting of two private properties located within the Culvert 105 OU Area. This ICM involved an approximately 2 acre undeveloped portion of these properties located about 400 feet east of North Hartland Street and about 800 feet north of Sleeper Street in the Village of Middleport. This ICM excavated approximately 3,500 cubic yards of soil within the ICM area achieving the minimum excavation depths of 12 to 24 inches as defined by the ICM Work Plan. Data from pre-excavation sampling in the ICM area indicated arsenic concentrations in remaining subsurface soils at/below the local background level. The excavated soil was deposited, and presently remains, in the ESI Fill Area on the FMC Property pursuant to a temporary approval for this placement. The completed activities for this ICM are described in the *2011 Interim Corrective Measure Construction Report* (March 2012).

As discussed in the following sections, the DEC is approving these interim measures as part of the final remedy.

When each of the seven IRMs and ICMs discussed above were approved, those approvals specifically did not include a final decision regarding the disposition of the remedial waste in the ESI Fill Area. The selected remedy in this FSOB does address the final disposition of the soil in the ESI Fill Area, recognizing that a final remedy has not been selected for that on-site area and providing a path forward for that the final determination.

Section 6 CORRECTIVE MEASURES STUDY (CMS)

Numerous Corrective Measures Alternatives (CMAs) were identified, screened, and evaluated by FMC in a CMS report. The selected CMA, or CMAs must; be protective of human health and the environment, comply with other statutory requirements and comply with the requirements of the Order entered into with FMC. The 1991 Order requires that each CMA be evaluated against specific criteria established in the Order (technical, environmental, human health, institutional, and cost) and against how well each satisfies the Agencies' Corrective Action Objectives (CAOs) which are presented in Appendix A of this document. Also two additional CMA evaluation criteria (community acceptance and green remediation practices) were included through the approval of the CMS Work Plan.

6.1 Summary of Alternatives

FMC submitted the draft CMS Report to the Agencies on May 16, 2011. The alternatives evaluated by FMC in the draft CMS Report are discussed below.

Common Elements of Corrective Measures Alternatives Evaluated by FMC

The CMS indicated that each of the remedial alternatives evaluated by FMC, with the exception of Alternative 1 – No Further Action, rely on the same common elements to address the arsenic contaminated soil. The primary component of each of the alternatives is soil excavation and disposal of the excavated soil either on-site or off-site. Each of the alternatives requires equipment to be brought to specific properties to excavate the soils containing arsenic above specified cleanup levels. The cleanup level however is different under each alternative. The common elements for CMS Alternatives 2-8 are:

a) Continued implementation of the Site Management Plan for the Wooded Parcel - institutional and engineering controls on the Wooded Parcel property will remain in place to protect against exposure and migration of contaminants in remaining subsurface soils. This involves continuing the

i. Institutional Controls – in the form of the deed restrictions placed on this property by the owner which limit the uses of this property to commercial and require adherence to the approved Site Management Plan.

ii. Engineering Controls – implementation of the approved Site Management Plan for this property which requires FMC to maintain the Wooded Parcel cover system put in place during the ICM under an access agreement with the present property owner. It also requires FMC to perform monitoring of storm water which flows through Culvert 105 on this property, manage any excavated subsurface soil, and rectify any disturbance of the cover system.

b) No Further Action for Previously Remediated Properties - no further action will be required for the Roy-Hart School Yard ICM Area and 31 other properties remediated during the ICMs for which the property owners received letters from the Agencies stating that no use restrictions were required and that no further sampling or other actions were needed.

c) Proper Disposal of Remedial Generated Waste (A discussion of the disposal options are discussed in Sections 6.2 and 7 below.)

d) Property Restoration – properties excavated by the remedy will be restored by placement of clean backfill (clean fill soil and top soil as appropriate) to original grade where soils are excavated. Lawns will be restored by seeding or placement of sod. Replacement of any removed trees will be provided at the discretion of each property owner. Landscaping features, sidewalks, driveways, and other property-specific features (e.g., pools, sheds, fences) will be replaced in kind where removal is necessary and the property owner requests replacement. The need for removal of any property-specific features would be determined by the DEC during the design of the remedial action in consultation with the affected property owners.

e) Tree Preservation – opportunities to preserve trees will be identified in consultation with the property owner and a qualified arborist relying on site-specific information during the remedy

implementation after the DEC selects the final corrective measures and soil remedial goals for the study areas.

f) Culvert 105 Remediation – where the remediation of soil around the Culvert 105 pipe, catch basins, and manholes requires removal of these features, the culvert pipe, catch basins, and manholes will be replaced in accordance with current relevant building codes.

g) Remedial Design and Pre-design Activities - a remedial design would be required as part of the remediation phase to provide technical drawings, plans and specifications, as well as other project specific plans necessary to implement the remediation construction activities. Pre-design activities necessary to support the remedial design would also be conducted. The remedial design may include further evaluation and possible use of soil tilling/blending on non-residential properties or larger residential properties (> 5 acres) since the pilot work performed to date indicates that the technology may be implementable.

FMC Proposed Corrective Measures Alternatives (CMAs)

Alternative 1 (CMA 1) – No Further Action

Alternative 2 (CMA 2) – Remediation of soil to a post remediation maximum arsenic concentration of 20 ppm at every location on each affected property, including the non-ICM area of the Roy-Hart School property. (This excludes the Wooded Parcel and sections of the Culvert 105 pipe.)

No further action would be necessary on previous ICM properties/areas under this CMA. Appropriate institutional controls would be established for remaining sub-surface soils on properties with buried pipe sections of Culvert 105 that are not replaced. Appropriate institution controls will remain on the Wooded Parcel property.

Alternative 3 (CMA 3) – Remediation of soil on each residential property and the school yard to a post remediation average arsenic concentration of 20 ppm for surface soils and for soils at all sampled depths with a maximum property soil arsenic concentration for each individual property of 40 ppm. Post-remediation soil arsenic goals would be higher for non-residential land usages. (This excludes the Wooded Parcel and sections of the Culvert 105 pipe.) CMA 3 arsenic remedial goals for all land usages are presented in the table below:

Land Use	Average Concentration	Maximum Concentration
Residential	20 ppm	40 ppm
Public and Institutional (excluding non-ICM Roy Hart school property)	30 ppm	60 ppm
Agricultural, Commercial	40 ppm	80 ppm
Industrial, Railroad, Utility	40 ppm	80 ppm

No further action would be necessary on previous ICM properties/areas or on the non-ICM area of the Roy-Hart School property, under this CMA. Appropriate institutional controls would be established on the following properties/areas: a) the non-ICM area of the Roy-Hart School property; b) properties remediated to non-residential post-remediation soil arsenic goals (i.e., those properties that exceed the residential remedial goals of 20 ppm average and 40 ppm maximum); and c) properties with buried pipe

sections of Culvert 105 that are not replaced. Appropriate institution controls will remain on the Wooded Parcel property.

Alternative 4 (CMA 4) – Remediation to a post-remediation average arsenic concentration of 30 ppm for surface soils and for soils at all sampled depths with a maximum concentration of 60 ppm on all individual properties regardless of land usage. (This excludes the Wooded Parcel and sections of the Culvert 105 pipe.)

No further action would be necessary on previous ICM properties/areas or on the non-ICM area of the Roy-Hart School property, under this CMA. Appropriate institutional controls would be established on properties with buried pipe sections of Culvert 105 that are not replaced. No institutional controls would be required on the Roy-Hart property. Appropriate institution controls will remain on the Wooded Parcel property.

Alternative 5 (CMA 5) – Remediation to a post-remediation average arsenic concentration of 40 ppm for surface soils and for soils at all sampled depths with a maximum concentration of 80 ppm on all individual properties regardless of land usage. (This excludes the Wooded Parcel and sections of the Culvert 105 pipe.)

No further action would be necessary on previous ICM properties/areas or on the non-ICM area of the Roy-Hart School property, under this CMA. Appropriate institutional controls would be established on properties with buried pipe sections of Culvert 105 that are not replaced. No institutional controls would be required on the Roy-Hart property. Appropriate institution controls will remain on the Wooded Parcel property.

Alternative 6A (CMA 6A) - Remediation of soil on residential, public, and institutional properties to a post-remediation average arsenic concentration of 20 ppm for surface soils and for soils at all sampled depths with a maximum soil arsenic concentration of 35 ppm on all such individual properties, except for the non-ICM area of the Roy-Hart School property. (This excludes the Wooded Parcel and sections of the Culvert 105 pipe.) Soil remediation levels would be higher for other land usages. CMA 6A arsenic remedial goals for all land usages are presented in the table below:

Land Use	**Average Concentration**	**Maximum Concentration**
Residential	20 ppm	35 ppm
Public and Institutional (excluding non-ICM Roy Hart school property)	20 ppm	35 ppm
Agricultural, Commercial	30 ppm	50 ppm
Industrial, Railroad, Utility	40 ppm	80 ppm

No further action would be necessary on previous ICM properties/areas or on the non-ICM area of the Roy-Hart School property, under this CMA. Appropriate institutional controls would be established on the following properties/areas: a) the non-ICM area of the Roy-Hart School property; b) properties remediated to agricultural, commercial, industrial, railroad, utility post-remediation soil arsenic goals (i.e., those properties that exceed the remedial goals of 20 ppm average and 35 ppm maximum); and c) properties with buried pipe sections of Culvert 105 that are not replaced. Appropriate institution controls will remain on the Wooded Parcel property.

Alternative 6B (CMA 6B) – This alternative is the same as CMA 6A, except that CMA 6B includes remediation of the non-ICM portion of the Roy-Hart School property to the post-remediation soil arsenic remedial goals for residential and public/institutional properties (20 ppm average and a maximum of 35 ppm). No institutional controls would be established for the non-ICM portion of the Roy-Hart School property.

Alternative 7A (CMA 7A) – Remediation of soil on residential, public, and institutional properties to a post-remediation average arsenic concentration of 20 ppm for surface soils and for soils at all sampled depths with a maximum soil arsenic concentration of 30 ppm on all such individual properties, except for the non-ICM area of the Roy-Hart School property. (This excludes the Wooded Parcel and sections of the Culvert 105 pipe.) Soil remediation levels would be higher for other land usages. CMA 7A arsenic remedial goals for all land usages are presented in the table below:

Land Use	**Average Concentration**	**Maximum Concentration**
Residential	20 ppm	30 ppm
Public and Institutional (excluding non-ICM Roy Hart school property)	20 ppm	30 ppm
Agricultural, Commercial	30 ppm	50 ppm
Industrial, Railroad, Utility	40 ppm	80 ppm

No further action would be necessary on previous ICM properties/areas or on the non-ICM area of the Roy-Hart School property, under this CMA. Appropriate institutional controls would be established on the following properties/areas: a) the non-ICM area of the Roy-Hart School property; b) properties remediated to agricultural, commercial, industrial, railroad, utility post-remediation soil arsenic goals (i.e., those properties that exceed the remedial goals of 20 ppm average and 30 ppm maximum); and c) properties with buried pipe sections of Culvert 105 that are not replaced. Appropriate institution controls will remain on the Wooded Parcel property.

Alternative 7B (CMA 7B) – Same as CMA 7A, except that CMA 7B includes remediation of the non-ICM portion of the Roy-Hart School property to the post-remediation soil arsenic remedial goals for residential and public/institutional properties (20 ppm average and a maximum of 30 ppm). No institutional controls would be established for the non-ICM portion of the Roy-Hart School property.

Alternative 8 (CMA 8) – Remediation of all properties including the non-ICM portion of the Roy-Hart School property to a post-remediation average arsenic concentration of 20 ppm for surface soils and for soils at all sampled depths with a maximum concentration of 30 ppm for each individual property. (This excludes the Wooded Parcel.) On large properties (generally larger than one acre) the averages would be calculated for each 100'x100' area. CMA 8 also includes removal/replacement of all remaining buried pipe portions of Culvert 105.

No further action would be implemented on previous ICM properties/areas. Appropriate institution controls will remain on the Wooded Parcel property.

Differences Among FMC Corrective Measures Alternatives

The major differences among FMC Alternatives 2 through 8 are in the arsenic remedial goals associated with each alternative. These different arsenic remedial goals then contribute to other differences between alternatives which include the:

- number of properties to be remediated;
- volume and extent of soil to be remediated;
- lineal footage of buried Culvert 105 pipe to be removed and replaced;
- estimated duration of remediation;
- number of properties subject to site management;
- need for further remediation of Roy-Hart School Yard soils; and
- cost of remediation.

Alternative CMA 3 was proposed by FMC in the Corrective Measures Study.

The DEC has used information in the CMS to establish another Corrective Measure Alternative-CMA 9. This alternative while similar to CMAs 2 and 8, will include remediation of soil to a post remediation maximum arsenic concentration of 20 ppm on each affected property with flexibility to be employed by the DEC on a case-specific basis which may, based on the location and depth of the samples as it relates to the implementability of a removal or to accommodate property owner concerns with structures, trees, etc., allow for a limited number of samples to exceed this level. This will also include the non-ICM area of the Roy-Hart School property and all sections of the Culvert 105 pipe, excluding the Wooded Parcel.

No further action will be necessary on previous ICM properties/areas under this CMA. Appropriate institution controls will remain on the Wooded Parcel property.

6.2 Summary of FMC Proposed Remedial Soil Disposal Options

The CMS provided the following disposal options:

Off-Site Disposal**:** The off-Site disposal options considered by FMC in its CMS were:

- Commercial Landfill - Off-Site disposal of non-hazardous remediation waste at an appropriate commercial landfill(s) permitted in accordance with applicable rules and regulations (e.g., 6NYCRR Part 360).

- Beneficial Reuse at a Commercial Landfill - Beneficial reuse of non-hazardous remediation soil as daily landfill cover at an appropriate off-Site commercial landfill(s) that is permitted in accordance with applicable rules and regulations. This option provides for a sustainable reuse of the remedial waste.

The transport options for off-Site disposal are truck or rail transportation.

On-Site Disposal: The on-site disposal option consists of constructing an engineered consolidation area known as a Corrective Action Management Unit (CAMU) located at the eastern portion of the FMC Facility to receive the excavated soil. The CAMU would be used for the remediation soils generated in the course of remedial actions (including previous ICMs) related to the FMC Facility including from OUs2/4 and 5. The CAMU would be constructed in accordance with RCRA regulations. It would have a maximum 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 would be vegetated with a variety of low-maintenance 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. This on-site disposal option was proposed by FMC in the Corrective Measures Study.

Section 7 SELECTION AND EVALUATION OF REMEDIES

The remedy must be protective of human health and the environment and comply with applicable statutory requirements. Also the Order and the approved CMS Work Plan (incorporated into the Order by reference) require that the remedy selection be based on a comparison of alternatives using seven (7) evaluation criteria and the Corrective Action Objectives (CAOs) established by the Agencies. Potential remedial alternatives for the Site were identified, screened and evaluated by the Agencies using information from the CMS report.

In evaluating the remedial alternatives set forth in the CMS Report the DEC is selecting a remedy that is different than any of the alternatives proposed by FMC in their CMS. For the purposes of this document, the remedy is identified as Corrective Measure Alternative 9 or CMA 9. CMA 9 entails removal of soil containing arsenic levels exceeding 20 ppm, which represents the higher end of the range of local background concentrations of arsenic ("local background"). This site-specific cleanup criterion will be applied at all locations/depths (including subsurface soils surrounding Culvert 105 pipes) with some flexibility to be employed by the DEC on a case-specific basis to allow for limited confirmation samples to exceed this level, based on the location and/or depth of the sample exceeding 20 ppm and the implementability of the removal and exposure potential, while still achieving sufficient removal to assure a protective cleanup for which a no further action determination is appropriate. In addition this consideration will also be applied to accommodate property owner concerns related to preservation of their property with respect to specific features such as mature trees, sheds, decorative plantings, or other features of significance to the property owner where possible.

On-site disposal of the remedial soils will be allowed provided that certain technical, legal, and scheduling issues are successfully resolved; otherwise off-site disposal will be required.

This remedy also includes the approval of past interim corrective measures as final remedies for properties or areas within OUs 2/4 and 5 where the Agencies have previously provided letters indicating that no further action is necessary. A detailed description of the remedy is contained in Section 8. The following is a summary of the evaluations performed during the selection process and a detailed description of DEC's remedy.

7.1 Department's Evaluation of CMAs

The seven evaluation criteria set forth in the CMS work plan and used to analyze the selected remedy and alternatives along with the correction action objectives (CAOs) are:

- Technical
- Environmental
- Human Health
- Institutional
- Green Remediation Practices

- Cost
- Community/Property Owner Acceptance

These seven criteria were used by the Agencies, in conjunction with the corrective action objectives (CAOs) to evaluate each of the CMAs. The Agencies' evaluation of each of the CMAs based on these criteria is set forth below. The Agencies' evaluation of the CMAs pursuant to the CAO criteria is set forth in Appendix A.

Technical

The technical criterion requires each CMA to be evaluated with respect to performance, reliability, implementability, and safety. The performance and reliability evaluation examines the effectiveness of the CMA in reducing unacceptable risks and its demonstrated ability to maintain that effectiveness over time. The implementability evaluation examines the engineering and construction related tasks necessary to carry out the corrective measure. The implementability evaluation typically covers permit requirements and other necessary approvals, equipment requirements, space and logistics considerations, and operation, maintenance and monitoring (OM&M) requirements. The safety evaluation examines potential safety risks to workers and community members during and after implementation of the CMA.

Performance and Reliability - Although the selected remedy employs some degree of case specific flexibility with respect to the 20 ppm arsenic remedial goal the number of properties remediated and the amount of arsenic contaminated soil removed is expected to be similar to CMA 2 (i.e., 181 currently identified properties and approximately 228,000 cubic yards of soil). Therefore the selected remedy removes arsenic contaminated soil from more properties than the other alternatives which range from 48 to 179 properties (not including CMA 1 – No Further Action). The selected remedy currently identifies 181 properties that will be affected, while CMA 3, proposed by FMC, would affect 152 properties, and CMA-8 would affect 179 properties. In addition, the selected remedy removes more arsenic contaminated soil volume than the other alternatives which range from approximately 38,000 to 162,000 cubic yards of soil. Removing a greater area/volume of arsenic contaminated soil to which residents are potentially exposed provides for greater long-term performance and reliability in terms of minimizing potential future human and environmental exposures to arsenic. Also by removing more arsenic contaminated soil and placing it in a secure disposal facility one greatly reduces future contaminant migration potential to groundwater or other media which in turn enhances the remediation's long-term performance and reliability. However, to the extent that the selected remedy's soil mixing option for the large non-residential tracts is proven to reliably achieve the required level, the volume of soil requiring removal could be substantially reduced.

The selected remedy requires sampling of subsurface soils along all segments of the Culvert 105 pipe (except for on the Wooded parcel) and removal of any such soils with arsenic concentrations above the remedial goal. The result is a more reliable remedy than Alternative 2 (under which removal is not required from those segments), since it prevents future migration of contaminants along Culvert 105.

Under the selected remedy it is anticipated that only one property will be subject to an institutional and engineering control, the Wooded Parcel, which currently has a deed restriction in place. CMAs 2-7 would require institutional/engineering controls at more properties. Remedies that rely less on long-term controls are considered as having better long-term performance and reliability since the remedy does not depend on the future maintenance of such controls to insure adequate protection of human

health and the environment. CMA 8 would also call for controls in the Wooded Parcel, but would allow higher concentrations to remain in the Study Areas.

Implementability - The technical and administrative feasibility of a remedy including the availability of materials and services needed to implement a particular option is evaluated as implementability. The selected remedial alternative and all the other alternatives in the CMS with the exception of CMA 1 rely on the same technology, excavation of soils. Excavation of soil is readily implementable as excavation, transportation, and disposal are conventional technologies that are typically used in remedial actions.

Excavation and disposal are common approaches to addressing metals contamination in soil. DEC's Presumptive Remedy Guidance (see DER-15) issued in 2007 states that excavation and off-site disposal is a presumptive remedy for metals contamination in soil. That guidance provides that

> Excavation and off-site disposal is a conventional remedial method. Contaminated soil may be excavated and disposed off-site in a permitted waste landfill or hazardous waste landfill based on the contamination levels and the results of their toxic characteristic leaching procedure (TCLP) tests. For some sites this conventional remedy may be the most cost-effective remedy. This remedy is very quick to implement and may not require institutional and engineering controls if all contaminated material is excavated and disposed off-site.

The selected remedy will require the establishment of more private property access agreements, involve addressing excavation under more trees (e.g., hand excavation or tree removal/replacement), and result in more truck/vehicle traffic on local streets/roads than CMAs 3-7. CMA 9 in this respect will be similar to CMA 2 and CMA 8. Therefore in the short-term its implementation may be somewhat more difficult than the other alternatives CMA 3-7. While this may require a longer duration than the other alternatives, the selected remedy still involves work that is somewhat routine and readily implementable. Further the remedy provides for property-specific flexibility in the application of the arsenic remedial goal, which could lessen the implementation problems associated with excavation under the trees and other obstructions.

Safety - Safety risks to construction workers and the community during the implementation phase of the remedy are often referred to as short-term risks. Since the selected remedial alternative and the other alternatives in the CMS (except for CMA 1) all involve comparable construction activities, including movement of heavy equipment and other construction equipment through areas adjacent to roads and residential properties, it is anticipated that the short-term safety risks posed by these activities will be similar. For the selected remedial alternative, CMA 9, the amount of excavation would be comparable to CMA-2 and CMA 8, but the extent of excavation would be greater than for CMAs 3-7 in the CMS; as such, CMA 9 may take longer to implement than these other alternatives. As a result, although the safety risks in all the CMAs are low and similar in type, they may be present for a longer period of time for the selected remedy. However, these short-term risks can be effectively managed and minimized through the development and implementation of both general and property-specific health and safety plans (HASPs) and engineering controls to provide protection for workers and the surrounding community. The selected remedy will require the development of these plans and controls during the design phase of the remedial action.

In summary, CMA 9 is comparable to CMA 2 and in some aspects to CMA 8. It is considered superior to CMAs 3-8 with respect to long-term performance and reliability, but slightly less favorable than

CMAs 3-7 with respect to implementability and safety. From an overall perspective the DEC considers the selected remedy to be favorable to the other CMAs with respect to the technical criterion.

Environmental

The environmental criterion requires each CMA to be evaluated with respect to acute (short-term) environmental impacts during construction and chronic (long-term) beneficial and/or adverse impacts of the CMA on the environment, particularly in environmentally sensitive areas.

Short-Term Impacts – The OU 2/4 and 5 areas are mainly residential in nature, except for the area along Culvert 105 (OU5) north of Sleeper Street to its discharge point into Tributary One of Jeddo Creek. In these residential areas all of the alternatives (except CMA 1) would have similar short term impacts associated with excavating and restoring contaminated properties. The selected alternative CMA 9 is similar in extent to CMA 2 and CMA 8 and the short term impacts will be felt for approximately the same amount of time. The CMAs 3-7 would require less property to be remediated and hence the short-term impacts would be less.

Culvert 105 north of Sleeper Street to its discharge point into Tributary One of Jeddo Creek is the area presently most conducive to supporting an ecological habitat since it is wooded. In this area CMA 9 requires excavation activities over a larger area than some of the other alternatives in the CMS but is comparable to CMA 2, CMA 3 and CMA 8. The extent of the selected remedy, as approximated by reference to CMA 2 and FMC's recommended alternative CMA 3 (see Figure 5-3 in FMC's Draft CMS Report), is virtually the same as for those alternatives. As a result, there should be no discernable difference between FMC's recommended CMA 3 and DEC's selected remedial alternative with respect to the short-term environmental impacts on this area. Also, the selected remedy will require proper restoration of these habitats and therefore it is anticipated the native wildlife will return to re-occupy these areas over time.

Long-Term Impacts - It is well documented that elevated levels of arsenic in soil can cause adverse human health and ecological impacts. Removing soil with elevated levels of arsenic to background levels and replacing it with soil having lower background concentrations can substantially reduce such impacts. CMA 9 is similar to CMA 2 in that the remedial goal for arsenic is 20 ppm. CMA 9 will allow for flexibility, taking into account the exposure potential, but the extent of cleanup will be comparable to CMA 2. Since the selected remedy removes and replaces more arsenic contaminated soil than CMAs 1, 3-8 in the CMS it is considered more favorable than these other CMAs in terms of reducing long-term human health and ecological impacts.

In summary, in consideration of the likely transient nature of the short-term detrimental ecological impacts and the more permanent long-term beneficial ecological impacts as outlined above, the selected remedy is considered to have a greater net beneficial impact on the environment than the other alternatives in the CMS and as such is viewed as superior to the other CMAs in terms of the environmental criterion.

Human Health

The human health criterion requires each CMA to be evaluated based on the extent to which short- and long-term exposures to contaminants of concern are mitigated. The evaluation includes an examination of how each CMA protects human health both during and subsequent to implementation.

Arsenic is a known human carcinogen. There is strong evidence of arsenic carcinogenicity and of non-carcinogenic health effects based on large scale epidemiological studies. The DEC therefore has an obligation to minimize, to the extent practical, both current and potential future human exposure to elevated levels of arsenic in soil when selecting an arsenic remedial goal.

DEC's findings relative to the protection of human health are based in part on the NYSDOH's thorough review and evaluation of the arsenic human health risk assessments which are provided in FMC's Draft CMS Report. Based on this review/evaluation, the Departments find that these FMC risk assessments do not appropriately assess potential exposure to arsenic and the associated cancer and non-cancer human health risks. As a result, the Departments consider that these FMC assessments substantially underestimate the potential human health risks associated with arsenic exposure, and therefore do not serve as an appropriate basis upon which to make risk management and remedial decisions.

Risk evaluations prepared by the NYSDOH during the development of the State's Soil Cleanup Objectives have determined that the soil concentration associated with the 10^{-6} cancer risk level for arsenic is less than 1.0 ppm. The DEC and the NYSDOH consider this risk evaluation to be applicable and appropriate to the Middleport community. However, since typical background levels of arsenic in soil almost always exceed 1.0 ppm, arsenic remedial goals are routinely evaluated in terms of background concentrations, as is true in this case.

Short-Term Arsenic Exposure - Except for CMA 1 (No Further Action), all CMAs require excavation of contaminated soils to varying degrees. These excavation activities have the potential to produce some short-term arsenic exposures for construction workers and community residents. The potential human exposure routes in this short-term scenario are primarily inhalation and direct dermal contact. In evaluating the CMAs with respect to these potential exposure routes, the selected remedy and CMAs 2-8 are all considered to have similar potentials for worker and public exposures via these routes since they all employ the same excavation methods which can cause such exposures. However, the selected remedy (as the other alternatives) includes features designed to mitigate these short term exposures. It requires the development and implementation of both general and property-specific health and safety plans (HASPs) and engineering controls which are intended to prevent/mitigate dermal exposures for construction workers and the surrounding community. It also requires the use of dust suppression techniques (e.g., wetting the soil) and the implementation of a community air monitoring plan (CAMP) which are designed to work in concert with one another to prevent/mitigate inhalation exposures. With implementation of these mitigation measures it is anticipated that the potential for short-term human exposure to arsenic contaminated soil during excavation activities will be minimal.

Long-Term Arsenic Exposure – In the long term, the removal of more arsenic contaminated soil, to which the public is/may be exposed, will result in a greater reduction of human exposures thereby minimizing to the greatest extent practicable the health risks associated with the arsenic contamination. As stated above arsenic is considered to pose a carcinogenic risk above the desired 10^{-6} risk level at soil concentrations that are less than 1 ppm which is below the concentration range of the local (Gasport) background arsenic data set. Therefore the alternative which best achieves arsenic background soil concentrations will also be the alternative that reduces long-term arsenic exposure to the greatest extent practicable. In the case of the Middleport community, based on the FMC study, the agencies determined

that an arsenic level of 20 parts per million (ppm) was representative of the upper end of the local background range ("local background").

The DEC considers the selected remedy CMA 9 to be the best way to achieve background arsenic concentrations. CMA 9 calls for removal of arsenic contaminated soil above a concentration of 20 ppm at all locations and depths but with some case-by-case flexibility. The DEC considers the selected remedy to be superior to the other CMAs with less restrictive arsenic remedial goals (CMA 1, 3-8) in terms of minimizing long-term arsenic exposures and their associated potential human health risks. Both CMA 9 and 2 have a remedial goal of 20 ppm. CMA 9 also includes the removal of Culvert 105. The selected remedy will achieve arsenic soil concentrations that are consistent with local background ranges. See additional discussion in Appendix A.

It should be noted that the selected remedy will also effectively remove soils with elevated levels of other constituents (e.g., lead, pesticides). With regard to all site-related contaminants, the selected remedy is considered to be similar to the other CMAs with respect to protection against short-term human exposures and better than the other CMAs with respect to reducing long-term exposures to arsenic and other hazardous constituents and as such is viewed as superior to the other CMAs in terms of the human health criterion.

Institutional

The institutional criterion requires each CMA to be evaluated with respect to Federal, State, and local laws, regulations, standards, criteria, and guidance. The DEC considers New York State's regulations for Inactive Hazardous Waste Facilities (6 NYCRR Part 375) and the Soil Cleanup Objectives (SCOs) contained within those regulations (6 NYCRR Part 375-6 and CP-51) as relevant and appropriate regulations to consider in evaluating CMAs and associated remedial goals. These regulations allow for the use of site-specific arsenic SCOs based on local background data where appropriate. Accordingly, they provide for an arsenic SCO of 13 ppm for areas where the protection of ecological resources is deemed necessary and 16 ppm for all other land uses, which represents the upper limit of normal background levels established from soil sampling data. CMAs 3-8 allow an arsenic cleanup concentration above 20 ppm and therefore are not consistent with the NYS arsenic SCOs, and post-implementation arsenic concentrations would exceed normal background levels.

In determining whether an SCO has been achieved through sampling DEC guidance states that: "the uses of averages, means, or other statistical techniques are generally not allowed" (See DER-10 – "Technical Guidance for Site Investigation and Remediation" at www.dec.ny.gov/regulations/67386.html). Since CMAs 3 – 8 rely on averaging to determine if certain of their remedial goals have been achieved they do not generally conform to this guidance.

While CMA 9 does not employ averaging of sample results it allows for some case-by-case flexibility when determining achievement of the arsenic remedial goal based on confirmatory sampling. The above cited NYS guidance document states the following with regard to determining achievement of remedial goals, "Recognizing the heterogeneity of contaminated sites and the uncertainty of sampling and analysis of samples, the… project manager may judge that remediation is complete for sites when (1) there is a large number of confirmatory samples; (2) the vast majority of confirmation samples indicate that the soil cleanup levels for the site have been achieved; and (3) those that do not achieve the SCO exceed it only by a small amount." These decisions will be made by the DEC in consultation with the NYSDOH.

In summary the selected remedy is considered to be similar to CMA 2 in the scope of the work and superior to the other CMAs with respect to the institutional criterion. (See Appendix D for comparison of arsenic criteria from other States.)

Green Remediation Practices

The green remediation practices criterion requires each CMA to be evaluated for consistency with USEPA's and DEC's Green Remediation concepts and strategies which consider the environmental consequences of remedial actions including energy requirements, air emissions, material consumption, resource consumption and waste generation. The criterion provides a goal of using the best management practices of EPA's Green Remediation concepts (e.g., clean diesel technology, waste minimization, resource conservation, reduction of greenhouse gases and other air emissions, ecological and soil preservation) to reduce the demands placed on the environment ("footprint"). However it is important to note that green remediation concepts should not be used to avoid appropriate and necessary cleanup of environmental contamination.

The selected remedy may be less favorable than CMAs 1 and 3 - 8 in terms of waste minimization, resource conservation, ecological and soil preservation. This is due to the fact that the selected remedy is likely to require more waste generation (i.e., more remedial soils), more tree removal and disturbance of ecological environments and a greater volume of replacement soil than CMAs 1 and 3 - 8 due to its arsenic remedial goal.

The selected remedy contains a number of elements which are intended to make it more compatible with Green Remediation concepts. They include but are not necessarily limited to:

- A requirement for the development of a Tree Preservation Plan to minimize to the extent practical the number of tree removals necessary for implementation of the selected remedy;
- The evaluation and potential use of soil tilling/blending to lessen the generation of remedial soils and the use of clean backfill soil resources;
- A preference for beneficial reuse of non-hazardous soils disposed off-site as well as for transportation via train;
- The option of on-site placement in a CAMU if certain technical and regulatory requirements are met which would significantly reduce air emissions due to heavy equipment traffic; and
- Early consideration during the remediation design phase of green remediation opportunities to be incorporated throughout implementation (see DEC's DER-31 – Green Remediation at www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf).

In summary the selected remedy is considered similar to CMA 2 and somewhat less favorable to the other CMAs in terms of the Green Remediation criterion. However, as stated above, green remediation concepts should not be used to avoid appropriate and necessary cleanup of environmental contamination. It also should be noted that the selected remedy calls for the implementation of a number of Green Remediation practices designed to reduce this remediation's incidental impacts on the environment.

Cost

The cost criterion requires each CMA to be evaluated with respect to the capital, engineering, and any long term costs (e.g., inspection, monitoring, and maintenance) associated with each CMA. The capital costs consist of two components: 1) direct cost expenditures for construction equipment, labor, and materials to perform the remedial construction; and 2) indirect cost expenditures for engineering, financial, and other services that are not part of the actual construction but required to implement the corrective measure. The costs of the alternatives vary significantly. See Figure 3 for a detailed listing of the various costs. Cost is a balancing criterion and is not the main criterion used by the DEC when comparing alternatives.

The cost of the selected remedy will be similar to the CMA 2 estimated cost since these alternatives essentially share the same arsenic remedial goal. As estimated by FMC, CMA 2 is the most expensive remedial alternative but this must be evaluated together with the other criteria, including human health benefits, benefit to the environment, and adherence to applicable laws and standards. Other alternatives would cost less but would not be as protective to human health and the environment nor would they comply with applicable laws and standards.

FMC has stated that it believes that the difference in the carcinogenic risks between CMA 2 (same remedial goal as the DEC preferred alternative, CMA 9) and CMA 3 (FMC preferred alternative) is not significant enough to warrant the higher cost. However, the Agencies do not accept FMC's risk assessment methodology and do not agree with the risk levels developed by FMC. FMC can also mitigate its costs by pursuing the on-site disposal option for a CAMU.

In summary although the selected remedy is more costly than CMAs 3-8 the cost is not the overriding criterion and cannot be the basis for rejecting a remedy that is necessary for the protection of human health and the environment.

Community/Property Owner Acceptance

CMAs should also be evaluated in terms of the degree to which they are acceptable to the community and affected property owners. In the spring of 2011, the FMC's Draft CMS Report was released for public comment; community and property owner comments on the Draft CMS Report were received and considered by the DEC in the selection of corrective measures. Comments included concerns relative to disruptions to residents and the community; public safety; overall effectiveness of the remedy; maintaining the character of the Village and neighborhoods (e.g., mature trees); human health concerns over exposure to soil contaminants; minimizing any restrictions on properties that may limit property usage, redevelopment or reuse; and the need for the DEC to provide documentation that properties are acceptable for unrestricted use.

FMC recommended CMA 3 for a final remedy. The Middleport Community Input Group (MCIG), and some other members of the community support the no action alternative (CMA 1) or alternatively CMA 3. The MCIG and other members of the community indicate that CMA 1 or CMA 3 are appropriate remedies in light of what they perceive to be a lack of evidence that arsenic presents any health risks at the identified levels. This perception seems to be based primarily on the results of FMC's site-specific arsenic risk assessments which are contained in its Draft CMS Report. Many of the public comments received favor the use of a site-specific approach to human health assessment with regard to exposure to arsenic in soil and consider FMC's risk assessments as adequately addressing site-specific exposures/risks. However, as previously stated above in the human health criterion evaluation, the DEC and NYSDOH have determined that these FMC assessments substantially underestimate potential

arsenic human health risks and are not appropriate for use in making risk management and remedial decisions.

Also as previously stated, the DEC considers the arsenic risk assessments performed by NYSDOH in conjunction with the NYS Soil Cleanup Objectives to be appropriately site-specific in terms of addressing arsenic exposures in the Middleport community and appropriately conservative with regard to the assumptions used to characterize the exposures of community members and the public in general. Further information on this important matter is provided in DEC's response to comments on FMC's Draft CMS Report and specifically in Fact Sheets prepared by the NYSDOH which discuss arsenic exposure/risk and respond to a number of frequently asked questions on the topic.

The DEC will endeavor to address or minimize the community concerns identified above during remedial design and implementation of the selected remedy. It is clear from the public comment that the public seeks more flexibility in the implementation of any cleanup selected particularly relative to the impact of the remedy on the existing character of the neighborhood and the trees, which the selected remedy will address.

The selected remedy CMA 9 includes flexibility with regard to achievement of the remedial goal. This flexibility will be tied to exposure potential and is intended to allow owners to preserve some property specific features at the owner's discretion. The selected remedy will include the development of property-specific excavation and restoration plans with input from each property owner to help minimize disturbances during excavation and insure proper restoration. It should also be noted that each property owner will have to grant legal access to his/her property before any remediation is implemented and accordingly each owner will have the right to accept or refuse remediation of their property. However, if an owner refuses to grant access, FMC will be required, on an annual basis, to ask the current or future property owners if they would like their property remediated. If the owner chooses to forgo remediation they or any future owners can change their mind and request remediation. The DEC will maintain a list of properties that are not fully remediated.

The selected remedy includes the development of a Tree Preservation Plan to preserve mature trees where practical and at each property owner's discretion. An outline for the development of this plan is provided in Appendix C.

Unlike CMA 2 which proposed institutional controls for at least 11 properties, the selected remedy only requires institutional controls on one property, associated with the Wooded Parcel ICM, where a deed restriction already is in place, with unrestricted use being the expected outcome for all other properties where the property owner allows the selected remedy to be successfully implemented (unless the owner of a commercially or industrially zoned property requests a cap remedy and a deed restriction). This difference is due to the fact that unlike CMA 2 the selected remedy requires the removal of subsurface soil along all Culvert 105 pipe segments where additional sampling indicates arsenic concentrations above the 20 ppm remedial goal. This removes the need for institutional controls on properties along the Culvert 105 pipe path. The number of properties requiring institutional controls in accordance with the selected remedy will be similar to CMA8. CMAs 2-7 would require more properties to have institutional controls and therefore are less favorable.

It is DEC's intention to provide letters to property owners documenting unrestricted use for all properties where the selected remedy is successfully completed.

FMC's CMS states that implementing CMA 3 would require the remediation of 152 properties out of 190 tested. The implementation of CMA 2, like CMA 9, currently identifies 181 properties to be remediated, a difference of only 29 properties.

In summary, while it is somewhat uncertain how members of the community will view the selected remedy until the public review process is complete, the fact that it is similar to CMA 2 and requires a more extensive remediation than CMAs 1 & 3, which were previously favored by those commenting on the Draft CMS Report, indicates that the selected remedy may be unfavorable in terms of the community/property owner acceptance criterion. However, it should be noted that the selected remedy includes a number of features as indicated above which are intended to address specific community concerns.

Summary of CMA Evaluations

A review of DEC's CMA evaluation with respect to the seven (7) applicable criteria indicates that the selected remedial alternative CMA 9 is the most favorable in terms of the environmental and human health protection criteria and compliance with applicable standards and criteria. It is more favorable or equal to some CMAs in terms of the technical, institutional, and green remediation criteria, and less favorable to some CMAs in terms of the cost and community/property owner acceptance criteria. While the selected remedy may not be viewed favorably against every criterion the DEC considers it to be the most favorable overall.

7.2 Evaluation of Corrective Action Objectives (CAOs)

The CAOs were established as one of the mechanisms to evaluate the Corrective Measures Alternatives (CMAs). A set of CAOs were established by the Agencies for this Facility in accordance with the 1991 RCRA Order. These objectives generally include protection of human health and the environment, achievement of unrestricted property usage, minimization of Community disruption, encouragement of public and property owner participation, and use of "green" remediation practices. The final CAOs were identified by the Agencies in a letter dated March 26, 2009 and are presented in Appendix A along with an evaluation of the selected remedy and other CMAs with respect to achievement of these CAOs. CAO #1 states that the selected remedy should have a remedial goal that is protective of human health and the environment in accordance with and in consideration of applicable or relevant and appropriate laws, rules, and guidance; this would include the 6 NYCRR Part 375 SCOs and CP-51.

7.3 Remedial Soil Disposition

As presented in Section 6.2 above the remedial soil disposal options as contained in FMC's Draft CMS Report generally include:

1. Off-site disposal in a commercial landfill facility with transport by rail or truck;
2. Off-site beneficial use as daily cover at a commercial landfill facility with transport by rail or truck; and
3. On-site disposal in a Corrective Action Management Unit (CAMU) with transport by truck

The DEC has evaluated these disposal options in terms of the seven (7) criteria listed in Section 7.1 which were used above to evaluate the CMAs. Based on this evaluation DEC's selected disposal option for the remedial soils generated from the corrective measures is on-site disposal if certain technical, legal, and timing requirements are met. Otherwise, off-site disposal with a preference towards

beneficial use as daily cover and transport by rail will be required. DEC's evaluation of the disposal options and a detailed description of our selected disposal option are presented in Appendix B.

Section 8 ELEMENTS OF THE SELECTED REMEDY

In selecting a remedy the DEC has identified several issues that were not adequately addressed by any single CMA presented in FMC's Draft CMS Report. Accordingly the DEC has elected to create an additional alternative (CMA 9) which is structured around CMA 2 but contains elements of CMA 8 in order to adequately address the issues identified during our CMA evaluation. The present worth cost to implement this remedy with on-site disposal, as derived from FMC estimates, is $58,000,000. This alternative calls for a remedial goal for arsenic of 20 ppm in the Study Areas with flexibility to make decisions regarding the attainment of the remedial goal based on property-by-property data and information. This alternative currently results in the cleanup of 181 properties within the Study Areas. It also accepts the remedial measures performed pursuant to the ICMs discussed in this FSOB where no-further-action letters were issued.

DEC's remedy selection determination as set forth in this Statement of Basis is not a precedential determination for future FMC operable units, except for Operable Unit #3 (Air Deposition Area #2).

8.1 Detailed Elements of Selected Remedy

The detailed elements of DEC's selected remedy are as follows:

1. Remedial Design. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the selected remedy. The design will include the:

    a. development of general and property specific sampling and excavation plans. These plans will include pre-excavation soil sampling and analysis to better define the excavation limits needed to achieve the 20 ppm arsenic remedial goal for each property. The property specific plans will detail the limits of excavation on each property, and indicate any limitations with regard to property specific features (e.g. trees) that are agreed to with the property owner. The plans will also indicate the removal and replacement of any property specific features (e.g. sheds, fences, etc). Each property owner will be consulted by the DEC during the development of their property specific plan;
    b. development of general and property specific health and safety plans. These plans will include the necessary details to protect residents, workers and the general public during implementation of the final remedy;
    c. development of general and property-specific restoration plans. These plans shall provide details for backfilling, soil quality, and vegetation establishment. Property specific plans shall indicate the replacement of any property specific features removed during the excavation for which the owner would request replacement (e.g. trees, sheds, fences, etc.);
    d. development of a tree preservation plan. The Tree Preservation Plan will meet the minimum requirements set forth in Appendix C.
    e. development of a village/town infrastructure protection and restoration plan. The plan will include a survey of village/town infrastructure both before and after the remediation. It will include pre-construction surveys as needed. The plan will include measures for mitigating or repairing any damage that may be caused to local infrastructure by the remedial action.

f. evaluation of approaches to minimize the disturbance and disruptions to the community during construction so that the character of the neighborhoods and quality of life can be maintained, to the extent feasible; and
g. green remediation principles and techniques, will be implemented to the extent feasible, as per DEC's Green remediation policies. A summary of the major green remediation components to be considered are as follows:
    - considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - reducing direct and indirect greenhouse gas and other emissions;
    - increasing energy efficiency and minimizing use of non-renewable energy;
    - conserving and efficiently managing resources and materials;
    - reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - maximizing habitat value and creating habitat when possible;
    - fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
    - integrating the remedy with the end use where possible and encouraging green and sustainable re-development
h. development of a specific remedial design/remedial action public outreach and citizens participation plan

2. Excavation of properties. Soil from the properties identified in the OU2 Areas, including the non-ICM area of the OU 4 area on the Roy Hart School property, that exceed 20 ppm soil remedial goal for arsenic will be excavated and transported to the ESI area of the FMC Facility. Excavation plans for these properties will be designed taking into account the flexibility set forth in paragraph 3 below or for commercial or industrial properties may be modified in accordance with paragraph 4.

   The remedial goals for the other soil contaminants (e.g., lead and pesticides) shall be the NYS Soil Cleanup Objectives (SCOs) as set forth in 6 NYCRR 375-6.8 of the DEC regulations and NYSDEC CP-51 Soil Cleanup Guidance for current zoning or reasonably anticipated future use. Existing and possibly additional sampling data will be used to confirm achievement of these goals. The DEC expects that these goals will be met without additional removal when the arsenic remedial goals are achieved.

   The owners of 18 properties in the OU3 area which were not sampled during the RFI when access permission could not be obtained from the property owner will be offered the opportunity to have soil sampling and analysis. If written permission is obtained from the property owner, sampling and analysis will be conducted, in accordance with a DEC-approved plan, and if warranted the property will be remediated consistent with the approved remedy as set forth in this section.

3. Remedial Flexibility for Residential Properties.

    a. an evaluation of all samples from an individual property will be performed, recognizing the heterogeneity of contaminated sites and the uncertainty of sampling and analysis. The DEC will exercise limited discretion when determining that remediation is complete and has generally achieved the remedial goals where some discrete samples may not achieve

the established cleanup levels. This flexibility will be tied to exposure potential. Also, recognizing the heterogeneity of contaminated sites and the uncertainty of sampling and analysis of samples, the DEC, in consultation with the NYSDOH, may determine that remediation is complete for sites when (1) there are a large number of confirmatory samples; (2) the vast majority of confirmation samples indicate that the soil cleanup levels for the site have been achieved; and (3) those that do not achieve the SCO exceed it only by a small amount. This determination will also accommodate property owner concerns related to preservation of their property with respect to specific features such as mature trees, sheds, decorative plantings, or other features of significance to the property owner where possible.

b. for all non-residential properties (including farm lands) and residential properties larger than 5 acres, excavation may be supplemented with or replaced by in-place soil tilling/blending. Such activities will first require additional pilot studies based on a work plan approved by DEC. If a pilot test for tilling demonstrates a reasonable expectation of achieving the remedial goals tilling will be approved by DEC.

4. Remedial Flexibility for Non-residential Properties. A site cover will be allowed for those properties currently zoned and used as commercial or industrial. The cover will consist either of the structures such as buildings, pavement, sidewalks and/or a soil cover in areas where the upper one foot of exposed surface soil will exceed the site-specific soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial or industrial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. This will be acceptable to the DEC if the owner volunteers to place a deed restriction on the property limiting the use to commercial or industrial use only, consistent with current zoning. After the deed restriction is placed, the owner will receive written notice that the remedy is complete and acceptable for the given use.

5. Disposition of Excavated Material. The excavated soil removed from the properties will be:

    a. sent off-site for disposal if it is found to be hazardous waste pursuant to NYCRR Part 371. If determined to be non-hazardous, the off-site disposal option will allow FMC to stage material on-site (for up to 24 months) within the Eastern Surface Impoundment in accordance with 6NYCRR Part 373-2.19(d) and 40 CFR Section 264.5 and other applicable requirements to maximize the beneficial reuse of the remedial waste as daily cover at commercial landfills, provided the ESI remedy selection authorizes such activity. If utilized, temporary soil pile(s) in the ESI area may not exceed 28 feet in height, nor exceed the footprint of the current ICM soil pile. While the transportation mode will be determined during the remedial design, the DEC preferred mode of transportation is rail since it reduces truck traffic, reduces greenhouse gases, and is in line with community comments; and/or
    b. placed in a CAMU to be constructed on the FMC property designed to meet all applicable rules and regulations, or if approved by DEC, stored in the ESI while the CAMU is being constructed. To utilize a CAMU, an application must be completed and approved and construction must begin within 24 months of this SOB (or such other time frame as the DEC agrees upon in writing) and be completed in accordance with a Department approved schedule. If the CAMU is not constructed in accordance with the

approved schedule the remedial wastes will be disposed of off-site in accordance with (a) above.

6. Disposition of ICM Soil in ESI Area. To date the ESI area has not been fully characterized by investigation nor has a remedy selection process been initiated for final closure of this land disposal unit. All soil generated from the ICMs, accepted as final by this Statement of Basis, which is currently stored under temporary authorization in the ESI, will be handled in a manner consistent with the remedy selected for the ESI. Incorporation of the ICM soil into the ESI closure will be allowed if the following conditions are met:

    a. the investigation and recommendation for a remedy selection of the ESI must be conducted in accordance with the DEC approved schedule and the final remedy selection for the ESI must authorize such a remedy; and
    b. if the conditions set forth above in 5 and 6(a) are not achieved within the DEC approved schedules, or the final remedy selected does not authorize disposal of ICM soils in the ESI, the ICMs soil will be removed from the FMC facility and will be disposed of at a permitted off-site facility or unless beneficially reused pursuant to a DEC beneficial use determination as set forth in 6 NYCRR Part 360, with a preference towards beneficial use as commercial landfill daily cover and transport via rail. This disposal of ICM soils will begin within 24 months of finalization of this SOB.

7. Culvert 105. Soil around Culvert 105 pipe sections and ditches will be sampled to characterize the arsenic concentrations of these soils. Soils found to exceed the 20 ppm arsenic remedial goal, based on these and previous sampling results, will be removed, to the extent feasible, consistent with paragraphs 2, 3, and 5 above. The culvert pipe will be replaced in accordance with the Village of Middleport design specifications and/or applicable industry practices.

8. Restoration of Excavated Areas. All areas of OUs 2/4 and 5 where soil is excavated will be restored in accordance with the restoration requirements set forth in the approved remedial design, and will:

    a. be backfilled with clean fill soil and top soil as appropriate which meets the requirements of 6NYCRR 375-6.8 to establish the grades approved in the remedial design. Lawns will be restored by seeding or placement of sod. Trees will be replaced at the discretion of the property owner and if any areas are determined to be wildlife habitat they will be appropriately restored to allow this use;
    b. replace landscaping features such as sidewalks, driveways, and other property-specific features (e.g., pools, sheds, fences) in kind (and consistent with local building codes) where removal is required to implement the remedy. The need for removal of any property-specific features will be determined during the design of the remediation phase in consultation with the affected property owners; and
    c. restore publicly owned property and infrastructure if it is shown to have been damaged by remedial activities. Any affected property shall be replaced in accordance with local building codes and standard industry practices.

9. The remedy will be implemented in accordance with a Department approved schedule and consent order established to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. The schedule shall provide for remedy

implementation to commence within 60 days of DEC's approval of the design document and for the remediation to be completed within 60 months of the of the effective date of the Order or such other time frame as the DEC agrees upon in writing.

10. Disposition of the ICM/IRM Properties. No further action is required for the 31 properties remediated during the 2003 ICM and the 2007-2008 ICMs as well as the ICM areas (the athletic fields) of the Roy Hart School Property. These property owners received letters from the DEC stating that no use restrictions were required and that no further sampling or other actions are needed at this time. For the Wooded Parcel, this property will not require further remediation, but will require that the institutional and engineering controls previously placed on the Wooded Parcel property be maintained. It also requires the continued implementation of the previously approved Site Management Plan (SMP).

11. Post-cleanup Status of Remediated Properties. No site management or usage restrictions will be required for properties that are determined to have achieved the remedial goal, except as noted in paragraph 4(a). A no further action letter will be provided to property owners where the cleanup on such property has achieved the provisions of the remedy.

12. Status of Properties not Subject to Remediation. For properties within OUs 2/4 and 5

    a. requiring remediation under this remedy but where remediation cannot be implemented as a result of an owner's refusal to grant property access (i.e., refusal to sign a access agreement) or require such strict limitations that the 20 ppm goal, even with flexibility, cannot be achieved, FMC will be required under this remedy to annually offer remediation of such properties to the current or new owners. This annual written offer must be documented by a certified letter to each such owner with a copy to DEC. If an owner accepts the offer of remediation and signs an appropriate access agreement at some future date, the property shall be remediated in a manner consistent with the remedy;
    b. whose owners previously refused sampling (including Property AE2) the remedy requires FMC to annually offer to sample these properties and, if the results of that sampling indicate arsenic concentrations above 20 ppm, the owner will be offered the option to remediate the property in a manner consistent with the remedy. For the property in the Culvert 105 Area (AB4) where the 2007 Early Action ICM cleanup did not allow a no–further-action letter to be issued this property will be re-evaluated to identify what additional removal is required to allow such a letter to be issued and the property owner will be offered the opportunity for the remediation.

13. Unless implementation of the remedy for OUs 2/4 and 5 is completed (excluding Site Management) within 60 months of the date of issuance of the final Statement of Basis, FMC shall post financial assurance using one or more of the financial instruments in 6 NYCRR 373-2.8, in the amount of the cost projection for the remainder of the remedy selected in this Final Statement of Basis. Financial assurance must include all properties within these operable units that (i) have not been investigated or (ii) those determined to need remediation that have not been remediated or have not received a no–further-action letter within the 60 month period.

14. As part of the remedy a Site Management Plan will be developed and implemented. The Site Management Plan will include an Institutional and Engineering Control Plan that identifies all

deed restrictions within the Study Areas and details the steps and media-specific requirements necessary to assure the institutional and engineering controls remain in place and effective (any deed restriction required by the remedy will reference the site management plan). This includes a requirement for the remedial party to complete and submit to the DEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3). This plan will include but may not be limited to:

a. an Excavation Plan which details the provisions for management of future excavations in areas with use restrictions and remaining contamination;
b. an Annual Notification Plan which details the annual notification to property owners where remediation did not occur (including those not previously sampled) or which were determined not to have achieved the remedial goal to achieve a no–further-action letter. The notification plan will require the remedial party to offer the owner(s) of such property the opportunity to have remedial action conducted on their property consistent with the remedy. Such remedial action would be performed by the remedial party;
c. provisions for the steps necessary for the periodic reviews and certification of the institutional controls.

APPENDIX A - CORRECTIVE ACTION OBJECTIVES (CAOs) DISCUSSION

The DEC has made a determination to select CMA 9, the corrective measures alternative that includes the removal of soils at all locations and depths within the Study Areas to achieve an arsenic remedial goal of 20 ppm with some flexibility employed on a case-specific basis to accommodate property owner concerns where possible and to finalize past interim measures in OUs 2/4 and 5 where the Agencies previously indicated no further action was needed.

The Agencies' Corrective Action Objectives (CAOs) which are presented below were finalized on March 26, 2009 after receipt and consideration of input from FMC and a public including the Middleport Community Input Group (MCIG). After each CAO a discussion is presented explaining how DEC's selected remedy compares to the established CAOs.

CAO #1: To protect human health and the environment relative to FMC-related contamination in accordance with and in consideration of applicable or relevant and appropriate laws rules and guidance using site-specific data and information supported by multiple lines of evidence including site-specific risk assessment and based on current and reasonably anticipated future land use(s). Reasonably anticipated future land uses will be identified in consultation with the community.

A. Achieve unrestricted use (i.e. without the need for institutional or engineering controls) of current and reasonably anticipated future residential properties within these study areas;

B. Reduce and manage potential human health risks associated with FMC related contaminants in soil keeping in mind that risk is a function of contaminant concentration and routes, likelihood of exposure and other factors such that:

- excess human health carcinogenic risks are reduced such that the lifetime excess cancer risks fall within the range appropriate for residential communities (i.e. 10-4 to 10-6);[1]
- human health non-carcinogenic risks are reduced such that non-carcinogenic risks do not exceed the level appropriate for residential communities (i.e., Hazard Index $\leq$ 1.0);[2] and
- the "point of departure" or starting point for corrective action risk-management decisions pertaining to arsenic in soil is the site-specific residential background considering site-specific histories of use for current and reasonably anticipated future residential properties within these study areas.

C. With agreement by the property owner and based on current and reasonably anticipated future non-residential use of a property a combination of institutional and/or engineering control methods may be acceptable as effective measures as long as they are determined to render adequate, long-term protection of human health and the environment.

D. Eliminate, reduce, or control existing or potential adverse ecological impacts due to elevated concentrations of FMC-related contaminants in soil and/or sediments while balancing adverse ecological impacts that may result from the remediation activities themselves.

E. Eliminate, reduce, or control the potential for migration of FMC-related contaminants in soil and/or sediment, while balancing adverse ecological impacts that may result from any such measures themselves.

[1] This is consistent with EPA's risk range. It is also consistent with NYSDEC's SCOs which are based on 10^{-6}.
[2] This is consistent with EPA's risk range and NYSDEC's SCOs.

CAO #1 Discussion

DEC-selected alternative achieves CAO #1. Pursuant to CAO #1 the selected remedy should have a remedial goal that is protective of human health and the environment in accordance with and in consideration of applicable or relevant and appropriate laws, rules, and guidance. In determining the remedial goal for arsenic and other soil contaminants the DEC considered applicable laws, regulations, policies, and guidance including but not necessarily limited to:

- USEPA 40 CFR § 265
- NYSDEC 6 NYCRR Part 373
- NYSDEC ECL Article 27, Title 9
- NYSDEC ECL Article 27, Title 13
- NYSDEC 6 NYCRR Part 375-6, which provides soil cleanup objectives (SCOs)[3]
- NYSDEC and NYSDOH's Technical Support Document (TSD)[4] for the SCOs.
- NYSDEC Commissioner's Policy #51 (CP-51) – Soil Cleanup Guidance, issued October 21, 2010.[5]
- NYSDEC's Guidance Document, DER-10 – Technical Guidance for Site Investigation and Remediation[6]

The DEC also looked at other available information and multiple lines of evidence in arriving at the remedial goal such as:

- the approved RFI for the study areas;
- FMC's February 2003 Report on the Development of Arsenic Background in Middleport Soils (CRA 2003);
- FMC's draft Reasonably Anticipated Future Land Usages Map; and
- Arsenic standards in 14 other states (see Appendix D).

CAO #1 indicates that a site-specific risk assessment may be performed. As previously stated in Section 7.1 of this document the DEC cannot accept FMC's site-specific risk assessment for arsenic since it substantially underestimates potential arsenic human health risks and is therefore not appropriate for use in making risk management and remedial decisions. However, the DEC considers the arsenic risk assessments performed by NYSDOH in conjunction with the NYS Soil Cleanup Objectives to be appropriately site-specific in terms of addressing arsenic exposures in the Middleport community and appropriately conservative with regard to the assumptions used to characterize those exposures. The selected remedy is supported by the NYSDOH SCO risk assessments[4] and the use of a background-based arsenic remedial goal.

CAO #1 also indicates that the remedy should be based on current and reasonably anticipated future land use(s) which should be identified in consultation with the community. Current land uses were identified from local zoning maps and FMC developed a draft map depicting "reasonably anticipated future land uses" in the Middleport area based on a review of zoning and planning documents. This FMC draft map was presented to community organizations (e.g., Village of Middleport Officials, Roy-Hart School officials, etc.) for review and number of comments were received. Although FMC made some revisions to their draft map before incorporating it into their Draft CMS Report they did not include all the revisions presented in community's comments. For example comments from Roy-Hart School officials pointed out that the school property is currently zoned "residential" and that residential development of this property should be considered as a "reasonably anticipated future use" for this property. However this is not indicated on FMC's current draft map.

[3] NYSDEC's SCOs are presented in tables under Subpart 375-6.8 of the regulations and can be viewed at: http://www.dec.ny.gov/regs/15507.html#15513
[4] NYSDEC's TSD for the SCOs can be viewed at: http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf
[5] NYSDEC CP – 51 can be viewed at: http://www.dec.ny.gov/docs/remediation_hudson_pdf/cpsoil.pdf
[6] NYSDEC's DER-10 guidance can be viewed at: http://www.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf

Based on the DEC evaluation of current zoning, FMC's draft map and the community comments on the draft map, the DEC finds the selected remedy CMA 9 to be consistent with current and reasonably anticipated future land uses within OUs 2/4 and 5 in that it does not restrict current land usages and accommodates a variety of anticipated future land uses including residential development on all properties (unless the owner of a commercially or industrially zoned property requests a cap remedy and a deep restriction), except the Wooded Parcel.

CAO #1.A indicates that a goal of the remedy should be to achieve unrestricted use of current and reasonably anticipated future residential properties. The stated goal of the selected remedy is to achieve unrestricted use for all such residential properties which is supported by the remedy's use of the local background-based arsenic remedial goal for residential soils. Furthermore the owners of such properties will receive a letter from the DEC documenting achievement of unrestricted use upon successful completion of the selected remedy on their property.

CAO #1.B indicates that a goal of the remedy should be to reduce human health risks. The selected remedy is in conformance with the concept of reducing risk to human health with respect to arsenic exposure in a residential community. The removal of arsenic-contaminated soil will reduce human health risks or potential human health risks due to human exposure.

CAO #1.C allows institutional and/or engineering controls to be used as an acceptable remedy for non-commercial properties with agreement by the property owner if protective. The selected remedy makes use of this allowance only for the Wooded Parcel property (unless the owner of a commercially or industrially zoned property requests a cap remedy and a deed restriction). The Wooded Parcel is in an industrial zone (i.e., non-residential). It has both institutional (deed restrictions) and engineering (cover system) controls in place with the agreement of the property owner as a result of a previous ICM. It also is subject to a Site Management Plan which FMC is required to implement to maintain and monitor the cover system. As a result the selected remedy is in conformance with CAO #1.C.

CAO #1.D indicates that a goal of the remedy should be to eliminate, reduce, or control existing or potential adverse ecological impacts from FMC contaminants while balancing adverse ecological impacts that may result from the remediation activities. As discussed in Section 7.1 of this document the selected remedy CMA 9 may have a short-term impact on the environment due to clearing and excavation activities causing a disruption of the ecological habitats especially along Culvert 105 north of Sleeper Street. However the selected remedy also has greatest long-term beneficial impact on the environment since it eliminates, reduces, or controls existing or potential adverse ecological impacts due to arsenic in soil. The selected remedy is considered to represent an appropriate balance of short-term adverse and long-term beneficial environmental impacts especially when considering the fact that the selected remedy will also require proper restoration of ecological habitats.

CAO #1.E indicates that a goal of the remedy should be to eliminate, reduce, or control the potential for migration of FMC-related contaminants while balancing adverse ecological impacts that may result from remediation activities. Except for the Wooded Parcel the selected remedy will reduce arsenic concentrations to background levels (i.e., remove FMC-related arsenic) and as such eliminate the potential for future migration of FMC-related contaminants. As similarly stated for CAO #1.D above, this is also considered to represent an appropriate balance between and short-term adverse and long-term beneficial environmental impacts with regard to ecological habitats. Also with regard to the Wooded Parcel, the continued implementation of its Site Management Plan required by the selected remedy is considered an adequate control to prevent the potential migration of FMC-related contaminants in subsurface soils.

In summary based on the above evaluations the DEC considers that the selected remedy meets or exceeds all aspects of CAO #1.

CAO #2: Minimize disturbance and disruption of the community so that the character of the neighborhoods can be maintained.

CAO #2 Discussion

CAO #2 provides a goal to minimize the disturbance and disruption of the community so that the character of the neighborhoods can be maintained. Residents are concerned about maintaining mature trees and other important features throughout the neighborhood so as to preserve its unique character. In comparing the alternatives, other than the no-action alternative, some level of disturbance to existing trees including the loss of some trees is inevitable. To minimize disturbance to the community, the selected remedy CMA 9 provides flexibility by potentially allowing some soils to exceed the 20 ppm arsenic remedial goal based upon site-specific Department determinations. This is intended in part to allow for the preservation of mature trees.

The selected remedy includes the development of a tree preservation plan (see Appendix C) which is designed to preserve mature trees where possible. The selected remedy also includes the development of restoration plans which will be designed to help re-establish the character of the neighborhood, if necessary.

The selected remedy includes the possibility of soil tilling/blending on non-residential properties and for residential properties greater than 5 acres in size where appropriate to minimize truck traffic and remedial waste generation. The selected remedy also includes the restoration of properties' soil, sod, trees, and structures that will be removed during remediation. It should also be noted that any owner can refuse to allow their property to be remediated with the option of requesting remediation at a later date.

Considering all the above factors the DEC considers that the selected remedy meets CAO #2.

CAO #3: Inform and engage affected property owners (e.g., where contamination is located) and local residents and allow for meaningful participation throughout the cleanup process, including the CMS, and corrective measures, design, and implementation phases.

CAO #3 Discussion

The DEC has and will continue to engage affected property owners and local residents in meaningful participation. In this regard the Agencies released FMC's Draft CMS Report for public comment prior to developing this FSOB. A public meeting was held on FMC's Draft CMS Report and numerous comments were received during the comment period. The DEC has prepared and made available a Responsiveness Summary relative to these comments. In addition the Agencies have met with the MCIG community group on a number of occasions to discuss the CMS and its various comments. The NYSDOH has also developed fact sheets on arsenic risk in response to comments.

The selected remedy also includes a number of elements designed to inform and engage affected property owners and local residents and allow their participation in the cleanup process. For affected property owners the selected remedy requires the development of property-specific sampling and excavation, health and safety, and restoration plans. These plans will be specific to each property and each property owner will be consulted and involved in their development so that owner concerns are addressed prior to commencing remedial work. Therefore the DEC considers that the selected remedy meets CAO #3.

CAO #4: Consistent with the above objective, use best management practices of EPA's Green Remediation concepts (*i.e.,* clean diesel technology, waste minimization, resource conservation, reduction of greenhouse gases and other air emissions [e.g., by using alternative energy sources and/or fuel-efficient technology, minimizing truck trips, etc.] and ecological and soil preservation) to reduce the demands placed on the environment ("footprint"). In keeping with the Green Remediation strategies, site cleanup and reuse can mutually support one another by leveraging infrastructure needs, sharing data, minimizing demolition and earth-moving activities, re-using structures and demolition material, and combining other activities that support timely and cost-effective

cleanup and reuse. Early consideration of green remediation opportunities offers the greatest flexibility and likelihood for related practices to be incorporated throughout a project life.

CAO #4 Discussion

The selected remedy CMA 9 contains a number of elements which are intended to make it more in line with Green Remediation concepts. They include but are not necessarily limited to:

- a requirement for the development of a Tree Preservation Plan to minimize to the extent practical the number of tree removals necessary for implementation of the selected remedy;
- the evaluation and potential use of soil tilling/blending to lessen the generation of remedial soils and the use of clean backfill soil resources;
- consideration of incorporating on-site land disposal, providing technical and administrative issues are addressed, which will reduce the energy requirements for shipping remedial wastes a long distance; and
- early consideration during the remedial design phase of green remediation opportunities to be incorporated throughout implementation (see NYSDEC's DER-31 – Green Remediation at www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf).

Based on the above the DEC considers that the selected remedy meets CAO #4.

In conclusion the DEC finds that overall the selected remedy CMA 9 best satisfies the Corrective Action Objectives in comparison to the other alternatives evaluated.

APPENDIX B - EVALUATION AND SELECTION OF TRANSPORT AND DISPOSAL

1.0 Presentation of Transport and Disposition Options

The CMS provided the following transport/disposal options for the remedial soils from OUs 2/4 and 5:

A. Off-Site Disposal: The off-Site disposal options in the CMS were:

- Commercial Landfill - Off-Site disposal of remedial soils as non-hazardous waste at appropriate commercial landfill(s) which meet all applicable rules and regulations for such disposal. Any hazardous waste will be disposed at a permitted hazardous waste disposal facility.

- Beneficial Reuse at a Commercial Landfill - Beneficial reuse of remedial soils as daily landfill cover at appropriate off-Site commercial landfill(s) which meet all applicable rules and regulations.

The transport options for off-site disposal are:

- Transport by truck directly from the excavation to the commercial landfill.

- Transport by truck to the eastern portion of the FMC facility for temporary storage (i.e., staging) followed by loading into larger trucks for transport to the commercial landfill.

- Transport by truck to the eastern portion of the FMC facility for temporary storage (i.e., staging) followed by loading into rail cars for transport to the commercial landfill.

B. On-Site Disposal: FMC's on-site disposal option consists of constructing an engineered consolidation area known as a Corrective Action Management Unit (CAMU) located at the eastern portion of the FMC Facility to receive the remedial soil for permanent disposal. The CAMU would be constructed in accordance with RCRA regulations with a maximum height of 28 feet at its highest point and a maximum footprint (i.e., area at its base) of approximately 16.9 acres. For the southern half of the CAMU FMC proposed construction of a regulatory required liner and leachate collection system. For the northern half of the CAMU (which constitutes the portion of the CAMU which would be within the perimeter of their former Carbofuran impoundment) FMC requested an exemption to liner system regulatory requirements and therefore did not propose any liner for the CAMU's northern half. FMC also proposed to leave the ICM wastes in place to be incorporated into the new northern CAMU. For the entire CAMU FMC proposed to construct an engineered cover system consisting of natural and geosynthetic components with grasses and shrubs on its surface. FMC's proposal also called for trees to be planted at select locations along the perimeter of the CAMU.

2.0 Department's Evaluation of Transport and Disposition Options

This evaluation focuses on comparing the major options of off-site and on-site disposal. It also includes some discussion of off-site beneficial use and transport options. The seven evaluation criteria set forth in the CMS work plan and used to analyze these options are:

- Technical
- Environmental
- Human Health
- Institutional
- Green Remediation Practices
- Cost
- Community/Property Owner Acceptance

Below is DEC's evaluation of the disposal options based on these criteria:

Technical

The technical criterion requires the disposal options to be evaluated with respect to performance, reliability, implementability, and safety. The performance and reliability evaluation examines the effectiveness of the disposal options in reducing unacceptable risks and its demonstrated ability to maintain that effectiveness over time. The implementability evaluation examines the engineering and construction-related tasks necessary to carry out the disposal and any obstacles associated with the disposal option that might delay or lengthen implementation of the selected remedy. The safety evaluation examines potential safety risks to workers and community members that might be associated with the disposal options.

Performance and Reliability – One important aspect of performance and reliability in terms of disposal is how well the disposal unit prevents migration of contaminants long-term. Both the on-site disposal option and the off-site commercial landfill option offer a number of features which are designed to prevent future contaminant migration. It can be assumed with a high degree of confidence that remedial soils sent for off-site disposal will be received by a modern commercial landfill that is constructed with one or more liners and with systems to collect leachate containing waste contaminants.

The on-site CAMU which FMC proposed is unlined over its northern half with prevention of contaminant migration relying on groundwater collection/extraction systems along the disposal unit's northern and eastern perimeter. This is because ICM waste is already placed in this area. The southern part of the CAMU could be lined since it would be a new disposal area. There are several ways to enhance the reliability of the on-site disposal option. 1 - Require a liner for all disposal areas. The requirement for a liner would be predicated on the concentrations and leachability of the waste going into the CAMU. 2 - Testing the soil and setting concentration limits. Previous testing has indicated that the arsenic-contaminated soil does not have the propensity to leach arsenic or other contaminants into the groundwater. This would need to be verified through further testing if the on-site disposal option without a liner was to be implemented. In addition, a maximum soil concentration would be set for on-site disposal. 3 – Proper construction and maintenance of CAMU cap. A well built cap would prevent runoff from being contaminated and prevent soil from eroding. A properly built and maintained CAMU would be very effective and reliable at containing and isolating the waste long-term.

The DEC therefore considers the unlined portion of the CAMU to be somewhat less effective than the lined commercial facility in terms of its long-term ability to prevent contaminant migration, and as such somewhat less reliable than an off-site commercial landfill. However, if testing results show the waste does not leach arsenic, a properly constructed CAMU without a liner could reliably and safely contain the arsenic-contaminated soil onsite.

Implementability – The off-site disposal option has some problems which could affect implementation of the selected remedy CMA 9; however, they appear to be easily reconcilable. For instance the off-site option can cause implementation delays attributable to a lack of available long haul transport vehicles and/or scheduling limitations with receiving commercial landfills. However this is easily rectified through the use of on-site temporary staging of remedial soils prior to final off-site disposition. Such staging would allow remediation of off-site properties to continue without any delays due to logistical transport or disposal problems that might occur; however, it would require double handling of contaminated soils.

With respect to the on-site disposal option, the DEC has identified several issues that could cause a delay in remedy implementation.

Solid Waste Management Unit (SWMU) Group C (i.e., the former Carbofuran Pond and Eastern Surface Impoundment (ESI)) occupies the area of the FMC Facility where FMC proposed to construct the northern half of the CAMU which they have indicated as Phase 1 of CAMU development. The RCRA Facility Investigation (RFI) being conducted with respect to SWMU Group C has identified both soil and groundwater contamination in

this area. Further investigation may be needed in this area and an CMS/alternatives analysis will be necessary to evaluate various corrective measures for addressing the contamination in the area of SWMU Group C. Since it is not currently known what corrective measures might be necessary for this area of the facility it is also not known whether the construction of a CAMU in this area would be consistent with the corrective measures needed to address the SWMU Group C contamination.

Accordingly, the DEC has determined that it is premature to locate a CAMU in the SWMU Group C area until the completion of the investigation and remedy selection process for this area. However, if the RFI/CMS and remedy implementation for the SWMU Group C area could be expedited such that it did not delay remediation of OUs 2, 4, and 5, and the remedy for SWMU Group C would not otherwise prohibit a CAMU, then the implementation of the on-site option would be comparable to the off-site option. Location of a CAMU at an alternate on-site location may be another option which would avoid the above complications. Also, the remedy as selected, which will include a schedule for completion of construction of the CAMU, will not allow for the soil removal to be delayed because of lack of on-site disposal capacity. To utilize a CAMU, a CAMU application must be completed and approved and construction must begin within 24 months of this SOB (or such other time frame as the DEC agrees upon in writing) and be completed in accordance with a Department-approved schedule. If the CAMU is not constructed in accordance with the approved schedule the remedial wastes will be disposed of off-site.

Safety – There are safety issues related to both on-site and off-site disposal options. The off-site option involves transporting remedial soils over greater distances, either by truck or rail, than would be necessary for the on-site option, which inherently increases the accident potential. It would also require handling the soil twice, first to stage it onsite and then to pick it up and move it offsite which somewhat increases the accident potential. The on-site option entails construction, operation and closure of a CAMU which creates a construction accident potential that is not present with respect to the off-site option. While each option may have safety issues, the DEC considers the on-site option to be slightly better than the off-site option in terms of safety.

In summary, the on-site disposal option is considered slightly less favorable than the off-site disposal with respect to performance and reliability, equal with respect to implementability, and slightly better than the off-site option with respect to safety. From an overall perspective, the DEC considers the on-site disposal option for the OU 2/4 and 5 remedial soil to be comparable to the off-site option with respect to the Technical criterion.

Environmental

The environmental criterion requires disposal options to be evaluated with respect to potential long-term impacts on the environment. The design of the cover system for the on-site CAMU is essentially equivalent to the typical cover designs utilized at off-site disposal facilities, making the covers essentially equal in terms of environmental protection against surface water contamination. However, as previously stated above, half of FMC's CAMU would be unlined and would rely on groundwater extraction systems to minimize contamination to environmental media caused by contaminants leached from the disposed remedial waste. In comparison, most, if not all modern off-site commercial disposal facilities are singled if not double-lined with leachate collection systems. Such liners and collection systems are widely regarded as superior over groundwater extraction systems in terms of environmental protection. Since soils that leach levels of metals that would impact groundwater would not be allowed in the CAMU, whether or not a CAMU is lined or unlined is no longer a deciding factor.

From an overall perspective, the DEC considers the on-site disposal option to be comparable to the off-site option with respect to the environmental criterion.

Human health

The human health criterion requires disposal options to be evaluated based on their protection against short- and long-term exposures to contaminants present in remedial soils.

Short-Term Exposures - Both on-site and off-site disposal options involve similar methods of remedial soil placement in their respective disposal units with similar precautions taken during such placement designed to prevent short-term exposures to workers and the general public (e.g., personnel protection equipment, dust suppression, etc.). Since the on-site CAMU would be located in closer proximity to the surrounding residential neighborhood than is the case for the typical commercial landfill that is often more remotely located, it may pose a slightly higher short-term human exposure potential. However, this could be considered as being balanced out by the fact that the off-site disposal option requires more waste transportation putting remedial soils in close proximity to a number of residential neighborhoods along the truck or rail transport routes. As a result, the DEC considers the on-site and off-site options as having similar short-term human exposure potentials.

Long-Term Exposures - As stated above, both the on-site and off-site disposal options involve disposal units which have similar cover system designs. Therefore, they are considered by the DEC as offering similar protection against direct human exposure from a long-term perspective.

In summary, the DEC considers the on-site and off-site disposal options to be equivalent with respect to the human health criterion.

Institutional

The institutional criterion requires disposal options to be evaluated with respect to Federal, State and local laws, ordinances, regulations, standards, criteria and guidance. Both the on-site CAMU and off-site commercial landfills are allowable under current Federal and State laws and regulations. Each has similar processes for obtaining permits or approvals from appropriate Federal or State regulatory agencies. Therefore, the on-site and off-site disposal options appear similar with respect to conformance to Federal and State laws/regulations. However, the on-site CAMU may not be in compliance with local ordinances. Based on the current Town of Royalton Zoning Map, the eastern portion of the FMC facility where FMC proposed to construct the CAMU is zoned as a "Business" district. Furthermore, a resolution which was unanimously passed by the Royalton Town Board at a June 13, 2011 meeting states:

"the Town of Royalton Zoning Ordinance does not list a CAMU as one of the permitted, or specially permitted, uses for the CAMU site; and" it "…may violate the Town's Zoning Ordinance."

Since the Town Board resolution is not definitive ('may violate') regarding compliance with local zoning, it is unclear if FMC would have to request and obtain a zoning variance or some other approval from the Town government for an on-site CAMU at the proposed location. Or it may be possible for a CAMU to be placed at a different location on site. Due to this uncertainty, the DEC considers the off-site disposal option to be slightly more favorable than the on-site option with respect to the institutional criterion.

Green Remediation Practices

The green remediation practices criterion requires disposal options to be evaluated for consistency with USEPA's and DEC's Green Remediation concepts and strategies including land conservation, resource/material consumption, soil conservation, and reduction of greenhouse gases and other air emissions. The on-site and off-site disposal options are evaluated below with respect to each of these green remediation concepts and strategies:

Land Conservation – The southern section of FMC's on-site CAMU would occupy approximately 8.3 acres of land south of the facility's former Carbofuran impoundment. Past environmental investigations have indicated that this land has not been used for waste disposal, and is relatively free of soil contamination, including arsenic whose soil concentrations are predominantly consistent with local background. Use of this land for on-site disposal of remedial soil from OUs 2/4 and 5 would preclude any future productive development of this viable land. There may be other portions of the site that would be more appropriate for locating a CAMU. Off-site disposal in pre-existing commercial facilities would preserve this land for possible future business development. Off-site disposal would use some of the available landfill space in an off-site permitted landfill, but it is not

expected to cover as large a footprint of land as on-site disposal. Therefore, off-site disposal is considered by the DEC as more favorable than on-site disposal in terms of land conservation.

Resource/Material Consumption – The on-site disposal option, as proposed by FMC, would require the usage of natural resources and geosynthetic materials to construct the liner and leachate collection system over the southern portion of the on-site CAMU (if a liner/leachate collection is needed) and a final cover over the entire CAMU. Off-site commercial landfills use these same resources/materials for construction of their liner and cover systems. Therefore the DEC considers off-site disposal and on-site disposal to be comparable in terms of reducing resource/material consumption.

Soil Conservation – The off-site option allows for the beneficial use of some, or possibly all, remedial soils as daily cover for commercial solid waste landfills. It is reasonably anticipated that the nature of these non-hazardous remedial soils (e.g., gradable soils with generally moderate levels of contamination) will make them a viable substitute for "clean" soils which are often used as daily cover for municipal wastes in commercial landfills. While FMC has estimated that 25% of the remedial soils could be beneficially used in this manner, a much higher percentage of beneficial use could result from proper use of on-site staging of remedial soils, as explained in more detail below under the "cost" criterion. Regardless of the what percentage of the remedial soils are able to be beneficially re-used, the off-site option allows for the conservation of a significant volume of "clean" soil resources that would otherwise be required for daily cover at municipal landfill facilities. However, consistent with Green Remediation practices, the DEC would still allow the less contaminated soils to be beneficially used as commercial landfill daily cover if the on-site option was chosen. Therefore, the DEC considers the off-site and on-site disposal options to be comparable in terms of soil conservation.

Reduction of Greenhouse Gases and Other Air Emissions –In terms of greenhouse gas generation and other air emissions, the DEC believes that off-site disposal would produce more emissions due to the significant additional transport of remedial soils involved in the off-site option (i.e., added emissions from truck or rail transport to off-site commercial landfills). However, a number of factors must be considered before making such a conclusion. Some of these factors are discussed below:

- an on-site disposal option entails the use of heavy equipment to construct the liner and cover systems for the on-site CAMU, and as a result produces an additional volume of air emissions.

- an off-site disposal option would require double handling of remedial soils on-site, resulting in an additional volume of air emissions.

- the mass of air emissions associated with the additional transport of remedial soils under the off-site option is also related to the mode of transport being employed. A 2009 report issued by the "Federal Railroad Administration" (see link below) indicates, as do other information sources, that shipment by rail is in most cases, more fuel efficient and then shipment by truck, and therefore often produces less air emissions. This is especially true for shipment distances over 300 miles where the reduction in fuel consumption and corresponding reduction in air emissions from rail verses truck becomes substantial. Therefore, maximizing transport of remedial soils by rail where the distance between the FMC facility and the commercial landfill is over 300 miles can significantly reduce the additional air emissions associated with the off-site option. These additional emissions can be further reduced if commercial facilities that can directly accept rail shipments are utilized, as opposed to those which would require a rail to truck transfer to complete transport to the landfill.
http://www.fra.dot.gov/Downloads/Comparative_Evaluation_Rail_Truck_Fuel_Efficiency.pdf

- The volume of air emissions associated with the additional transport of remedial soils under the off-site option is directly related to the distance between the site and the commercial landfill facility. Based on FMC's Draft CMS Report, there are existing commercial landfills within a short distance of the FMC facility (under 100 miles). Utilization of such facilities will substantially reduce the additional air emissions associated with off-site transport of remedial soils.

It must be understood, that neither this document nor FMC's Draft CMS Report contain a detailed quantitative analysis of air emissions for both on-site and off-site disposal options, and that without such an analysis it is impossible to definitively conclude which option will produce the smaller volume of greenhouse gases and other air emissions. However, based on DEC's qualitative evaluation, the additional air emissions assumed to be attributable to the off-site option are expected to be substantially more than those produced by on-site disposal.

In summary, the off-site option is considered favorable to the on-site disposal option in terms of land conservation while the on-site option is superior in terms of Greenhouse Gas Emissions. The two options are comparable in terms of resource/material consumption and soil conservation. Therefore, from an overall perspective, the DEC considers the on-site option to be favorable to the off-site option with respect to the green remediation practices criterion.

Cost

The cost criterion requires each disposal option to be evaluated with respect to the capital, engineering, and any long term costs (e.g., inspection, monitoring, and maintenance) associated with the final disposition of remedial soils. The cost estimates contained in FMC's Draft CMS Report indicate the cost of on-site disposal to be approximately $13.7 million and off-site disposal (including transportation) to be approximately $25.8 million, based on the volume of remedial soil generated by implementation of CMA 2 which is likely similar to the volume associated with DEC's selected remedy. However, the DEC considers that these FMC cost estimates make certain assumptions and fail to adequately consider certain factors that may serve to underestimate on-site costs and overestimate off-site costs. Some of these possible under and overestimations are described below:

- With respect to on-site disposal, the DEC does not agree with all of FMC's projected costs associated with on-site CAMU construction, operation, closure, and post-closure care and maintenance. This is especially true with regard to the cost associated with the long-term care of such a disposal unit which would likely have to continue in perpetuity. The DEC considers the assumptions used by FMC to calculate the "present worth" of long-term care as flawed in terms of the anticipated rate of return and an inadequate accounting for inflation among other things. For these and other reasons, FMC's estimate may have under-estimated the true costs of on-site disposal.

- FMC's estimate for off-site disposal also assumes that 100% of the remedial soils would be transported by truck to the off-site commercial disposal facility. However, the costs of transport by rail for distances over 300 miles is often substantially less than the costs of truck transport (http://mechdb.com/index.php/File:Railvstruck.png). Therefore, transporting remedial soils by rail at such distances would reduce the cost of off-site disposal.

In summary, based on the above, it is likely that the disparity between on-site versus off-site costs is less than indicated by the FMC estimates. However, since assumptions such as the volume of soil beneficially re-used are highly speculative, it must be conservatively assumed that off-site disposal will be higher than on-site disposal. Therefore, the DEC considers the on-site disposal option to be more favorable than the off-site option with respect to the cost criterion.

Community Acceptance

Disposal options are to be evaluated based on the degree to which they are acceptable to the community. On May 17, 2011, the Agencies provided the public with an opportunity to comment on FMC's Draft CMS Report for OUs 2/4 and 5 which included an evaluation of on-site and off-site disposal options for remedial soils and FMC's recommendation for on-site disposal in a CAMU. Although these comments were somewhat mixed with regard to the disposal options, almost all comments received from within the affected community (i.e., Town of Royalton and Village of Middleport) were in opposition to the on-site CAMU disposal option. These included comments

from the Middleport Community Input Group (MCIG) which took an official position against an on-site CAMU, and a number of comments from individual Middleport residents. The comments cited the negative aesthetics associated with the CAMU, as well as the stigma and potential adverse effect on local property values associated with having such a disposal unit in the heart of a mainly residential community, among the reasons given in opposition to an on-site CAMU. These comments are consistent with those provided by community residents/organizations in previous Agencies/Community interactions, which have also been considered by the DEC in this evaluation. Also, a number of local governmental organizations provided official documents in opposition to the on-site CAMU disposal option including the Roy-Hart School Board, the Village of Middleport and the Town of Royalton (see Attachment 1 of the Responsiveness Summary). In addition, the Town of Royalton provided the Agencies with a copy of a resolution passed unanimously on June 13, 2011 which states that:

"The Town of Royalton Town Board opposes the existence of a CAMU on any property located with the Town."

With respect to off-site transport of remedial soils, a number of comments received on FMC's Draft CMS Report indicated a community preference towards utilizing rail as the mode of transport. In support of this preference, those commenting cited the fact that the rail option provides less traffic within the community than the truck option, and is considered generally less disruptive.

In summary, based on the input received from the affected community to date as indicated above, the DEC considers the off-site option as more favorable with a preference for transport by rail than the on-site option with respect to the community acceptance criterion.

Summary of Disposal Option Evaluation

A review of DEC's evaluation of disposal options with respect to the seven (7) criteria indicates that on-site disposition of remedial soils with a preference towards beneficial re-use is: the more favorable option in terms of the green remediation practices and cost criteria; equal to off-site disposal in terms of the technical, environmental, and human health criteria; slightly less favorable than off-site disposal for the institutional criteria; and less favorable than off-site disposal with respect to the community acceptance criteria. Therefore, from an overall perspective, the DEC considers the on-site CAMU option for OU 2/4 and 5 remedial soils with emphasis on encouraging beneficial use and the off-site option as being very comparable and both acceptable.

3.0 Elements of the Transport and Disposition of Soils Portion of Remedy

The following are the elements of the selected remedy's options for transport and disposition of remedial soils that will be generated by implementation of the remedy for OUs 2/4 and 5 and the ICM soils currently stored at FMC:

- The option for on-site disposal is available if doing so does not substantially delay implementation of the remedy for OUs 2, 4, and 5. If the conditions for on-site disposal are not met, off-site disposition of remedial soils at a commercial land disposal facility, or facilities, with the proper Permits and/or authorizations to accept such soils will be required;

- The DEC encourages maximizing the volume of remedial soils which are beneficially re-used as daily cover at commercial landfills to the greatest extent practical for either the on-site or off-site disposal options, to provide for a more "green" and less costly soil disposition;

- For the off-site disposal option, the use of on-site temporary staging within the Facility area in accordance with a plan approved by the DEC and consistent with 6 NYCRR 373-2.19(e) of the DEC regulations is allowed. The plan will set a time limit for temporary storage, the maximum volume of remedial soils that can be present at the site at any one time, as well as limits on the area, height, and slopes of the temporary unit. Such staging will

help ensure the expeditious cleanup of properties and help to maximize the volume of remedial soil sent off-site for beneficial re-use as daily cover;

- For any remedial soils transported off-site, the use of rail to transport remedial soils is encouraged, and is required for transport to any commercial landfill which is over 300 miles from the FMC facility.

APPENDIX C - TREE PRESERVATION PLAN (TPP) MINIMUM STATEMENT OF WORK ELEMENTS

The remedial design shall include a Tree Preservation Plan which shall be used to help individual the property owners make determinations regarding trees on their property that could be affected by remediation. The tree preservation plan to be developed as part of the remedy shall provide the information gathering and decision making processes that will be followed when a property owner seeks to preserve an existing tree or trees. The tree preservation plan should include, but not be limited to, a:

- preliminary evaluation of each tree which includes determining the size/dimensions of its Root Protection Zone (RPZ), the arsenic concentrations within its RPZ based on existing data (if any), and the need for additional soil sampling and analysis within the RPZ to better characterize the soil arsenic concentrations within the RPZ in terms of the horizontal extent and depth of arsenic concentrations above the arsenic remedial goal;

- sampling and Analysis Plan (SAP) to obtain additional arsenic concentration data within each RPZ, where such data is determined necessary based on the preliminary evaluation;

- detailed procedure and set of definitive criteria upon which an independent, certified arborist approved by the DEC will evaluate each tree in terms of its current condition and its ability to withstand (i.e., survivability) the removal of soil within its RPZ to the extent needed to achieve the arsenic remedial goal;

- detailed set of RPZ excavation procedures which are designed to maximize the potential for tree preservation, including (but not limited to) hand excavation techniques and seasonal excavation during dormant growth periods;

- description of the information to be provided to the property owner about each tree's preservation including all the factors to be considered (e.g., size of RPZ with respect to the property size, arsenic concentrations within RPZ, extent and depth of soil removal needed to achieve remedial goals, certified arborist's evaluation and recommendations, etc.); and

- post-excavation tree preservation procedures for backfilling, fertilization and irrigation within the RPZ, and FMC long-term care procedures which are determined necessary by an independent, certified arborist to improve tree recovery.

- a requirement that removal/replacement of trees in the Village Street Right of Way is coordinated with the Village Board since these areas are under the jurisdiction of the Village Board.

Tree Preservation Decision Making: FMC shall provide each property owner with all information regarding the tree(s) on their property, the soil contaminant levels within the root zone(s), as well as a recommendation from a qualified (certified) arborist provided by FMC, which recommendation will be reviewed by and granted the concurrence of the DEC prior to it being provided to the property owner. The property owner will be informed of the potential ramifications in making his/her tree preservation decision. Upon reviewing this information, the property owner shall make the final decision regarding the preservation of his/her tree(s). In cases where the DEC agrees that a tree, or trees, cannot be preserved if the excavation required to achieve remedial goals is performed, the property owner may still refuse to have any tree removed. If remedial efforts are limited on part or all of a property as a result of the TPP or other access limitations, FMC will include such property in its Annual Notification Plan and shall perform additional remedial efforts upon request by the property owner consistent with the final selected remedy in the future.

APPENDIX D –REVIEW OF OTHER STATES' ARSENIC REMEDIAL GOALS

The DEC reviewed the arsenic cleanup levels in numerous other states. Over the past 20 years there have been various attempts to unify soil remediation cleanup standards across the U.S. The EPA has not established standard action levels for soil which trigger cleanup actions. In reviewing arsenic remedial goals and Records of Decision (RODs) in the Superfund program for sites across the US there has been substantial variability in remedial goals and the nature of each site is important in explaining the difference. For example in EPA Region 2 (NY and NJ) most of the decisions were either based on background or residential risk analyses (a majority of these were around 20 ppm). In EPA Regions 8, 9, and 10 combined (CO, MT, UT, AZ, CA, and AK), there were substantially more industrial decisions resulting in higher cleanup values (200 ppm and higher) at these sites. In addition some States have established cleanup levels for arsenic in soil for a residential setting.

Out of 17 States responding to a 1998 survey conducted by the Association for the Environmental Health of Soils 16 have established arsenic cleanup levels ranging from 0.4 ppm to 20.0 ppm with most based on background. Established levels in New York (16.0 ppm) and New Jersey (20.0 ppm) are based on background. Colorado is the only state responding to the survey which allows 40-250 ppm based on site-specific considerations. There are many factors to consider when determining a cleanup number for any constituent, including arsenic. Therefore remedial decisions or arsenic cleanup levels for any particular site should not be interpreted as necessarily applicable to Middleport since factors which are unique to each site are often involved in remedy selection.

The DEC recently reviewed current cleanup levels in 14 states and found that the 20 ppm cleanup value selected for this site is higher than or equal to the state-wide calculated health based cleanup value in all 14 reviewed states for residential use and 11 out of the 14 reviewed states for all other uses. Following is a summary of that review:

STATE	**USE**	**CLEANUP LEVEL (in parts per million)**
Arizona	All Uses	10
Connecticut	All Uses	10
Delaware	Restricted Use/Non-Critical Water Resource	4
Florida	Residential	2.1
	Commercial/Industrial	12
Iowa	All Uses	17
Kansas	Residential	11.3
	Non-Residential	38
Maryland	Residential	0.43
	Non-Residential	1.9
Maine	Residential	0.14
	Other Uses	0.42 – 4.2
Massachusetts	All Uses (S-1, S-2 and S-3)	20
Mississippi	Unrestricted	0.426
	Restricted	3.82
New Jersey	All Uses	19
New York	All Uses	16
	Protection of Ecological Resources	13
Oregon	Urban Residential	0.39
	Other Uses	1 – 370
Pennsylvania	Residential	12
	Non Residential (0 - 2' and 2' – 15')	53 – 190,000
Rhode Island	All Uses	7

Natural background arsenic concentrations in the U.S. soil are based on research conducted by the U.S. Geological Survey (USGS). The concentration of arsenic in U.S. natural background samples ranged up to 97.0 ppm with an average of 7.2 ppm.

As previously noted FMC conducted a background study. (See 2003 Report on the Development of Arsenic Background in Middleport Soils (CRA 2003)). In this study 103 soil samples were collected and analyzed for arsenic from wooded areas, agricultural fields, commercial/industrial properties, residential properties, and orchards in the Gasport area which is not considered affected by FMC Plant releases. The sample results were weighted to approximate the historic land uses in Middleport (i.e., since 33% of Middleport was historically residential, residential arsenic data was weighted at 33%). The value of 20 ppm represents the weighted 95th percentile of the entire background data set, which basically means that 95% of the weighted data falls at or below 20 ppm. It also happens to be the 95th percentile (un-weighted) of the residential portion of the background data set (i.e., 95% of the residential data falls at or below 20 ppm).

Also the DEC had previously conducted a *statewide* rural background study and determined the background level of arsenic. That study determined that the background level for arsenic was 16 ppm. The Technical Support Document (TSD) expressly reviewed the background level of arsenic and the various studies in NYS relative to this issue and expressly discussed the arsenical pesticide use in parts of New York State. *(See TSD, page 301 - 302)* The TSD considered five studies conducted in NYS relative to arsenic which indicated arsenic concentrations ranging from 14.1 ppm to 19.1 ppm. Based on these background levels the 6NYCRR Part 375 and CP-51 soil cleanup objective was set at 16 ppm.

The 20 ppm arsenic level was selected in 2003 as an appropriate upper limit of the estimated range of soil arsenic background in Middleport as appropriately weighted to reflect historic land uses. The conclusion of DEC's background study relative to arsenic is generally consistent with the conclusion of the FMC 2003 background study and supports the use of the 20 ppm cleanup level. Importantly the DEC did not simply adopt the State's background level of 16 ppm in setting the background level. Rather the DEC has adopted the residential background level determined more applicable to the local area.

APPENDIX E – RELEVANT REPORTS AND DOCUMENTS

Arcadis (May 2011) FMC DRAFT Corrective Measures Study Report – Suspected Air Deposition and Culvert 105 Study Areas.

Arcadis (September 2009) FMC RCRA Facility Investigation (RFI) Volume II – Suspected Air Deposition study Area 1 (South of the Erie Canal and West of the Niagara/Orleans County Line) and Culvert 105 Study Area South of the Erie Canal.

Conestoga-Rovers & Associates (February 2003) FMC Development of Arsenic Background in Middleport Soils.

CITY: SYRACUSE , NY GROUP: ENVCAD DB: P. LISTER, G.STOWELL, P. LISTER LD: P. LISTER PM: D. WRIGHT LYR: ON=*;OFF=*REF, (FRZ)
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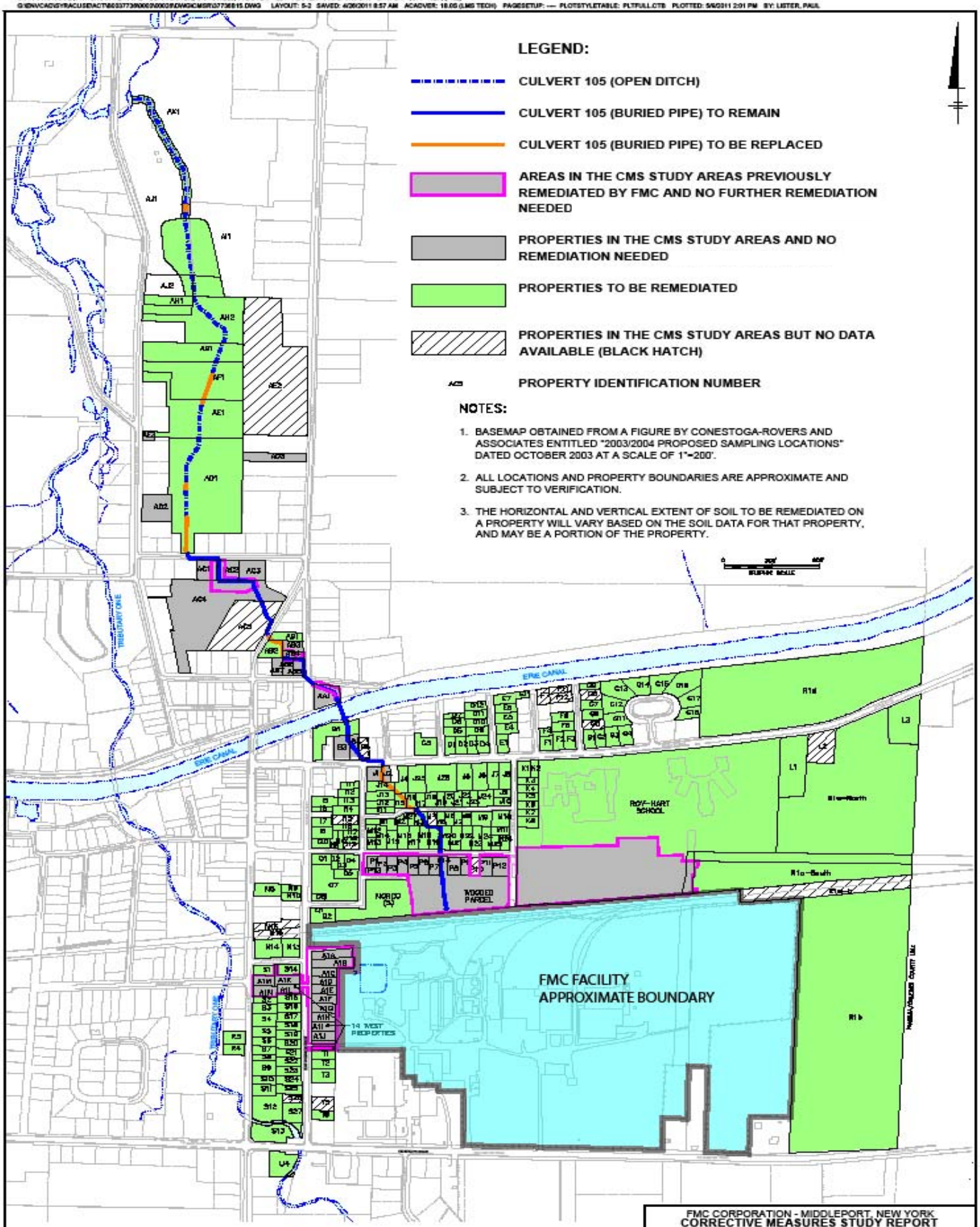

FMC CORPORATION - MIDDLEPORT, NEW YORK
CORRECTIVE MEASURES STUDY REPORT
SUSPECTED AIR DEPOSITION AND CULVERT 105 STUDY AREAS

PROPERTIES TO BE FULLY OR PARTIALLY REMEDIATED

ARCADIS

CITY: SYRACUSE , NY GROUP: ENVCAD DB: P. LISTER, G.STOWELL, P. LISTER LD: P. LISTER PM: D. WRIGHT LYR: ON=*;OFF=REF
G:\ENVCAD\SYRACUSE\ACT\B0037736\0000\00027\DWG\CMSR\37736B07.dwg LAYOUT: 3-1 SAVED: 5/9/2011 1:38 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 5/9/2011 1:39 PM BY: LISTER, PAUL

LEGEND:

- CULVERT 105 (OPEN DITCH)
- CULVERT 105 (BURIED PIPE)
- AREAS IN THE CMS STUDY AREAS PREVIOUSLY REMEDIATED BY FMC

NOTES:

1. BASEMAP OBTAINED FROM A FIGURE BY CONESTOGA-ROVERS AND ASSOCIATES ENTITLED "2003/2004 PROPOSED SAMPLING LOCATIONS" DATED OCTOBER 2003 AT A SCALE OF 1"=200'.
2. ALL LOCATIONS AND PROPERTY BOUNDARIES ARE APPROXIMATE AND SUBJECT TO VERIFICATION.

VILLAGE OF MIDDLEPORT WASTEWATER TREATMENT PLANT
CULVERT 105 REACH C3
CULVERT 105 REACH C2
CULVERT 105 REACH C1
CULVERT 105 REACH CS
CULVERT 105 EARLY ACTION (2007)
12 P-BLOCK PROPERTIES EARLY ACTION (2007-2008)
ROY-HART SCHOOL
ROY-HART SCHOOL ICM (1999)
NORTH RAILROAD PROPERTY
CULVERT 105
WOODED PARCEL EARLY ACTION (2007-2008)
BLEACHER AREA IRM (1996)
14 WEST PROPERTIES ICM (2003)
TRIBUTARY ONE
ERIE CANAL
0 300' 600'
GRAPHIC SCALE

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

AREAS IN THE CMS STUDY AREAS PREVIOUSLY REMEDIATED BY FMC

ARCADIS

FIGURE
2

FIGURE 3

SUMMARY OF COST ESTIMATES FOR CORRECTIVE MEASURES ALTERNATIVES

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

Description	Estimated Cost									
	Alternative 1	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
A. Soil Remediation Capital Costs (Excluding T&D) Subtotal =	$ -	$ 37,328,730		$ 14,928,250		$ 8,177,900		$ 5,545,100	
B. Culvert 105 Buried Pipe Removal and Replacement Capital Costs Subtotal =	$ -	$ 338,850		$ 299,250		$ 236,400		$ 236,400	
C. Engineering and Coordination Costs Associated with Soil and Culvert 105 Buried Pipe Remediation Capital Items Subtotal =	$ -	$ 3,766,758		$ 1,522,750		$ 841,430		$ 578,150	
D. Transportation and Disposal Capital Costs		CAMU	Landfill	CAMU	Landfill	CAMU	Landfill	CAMU	Landfill
Subtotal =	$ -	$ 13,701,000	$ 25,762,500	$ 3,622,500	$ 7,762,500	$ 1,995,000	$ 4,275,000	$ 1,470,000	$ 3,150,000
E. OM&M Costs Subtotal =	$ 362,608	$ 2,814,632	$ 1,440,632	$ 3,226,663	$ 2,812,663	$ 1,962,639	$ 1,734,639	$ 1,902,639	$ 1,734,639
TOTAL ESTIMATED COST =	$ 362,608	$ 57,949,970	$ 68,637,470	$ 23,599,413	$ 27,325,413	$ 13,213,369	$ 15,265,369	$ 9,732,289	$ 11,244,289

Description	Estimated Cost									
	Alternative 6A		Alternative 6B		Alternative 7A		Alternative 7B		Alternative 8	
A. Soil Remediation Capital Costs (Excluding T&D) Subtotal =	$ 17,149,050		$ 19,398,750		$ 19,475,700		$ 22,443,900		$ 28,537,400	
B. Culvert 105 Buried Pipe Removal and Replacement Capital Costs Subtotal =	$ 299,250		$ 299,250		$ 299,250		$ 299,250		$ 789,750	
C. Engineering and Coordination Cost Items Associated with Soil and Culvert 105 Buried Pipe Remediation Capital Items Subtotal =	$ 1,744,830		$ 1,969,800		$ 1,977,495		$ 2,274,315		$ 2,932,715	
D. Transportation and Disposal Capital Costs	CAMU	Landfill	CAMU	Landfill	CAMU	Landfill	CAMU	Landfill	CAMU	Landfill
Subtotal =	$ 4,462,500	$ 9,562,500	$ 5,145,000	$ 11,025,000	$ 5,302,500	$ 11,362,500	$ 6,339,000	$ 13,387,500	$ 9,241,500	$ 18,225,000
E. OM&M Costs Subtotal =	$ 3,028,657	$ 2,518,657	$ 3,008,655	$ 2,420,655	$ 3,124,657	$ 2,518,657	$ 3,134,655	$ 2,420,655	$ 1,334,608	$ 362,608
TOTAL ESTIMATED COST =	$ 26,684,287	$ 31,274,287	$ 29,821,455	$ 35,113,455	$ 30,179,602	$ 35,633,602	$ 34,491,120	$ 40,825,620	$ 42,835,973	$ 50,847,473

Notes:

1. Refer to Appendix I for a total breakdown of costs.
2. CAMU disposal costs assume Phase 1 portion of CAMU would be filled to capacity (169,350 tons or approximately 112,900 cy) followed by the Phase 2 area (172,500 tons or approximately 115,000 cy). If the CAMU is completely filled to capacity (both Phase 1 and Phase 2), then any remaining soil would be disposed of off-site at a commercial landfill. Based on this, CMA 2 requires landfill disposal to satisfy the disposal of soils exceeding the capacities of both the Phase I and Phase 2 CAMU.
3. CAMU cost represents $35/ton and $45/ton for placement in the Phase I and Phase 2 Areas, respectively.
4. Landfill cost represents 75% disposal in a commercial landfill as non-hazardous wastes at a cost of $80/ton and 25% beneficially reused as daily cover material at a commercial landfill at a cost of $60/ton.