
SITE MANAGEMENT PLAN

DUBLIN ROAD SITE TOWNS OF RIDGEWAY AND SHELBY, ORLEANS COUNTY, NEW YORK

Prepared For:



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Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date
0	2014	The first SMP prepared using the <i>Operations and Maintenance Plan for Remedial Activities at the FMC Dublin Road Site</i> , 1996 and subsequent revisions.	2014
1	2026	Updated SMP following the decommissioning of the groundwater collection system and treatment plant and complying with current SMP Template requirements. Updated notifications.	

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CERTIFICATION STATEMENT

I Jeffrey Poulsen, P.G. certify that I am currently a NYS registered professional geologist and Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and Green Remediation (DER-31).



Name

P.G., QEP
Title

1/9/2026

Date

LIST OF ACRONYMS

ACRONYM	Definition	ACRONYM	Definition
ARAR	Applicable or Relevant and Appropriate Requirement	NYSDOH	New York State Department of Health
BHCs	Benzene hexachloride and its isomers	NYSDOT	New York State Department of Transportation
CAMP	Community Air Monitoring Plan	O&M	Operation and Maintenance
CFR	Code of Federal Regulation	P.E. or PE	Professional Engineer
COC	Certificate of Completion	PFAS	Per- and Polyfluoroalkyl Substances
CP	Commissioner Policy	PG	Professional Geologist
CY	cubic yards	PRR	Periodic Review Report
Department	New York State Department of Environmental Conservation	QEP	Qualified Environmental Professional
DER	Division of Environmental Remediation	RAD	Remedial Action Detection limit value
DUSR	Data Usability Summary Report	RAO	Remedial Action Objective
EC	Engineering Control	RAWP	Remedial Action Work Plan
ECL	Environmental Conservation Law	RI/FS	Remedial Investigation/Feasibility Study
ESD	Explanation of Significant Differences	ROD	Record of Decision
ETU	Ethylene Thiourea	RSO	Remedial System Optimization
EWP	Excavation Work Plan	SCG	Standards, Criteria and Guidelines
FMC	FMC Corporation	SCO	Soil Cleanup Objective
ft/day	feet per day	SMP	Site Management Plan
ft ² /day	square feet per day	SPDES	State Pollutant Discharge Elimination System
GWE&T	groundwater extraction and treatment	TAL	Target Analyte List
HASP	Health and Safety Plan	TCL	Target Compound List
IC	Institutional Control	TCLP	Toxicity Characteristic Leachate Procedure
IRA	Interim Remedial Action	TI	Technical Impracticability
MCL	Maximum Contaminant Level	TOGS	Technical and Operational Guidance Series
NPL	National Priorities List	USEPA	United States Environmental Protection Agency
NYCRR	New York Codes, Rules, and Regulations		
NYS	New York state		
NYSDEC	New York State Department of Environmental Conservation		

EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan

Site Identification: **NYSDEC Site No. 837001 Dublin Road Site**

	1. The property may be used for commercial and industrial use;
	2. Activities that could affect the integrity of the landfill cover, including without limitation, excavation, digging and construction activities, are prohibited on any portion of the Declaration of Covenants, Restrictions, and Environmental Easement Area, unless the New York Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (USEPA) have given their prior written consent to any such intrusive activity.
	3. Groundwater underlying the Property shall not be extracted, consumed, exposed, or utilized in any way, except as is necessary to comply with this SMP, and any subsequent revisions to those documents approved in writing by the NYSDEC and, if required, by the USEPA, including sampling for the monitoring of contamination levels pursuant to the ROD, and/or treatment and discharge consistent with the ROD, or unless sampling and analysis demonstrates to NYSDEC's satisfaction that the groundwater meets applicable groundwater quality standards.
	4. The Declaration of Covenants, Restrictions, and Environmental Easement Area shall not be used for "Residential Use" and "Restricted Residential Use" as defined by the NYSDEC Regulations – 6 NYCRR Part 375 1.8(g)(2) (i) and (ii). Allowable Uses include "Commercial Use" and "Industrial Use" as defined in NYSDEC Regulations – 6 NYCRR Part 375 1.8(g)(2) (iii) and (iv).
	5. Vegetable gardens and farming, including cattle and dairy farming, on the property are prohibited.
	6. All future activities on the property that will disturb remaining contaminated material are prohibited unless they are conducted in accordance with this SMP.
	7. The property may not be used for a less restrictive use without additional remediation and amendment of the SMP by the NYSDEC.
	8. NYSDEC retains the right to access the Property at any time in order to evaluate the continued maintenance of all controls.
	9. All ECs must be inspected at a frequency and in a manner defined in the SMP.

Site Identification: NYSDEC Site No. 837001 Dublin Road Site

Engineering Controls:	1. Containment cell cover system and collection sumps	
	2. Fencing/Access Control	
	3. Vegetative Cover	
Inspections:		Frequency
1. Containment Cell Cover		Semiannually
2. Comprehensive site-wide inspection, including wetland weir, monitoring wells, and containment cell sumps (12) and underdrains.		Annually
Monitoring:		
1. Groundwater monitoring wells (12 total), including water levels and groundwater sample collection.		Annually
2. Surface water samples collected from on-site wetland (SW-1), and the East (SW-2) and West (SW-3) quarries.		Annually
Maintenance:		
1. General maintenance identified during monthly inspections, including fence line repairs and clearing of weedy vegetation.		As necessary
2. Containment cell collection sump pumping.		Monthly, if more than 1.0 feet of accumulation
3. Containment cell cover maintenance (erosion, settlement, animal burrows, etc.).		Monthly
4. Containment cell vegetative cover mowing and fence line clearing		Semiannually
Reporting:		
1. Inspection Reports		Monthly
2. Groundwater Monitoring Reports		Annually
3. Periodic Review Reports		Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Dublin Road Site located in the towns of Shelby and Ridgeway, New York (hereinafter referred to as the “Site” (**Figure 1**). The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program as a Class 4 site, Site No. 837001, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department). It was formerly listed under the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act in September 2022.

FMC Corporation (FMC) entered into Orders on Consent in 1982, 1988, and 1992 with the NYSDEC and/or the United States Environmental Protection Agency (USEPA) to investigate and remediate the 30-acre property. The most current Administrative Order on Consent (Order No: B8-0013-84-01, dated February 9, 1988, as amended on January 16, 1992) with the NYSDEC required FMC to remediate the site. The Site remedy was implemented consistent with the 1993 Record of Decision (ROD) and 1995 Explanation of Significant Differences (ESD) and completed in 1996. A figure showing the site location and boundaries of this site is provided in **Figure 2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in **Appendix A**.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as “remaining contamination Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Orleans County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor’s successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the Order on Consent (Order # B8-0013-84-01; Site #837001) for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in **Appendix B** of this SMP.

This SMP was prepared by Parsons, on behalf of FMC, in accordance with the requirements of the NYSDEC’s DER-10 (“Technical Guidance for Site Investigation and Remediation”), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions and Alterations

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement for the site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the amended Administrative Order on Consent, 6 NYCRR Part 375 and/or Environmental Conservation Law.
2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
5. Notice within 48 hours of any non-routine maintenance activities.
6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

1. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Order on Consent, and all approved work plans and reports, including this SMP.
2. Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B**.

TABLE 1. NOTIFICATIONS

<u>Name</u>	<u>Contact Information</u>	<u>Required Notification*</u>
Mackenzie Rees – NYSDEC Project Manager	(585) 226-5409 mackenzie.rees@dec.ny.gov	All Notifications
David Pratt – NYSDEC, Hazardous Waste Remediation Supervisor, Region 8	(585) 226-5449 david.pratt@dec.ny.gov	All Notifications
Elizabeth McConnell – USEPA Project Manager, Region 2	(212) 637-4253 mcconnell.elizabeth@epa.gov	All Notifications
Kelly Lewandowski – NYSDEC Site Control	(585) 226-5459 kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Justin Deming – NYSDOH Chief, Regions 4, 5 & 8 Bureau of Environmental Exposure Investigation, NYSDOH	(518) 402-7860 justin.deming@health.ny.gov	Notifications 4, 6, and 7
Kristen Kulow – NYSDOH Project Manager	(607) 353-4335 kristin.kulow@health.ny.gov	Notifications 4, 6, and 7

Note: Notifications are subject to change and will be updated as necessary.

* Note: Numbers in this column reference the numbered bullets in the notification list in this section

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located on Dublin Road, off Fruit Avenue, in the towns of Shelby and Ridgeway, Orleans County, New York and is identified on the Orleans County Tax Map (**Figure 2**) as Sections:

- 078.00 Block 1 and Lot 5
- 078.00 Block 3 and Lot 23
- 078.00 Block 3 and Lot 24
- 078.00 Block 3 and Lot 25

The site is an approximately 30-acre area and is bounded by wooded areas and/or farmland to the north, the New York State Erie Barge Canal to the south, the Village of Middleport municipal landfill to the east, and Jeddo Creek to the west. Jeddo Creek runs northerly through the northeast corner of the Site (**Figure 2 – Site Layout Map**). The boundaries of the site are more fully described in **Appendix A – Environmental Easement**. The owner(s) of the site parcel(s) at the time of issuance of this SMP is: FMC

2.2 Physical Setting

2.2.1 Land Use

The boundary of the Site is enclosed with a chain-link fence. The northern portion of the Site is partially wooded and contains two inactive rock quarries (East and West quarries) and systems constructed as part of the remedial actions implemented at the Site, including a containment cell, a wetland, a drainage swale, and the Site groundwater treatment building for the decommissioned groundwater extraction and treatment (GWE&T) system. The East and West quarries were combined into a single pond after removal of soil/sediments and left to refill naturally. The Site is zoned for commercial and industrial uses and is currently vacant.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include rural and agricultural properties. The properties immediately south of the Site include the New York Erie State Barge Canal; the properties immediately north of the Site include vacant residential (wooded) properties; the properties immediately east of the Site include vacant residential (wooded) properties and a municipal landfill; and the properties to the west of the Site include agricultural properties.

2.2.2 Geology

Generally, the overburden at the Site ranges from 0 feet, where bedrock outcrops at the surface, to approximately 25 feet in thickness and consists of native soil and fill. The native soil consists of the Cazenovia gravelly-silt-loam soil series. The Cazenovia series includes silt, clay, silty sand, and clay-silt mixtures that are derived from loamy glacial till.

The bedrock underlying the overburden is the Grimsby Formation. The Grimsby Formation is approximately 52 feet thick and consists of quartzitic red and white sandstone interbedded with red shales and siltstones. The Grimsby Formation at the Site is further divided into two sections: the upper portion of the bedrock, identified as

the Upper Bedrock Zone, is approximately 20 to 25 feet thick. The Upper Bedrock Zone is weathered and closely fractured, with horizontal fractures along bedding planes intersected by discontinuous vertical fractures. The lower portion of the bedrock, identified as the Lower Bedrock Zone, is approximately 10 to 30 feet thick and is massive (unfractured) or moderately fractured along horizontal bedding plans and without vertical fractures.

The Queenston Shale underlies the Grimsby formation, which is composed of maroon-colored shales and siltstones. Predominant fractures in this formation are along bedding planes and, generally, are clay filled. A geologic cross section plan is shown in **Figure 3**, and a geologic cross section is shown in **Figure 4**. Site-specific boring logs are provided in **Appendix C**.

2.2.3 Hydrogeology

The overburden at the Site contains a thin or sometimes nonexistent saturated zone (as evident by routine water-level monitoring results indicating overburden wells at the Site are often dry). Although it is questionable whether significant horizontal groundwater flow occurs in the overburden, the horizontal hydraulic gradient at the Site — based on measurements when the overburden wells all contained water — is toward the northeast. Based on the sporadic saturation of the overburden under seasonal conditions and downward vertical hydraulic gradients (based on monitoring well water levels measured to date), it is likely that the primary flow direction in the overburden is downward to the bedrock.

The Upper Bedrock Zone is the primary water bearing unit at the Site. A number of pumping tests, slug tests, and modeling studies have been performed for the Site. These are described in the report titled “Installation, Testing and Evaluation of Extraction Wells and Monitoring Wells at the Dublin Road Site” (Bechtel Associates Professional Corporation, November 1996).

Single well permeability tests (Slug Tests) performed in the upper bedrock zone yielded transmissivity estimates ranging from 0.7 square feet per day (ft²/day) to 4.7 ft²/day. Transmissivity estimates from extraction well pumping tests range from 0.1 ft²/day to 42 ft²/day, with the majority of the values between 0.2 ft²/day and 4 ft²/day. Anisotropy was found to be significant.

Groundwater flow in the upper bedrock at the Site is indicated to be toward the east with a northeasterly component near Jeddo Creek. This flow is generally along the principal transmissivity orientation. The transmissivity distribution indicates values generally in the range of 2 ft²/day to 6 ft²/day. Given the thickness of the pumped (screened) zone of 20 feet, this transmissivity range would equate to a bulk hydraulic conductivity range of approximately 0.1 feet per day (ft/day) to 0.3 ft/day. The hydraulic gradient in the upper bedrock for static (i.e., non-pumping) conditions is estimated from hydraulic head measurements obtained in 1996. Using these data, the easterly hydraulic gradient is estimated to be approximately 0.03. Groundwater flow in fractured bedrock occurs within interconnected secondary openings (joints, bedding plane fractures).

The lower bedrock zone was investigated as part of the remedial investigation (RI) as described in the report titled “Remedial Investigation Report for FMC-Dublin Road Site” (Bechtel Environmental, Inc., May 1988). The lower bedrock zone in the RI Report is the lower 10 to 30 feet of the Grimsby Formation. It is characterized by less fracturing than the upper bedrock zone. Three groundwater monitoring wells were installed in the lower bedrock zone. Hydraulic head measurements indicate the groundwater flow direction in lower bedrock zone is toward the north-northeast with a hydraulic gradient of 0.006 feet per foot. The RI Report stated the groundwater quality data indicate “minimal effects to groundwater in the lower bedrock aquifer resulting from the site.”

Groundwater elevation data collected since April 2013, including groundwater monitoring well construction logs and potentiometric contour maps of the water levels in the overburden and upper bedrock wells from 2020 through 2023, are provided in **Appendix C**. These figures are representative of the historic groundwater levels and potentiometric contours recorded semiannually.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 – References.

In or about 1944, FMC purchased the 30-acre Dublin Road Site as part of its acquisition of the Niagara Sprayer and Chemical Company, Inc. From about 1933 to 1968, approximately six acres of the Site south of Dublin Road were used for the disposal of coal ash cinders, laboratory wastes consisting of glass bottles and chemical residues, residues from lime sulfur solution filtration, building debris, and residues from the cleanup of the pesticide production areas and equipment from the Middleport, New York plant. The waste materials were placed in a waste pile area on the south side of Dublin Road.

The primary Site contaminants consist of metals (arsenic, copper, lead, and zinc) and pesticides (i.e., benzene hexachloride and its isomers [BHCs] and DDT and its metabolites). The Site was added to the NPL in 1986 and was designated as a State-led remedial site. FMC completed a Remedial Investigation/Feasibility Study (RI/FS) under the terms of an Administrative Order on Consent with NYSDEC (Order No: B8-0013-84-01 dated February 9, 1988, as amended on January 16, 1992).

In general, the RI determined that groundwater, the waste pile area, swamp, pond, and quarry soils at the Site were contaminated with heavy metals including arsenic, copper, lead, and zinc, as well as a variety of pesticides (i.e., BHCs and DDT and its metabolites). To a lesser degree, herbicides 2,4-D and 2,4,5-T were also detected in Site groundwater. These contaminants were leached from the waste piles and transported into groundwater. Contaminants also migrated to surface water at the site from the waste pile to the rectangular pond, swamp, drainage swale, and East and West quarries. While the analytical results performed on the soils and sediments from these areas during the RI did not fail Toxicity Characteristic Leachate Procedure (TCLP) tests, they were above the remedial action objectives (RAOs).

The NYSDEC and USEPA approved the RI in 1990 and the FS in 1993.

In March 1993, the NYSDEC issued a ROD (EPA/ROD/R02-93/196, March 1993) with USEPA concurrence that selected the remedial action for the Site. The Site was remediated in accordance with the NYSDEC-approved Administrative Order on Consent No. B8-0013-84-01 (executed on February 9, 1988, and last amended on January 16, 1992). FMC completed remedial design activities in 1994.

Tables 1-6 and 1-7 of the March 1993 Record of Decision issued by the NYSDEC (ROD; **Appendix D**) summarize the indicator parameter data in the overburden and upper bedrock collected prior to 1993. Tables 3-1, 3-2 and 3-3 of the “Interim Remedial Action Report for the FMC Dublin Road Site” (IRA Report, Bechtel Associates Professional Corporation, June 1997) summarize the indicator parameter data for the waste pile, sediment and surface water at the Site collected prior to 1993 (**Appendix E**). In addition to the summary in the ROD, Exhibit A of the ROD identifies the investigation reports that are part of the administrative record for the Site.

Remedial construction activities began in May 1994 and were completed over three construction seasons by September 1996. By the end of the first construction season in 1994, approximately 45,000 cubic yards of waste material had been placed into the containment cell, filling it to maximum capacity of the original design. Soil samples collected after the excavation indicate that approximately 25,000 cubic yards of contaminated soil remains at the Site.

Over the winter and into the spring of 1995, FMC, NYSDEC, New York State Department of Health (NYSDOH), and USEPA agreed to increase the capacity of the cell by extending its length from 400 feet to 675 feet and increase the capacity of the cell to approximately 75,000 cubic yards. The change to the original selected remedy

was documented in an ESD Regarding the Selected Remedy for FMC Corporation's Dublin Road Site (No. 837001) prepared by NYSDEC (July 1995), with USEPA concurrence.

On September 11, 1996, the Agencies conducted a final inspection of the Site. The inspection confirmed that the soil remediation work was completed and that the GWE&T system was operational and functional. USEPA documented completion of construction activities in the "Preliminary Close Out Report", dated May 29, 1997. The remedial construction activities performed are documented in the IRA Report (**Appendix E**).

The following is a summary of the Remedial Actions from the IRA Report:

1. An on-site containment cell with composite liners and a leachate collection and removal system and final cover was constructed consistent with Title 6 New York Code of Rules and Regulations Part 360 (6 NYCRR Part 360). The permanent cover consists of synthetic liner covered by a geonet filter fabric, a 24-inch thick cover soil layer, a 6-inch thick topsoil layer, and vegetation for erosion control. The final compacted volume of materials placed in the containment cell is 71,254 cubic yards (CY).
2. A temporary on-site water treatment facility was constructed and operated to treat construction-related water and runoff during the 1994 and 1995 construction seasons.
3. A groundwater extraction system consisting of 11 upper bedrock extraction wells, and an on-site water treatment system, was constructed to treat collected contaminated groundwater and leachate from the containment cell.
4. An estimated 70,878 CY of contaminated soil and materials were excavated to various depths (but mostly to bedrock) during the 1994-1995 construction seasons. Of the 70,878 CY of excavated materials, 46,154 CY of materials were stabilized/treated on-site with lime and Portland cement prior to placement of excavated materials and stabilized materials in the on-site containment cell.
5. Soil that separated the East and West rock quarries was excavated (771 CY) and disposed at an off-site, permitted commercial landfill facility. This excavation resulted in the formation of a single quarry pond.
6. A wetland was constructed/restored along a former drainage swale north of Dublin Road on Site.
7. Clean imported soil was used for backfilling over exposed bedrock areas. An estimated total of 26,789 CY of clean fill materials were imported for use on Site. The Site was graded to facilitate surface water drainage to the constructed wetland and to redirect drainage from the abutting, closed Middleport municipal landfill (on the southeastern side of the Site) back on to the Middleport property.
8. Security fencing, gates and locks were installed to restrict access to the Site.
9. Operation, maintenance, and monitoring of the Site remedial system began in late 1996, including submittal of quarterly Operations and Maintenance Status Reports.

Soil and sediment remaining at the Site after completion of the remedial actions do not exceed the RAOs established in the ROD. The Agencies' September 1996 final inspection of the Site confirmed that the soil remediation work was completed and that the GWE&T system was operational and functional.

The selected remedy includes imposition of property use or deed restrictions to limit future use of the Site and on-site groundwater. A copy of the as-filed Environmental Easement is provided in **Appendix A**.

Operations, maintenance, and monitoring of the Site remedial systems have been conducted since October 1996.

The GWE&T system was operated from November 1996 through May 2012. Operation of GWE&T system ceased on May 29, 2012, with approval from NYSDEC (letter dated March 28, 2012). Between 2014 and 2021, the GWE&T system remained off-line and the Site ECs and ICs were monitored under the approved 2014 SMP. Routine monitoring of groundwater and surface water continued in accordance with the SMP monitoring schedule, routine maintenance and necessary repairs were conducted as needed to maintain Site ECs, and periodic reporting continued as required by the SMP and IC/EC schedule.

In September 2015, the NYSDEC reclassified from Class 2 to Class 4 under the Registry of Inactive Hazardous Waste Disposal Sites in New York State. In September 2020, the USEPA removed the Dublin Road Landfill Superfund Site from the NPL.

In October 2021, FMC provided to the NYSDEC a work plan for the decommissioning of the GWE&T system. In May 2024, the NYSDEC approved the implementation of the “Decommissioning of the Groundwater Extraction and Treatment System Work Plan.” (Parsons, April, 2022). FMC started the decommissioning process with the abandonment of the groundwater extraction wells, collection sumps, and three monitoring wells in August 2023. The decommissioning and removal of water treatment equipment, force main piping and electrical system was completed in December 2023. FMC provided the NYSDEC with a Decommissioning Report by letter dated April 10, 2024.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the ROD dated March 31, 1993. In addition to the general RAOs listed below, the ROD also lists the remedial objectives for Site contaminants based on state Applicable or Relevant and Appropriate Requirements (ARARs) or state RAOs for soil, sediment, ground water, and surface water. These are provided in Table 2-4 of the ROD, which is replicated here as **Table 2**. The table listing RAOs for screening surface water and groundwater only is provided in Section 2.5 Remaining Contamination. The six general RAOs from the ROD are as follows:

- Adequately protect against ingestion of, or contact with, contaminated soil.
- Minimize damage to and provide adequate protection of the saturated zone from contaminants migrating from soil.
- Minimize damage from and adequately protect against the spread of the contaminated groundwater.
- Adequately protect against future ingestion of, or contact with, contaminated groundwater.
- Adequately protect against contamination of surface water and sediments in the Site vicinity.
- Adequately protect against contaminated dust emissions into ambient air.

TABLE 1. REMEDIAL ACTION OBJECTIVES FOR THE DUBLIN ROAD SITE – 1993 ROD

Contaminant	Groundwater ¹ (mg/L)	Surface Water ² Class C (mg/L)	Soils ³ (mg/kg)	Sediments ³ (mg/kg)
Arsenic	0.025	0.19	35	5
Copper	0.2	0.027	25	19
Lead	0.015	0.011	93	27
Mercury	NE ¹	NE ⁴	0.1	0.11
Zinc	0.3	0.03	30	85
BHC	ND ⁵	0.00005 ⁶	NR ⁸	NE ⁴
a-BHC	---	---	0.48	NE ⁴

Contaminant	Groundwater ¹ (mg/L)	Surface Water ² Class C (mg/L)	Soils ³ (mg/kg)	Sediments ³ (mg/kg)
b-BHC	---	---	1.6	NE ⁴
d-BHC	---	---	2.3	NE ⁴
DDT	ND ⁵	0.0001 ⁷	8.8	NE ⁴
DDE	ND ⁵	0.0001 ⁷	8.8	NE ⁴
DDD	ND ⁵	0.0001 ⁷	12.4	NE ⁴

¹ ARAR : Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. for Class GA groundwater June 1998 (April 2000 addendum).

² ARAR: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. for Class C water June 1998 (April 2000 addendum). Calculated based on a measured hardness of 268 ppm for Jeddo Creek Tributary 3.

³ ROD (NYSDEC/EPA 1993).

⁴ RAOs for these contaminants not established. Sediments excavated from the Rectangular Pond were cleaned up to RAOs for soils.

⁵ Not detected.

⁶ The approved RAO for BHC compounds was changed from 0.00001 mg/L to 0.00005 mg/L, based on analytical constraints.

⁷ The approved RAO for DDT, DDE, and DDD was changed from 0.000001 mg/L to 0.0001 mg/L, based on analytical constraints.

⁸ Value not required. RAOs for individual BHC compounds will govern.

2.5 Remaining Contamination

All contaminated soil, sediment, and fill material with contaminant levels above the media-specific RAOs specified in the ROD were excavated and disposed of off-site or placed in the on-site containment cell. Soil and sediment remaining in the remediated areas at the Site after completion of the remedial actions do not exceed the RAOs established in the ROD. A description of the contamination in the containment cell and site media, along with confirmatory results, are provided in the IRA Report (**Appendix E**). Additionally, since the completion of the remedial actions at the Site, groundwater and surface water monitoring has been conducted semiannually and reported annually in Site Periodic Review Reports (PRR). Historical data reported in these PRRs are provided in **Appendix F**.

2.5.1 Soil

As discussed in Section 2.3, an estimated 70,878 CY of contaminated soil and materials were excavated to various depths (but mostly to bedrock). The soil and sediment remedy began in May 1994 and was completed in September 1996. The entire site was cleared of trees and vegetation except for a small area north of Dublin Road. Excavated material that failed TCLP was stabilized and placed in the containment cell. Materials that passed TCLP but had contaminants greater than the RAOs were excavated and placed directly in the containment

cell. Verification sampling was performed after a predetermined depth of material was removed from an area and the results are presented in Table 4-8 from the IRA Report; the areas are shown on Figure 4-2.

Generally, most areas south of Dublin Road did not meet the RAOs and more material was removed during 1994 and 1995 construction season. The containment cell was expanded in 1995 to accommodate the extra material that was required to be removed. The containment cell was closed at the end of the 1995 construction season. Clean imported soil was used for backfilling over exposed bedrock areas.

2.5.2 Sediment

In June 1996, the former quarries were dewatered, and the contaminated materials were excavated and transported off-site to a secure landfill at the Chemical Waste Management facility in Model City, New York. A new wetland was constructed north of Dublin Road and the area south of Dublin Road was graded and a soil layer placed over the bedrock using clean imported material.

2.5.3 Groundwater

The groundwater recovery system was in operation from the fall of 1996 through September 2010 and has removed an estimated total of approximately 0.004 pounds of herbicides and pesticides contaminants and approximately 6.0 pounds of metals contaminants (primarily zinc, copper, and arsenic, a portion of which is naturally occurring). These estimates are based on analytical results and measured flow rates from November 1996 through September 2010. These results are summarized in a report “Technical Impracticability Evaluation of Groundwater Restoration at the FMC Dublin Road Site” (2011 TI Report, AMEC Geomatrix, October 2011).

The 2011 TI Report provided evaluation and justification for determining that further continuation of the groundwater remedy will not enable groundwater to be restored to the RAOs specified in the 1993 ROD, and proposed discontinuation of the GWE&T portion of the remedy. In addition, the 2011 TI Report proposed modifications to the 1996 Operation and Maintenance (O&M) Plan (BAPC 1996). By letter dated March 28, 2012, from the NYSDEC, the USEPA and NYSDEC approved the discontinuation of the GWE&T portion of the remedy, provided comments on O&M modifications proposed in the 2011 TI Report, and requested revisions of the 1996 O&M Plan and submittal of a SMP. In 2014 the SMP was completed and approved by NYSDEC and Site groundwater is currently managed under routine monitoring.

The analytical data results summary tables for Site contaminants in groundwater from 2020 to 2023 are provided in **Appendix F**.

2.5.4 Surface Water

As part of the remedial actions conducted from 1994 to 1996, an estimated total of 26,789 CY of clean fill materials were imported for use on-site and the Site was graded to facilitate surface water drainage to the constructed wetland and to redirect drainage from the abutting, closed Middleport municipal landfill (on the southeastern side of the Site) back to the Middleport property.

The analytical data results summary tables for Site COCs in surface water from 2020 to 2023 are provided in **Appendix F**.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in **Appendix G**) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the ROD to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to Commercial and Industrial uses only. Adherence to these ICs on the site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 2**. These ICs are:

- The property may be used for: commercial and industrial use as defined in NYSDEC Regulations – 6 NYCRR Part 375 1.8(g)(2) (iii) and (iv);
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- Groundwater underlying the Property shall not be extracted, consumed, exposed or utilized in any way, except as is necessary to comply with this SMP, and any subsequent revisions to those documents approved in writing by the NYSDEC and, if required, by the USEPA, including sampling for the monitoring of contamination levels pursuant to the ROD, and/or treatment and discharge consistent with the ROD, or unless sampling and analysis demonstrates to NYSDEC's satisfaction that the groundwater meets applicable groundwater quality standards;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;

- Activities that could affect the integrity of the landfill cover, including without limitation, excavation, digging and construction activities, are prohibited on any portion of the Environmental Easement Area, unless the NYSDEC, and if required, the USEPA, have given prior written consent to any such intrusive activity;
- All future activities that will disturb remaining contaminated material are prohibited unless they are conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on **Figure 2**, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming, including cattle and dairy farming, on the site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Containment Cell Cap

Exposure to remaining contamination at the site is prevented by a cover system placed over the site. This cover system is comprised of a minimum of a 6-inch vegetated topsoil layer, 24 inches of clean soil, geotextile/geonet composite layer, 60-mil HDPE liner and a geotextile fabric covering a nominal 8-inch layer of limestone placed over the compacted materials over the entire cell prior to construction of the cell cap. Design drawings showing the containment cell cap and cover system are included in **Appendix O**. **Figure 2** presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in **Appendix G** outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in **Appendix H** and **Appendix I**, respectively. Any breach of the site's cover system must be overseen by a Professional Engineer (PE) who is licensed and registered in New York State or a qualified person who directly reports to a PE who is licensed and registered in New York State.

Procedures for inspecting, monitoring, and maintaining the containment cell are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). Design drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in **Appendix O**. Excavation into the containment cell is not anticipated, unless otherwise required as part of any cap maintenance/repair activities. If breach of the containment cell cap is required, FMC will notify the NYSDEC and will provide a description the proposed activities and the associated procedures for NYSDEC review and approval.

3.3.2 Fencing/Access Control

Exposure to any residual remaining contamination at the Site is controlled through the use of 6-foot chain link fencing and an access gate designed to keep unauthorized persons out of the Site. Site fencing and access control restricts access to the areas where contamination may exist, and to reduce the possibility of any damage to existing engineering controls (i.e., containment cell cap). While soil and sediment contamination remaining at the Site outside of the containment cell do not exceed the RAOs of the ROD, which are generally below NYSDEC Commercial Use soil cleanup objectives (SCOs) or lower, fencing and access control limits the potential for exposure for unauthorized personnel.

Procedures for inspecting and maintaining the fencing system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). **Figure 2** shows the location of the ECs for the site.

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage, trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the site.

3.3.3.1 Cover (or Cap)

The composite cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in **Appendix J**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – Wide Inspection

Site-wide inspections will be performed monthly or at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix K – Site Management Forms**. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The site management activities being conducted include, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as defined in 6 NYCRR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event on actions taken to respond to any emergency event requiring ongoing responsive action, describing and documenting actions taken to restore the effectiveness of the ECs.

4.3 Containment Cell Underdrain System

4.3.1 Containment Cell Underdrain Monitoring and Pumping

Monitoring of the 12 containment cell collection sumps will be performed on a routine basis, and pumping of the underdrains will be performed periodically when water levels in the sumps are 12 inches or more, as identified in **Table 3** “Containment Cell Monitoring and Pumping Requirements and Schedule (see below). Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the underdrain system has been reported, or an emergency occurs that is deemed likely to affect the operation of the system. Containment cell underdrain system components to be monitored include, but are not limited to, the components included in **Table 3**.

Table 2. Containment Cell Monitoring and Pumping Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
12 Containment Cell Collection Sumps	Height of water	Underdrains pumped when more than 12 inches accumulation	Monthly

A complete list of components to be inspected is provided in the Inspection Checklist, provided in **Appendix K – Site Management Forms**. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the groundwater and surface water on a routine basis. Groundwater and surface water samples will be analyzed for the BHC isomers, arsenic, copper, lead, and zinc and the sample results will be compared to the respective groundwater RAOs specified in the ROD (**Table 4**). For pesticide compounds, the groundwater RAO is non-detect (ND) with the remedial action detection limit (RAD) value established in the ROD. Groundwater samples will be collected biannually, and surface water samples will be collected annually. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 3. Groundwater and Surface Water Remedial Action Objectives

Constituent	Groundwater		Surface Water	
	RAO (mg/L)	RAD (mg/L)	RAO (mg/L)	RAD (mg/L)
Metals				
Arsenic	0.025	--	0.19	--
Copper	0.2	--	0.027	--
Lead	0.015	--	0.011	--
Mercury	--(1)	--	--	--
Zinc	0.3	--	0.030	--
Pesticides				
Total BHC	ND ⁽²⁾	0.00005 ⁽²⁾	0.00001	0.00005
Alpha-BHC	--	--	--	--
Beta- BHC	--	--	--	--
Delta-BHC	--	--	--	--
Gamma-BHC	--	--	--	--
DDE	ND ⁽³⁾	0.0001 ⁽³⁾	0.000001	0.0001
DDD	ND ⁽³⁾	0.0001 ⁽³⁾	0.000001	0.0001
DDT	ND ⁽³⁾	0.0001 ⁽³⁾	0.000001	0.0001
Herbicides				
2,4-D	--	--	--	--
2,4,5-T	--	--	--	--
2,4,5-TP	--	--	--	--
Ethylene Thiourea (ETU)				
ETU	--	--	--	--

Constituent	Groundwater		Surface Water	
	RAO (mg/L)	RAD (mg/L)	RAO (mg/L)	RAD (mg/L)
Notes: ND Not Detectable -- The Dublin Road Site ROD did not specify a cleanup level. mg/L milligrams per liter (1) The Dublin Road Site ROD did not specify a groundwater cleanup level for mercury. The New York State Maximum Contaminant Level (MCL) of 0.002 mg/L has been used for data comparison purposes in the quarterly O&M status reports, as specified in the approved O&M Plan. (2) The Dublin Road Site ROD states that “the approved RAO for BHC compounds is 0.00005 mg/L based on analytical constraints.” (3) The Dublin Road Site ROD states that “the approved RAO for DDT, DDE and DDD is 0.0001 mg/L based on analytical constraints.”				

Detailed sample collection and analytical procedures and protocols are provided in **Appendix J – Quality Assurance Project Plan**.

The remedial party will properly dispose of all wastes generated by the containment cell collection sump pumping at off-site disposal facilities according to local, state, and federal laws and regulations. Wastes will be tested before disposal to comply with the permit conditions of the disposal facility. Wastes generated at this site include water collected from the underdrains and purge water from groundwater monitoring well sampling. Purge water and water from the collection sumps is placed into an existing tank in the former groundwater treatment building. The water is characterized and removed from site for disposal at a regulated facility approved to handle this waste.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed semiannually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The network of on-site wells has been designed based on the following criteria:

The monitoring well network includes seven containment cell wells and five perimeter/sentinel wells that monitor downgradient plume migration. Perimeter/sentinel wells are uncontaminated wells located around the perimeter of the containment cell to monitor the radial flow from the elevated mound of waste covered under the cell. These wells are directly downgradient of the containment cell and upgradient of sensitive receptors. The monitoring well network for this site includes the following perimeter/sentinel wells:

The Site Perimeter Wells (five) are upper bedrock wells MW-61, MW-24, and MW-42; lower bedrock well MW-60; and overburden well MW-20. Monitoring of the perimeter wells will assess if contaminated groundwater is going off- Site. The containment cell wells (seven) consist of up-gradient overburden well MW-27; up-gradient upper bedrock well 40; down-gradient overburden wells MW-91, MW-92 and MW-93; and down-gradient upper bedrock

wells MW-89 and MW-90. The containment cell wells are intended to monitor the integrity of the containment cell. In addition, the containment cell wells will now monitor the potential impact to groundwater quality beneath the Site from the extraction well system shutdown.

Table 5 summarizes the wells' identification numbers, as well as the purpose, location, depths, diameter and screened intervals of the wells. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 4. Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/latitude)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-61	Perimeter	43.218358, -78.43942	2	480.40			
MW-20	Perimeter	43.218564, -78.440133	2	481.61			
MW-42	Perimeter	43.218628, -78.439389	2	482.95			
MW-60	Perimeter	43.218508, -78.439828	2	480.92			
MW-40	Perimeter	43.216333, -78.443694	2	518.40			
MW-27	Upgradient Containment Cell	43.21633, -78.443639	2	517.56			
MW-40	Upgradient Containment Cell	43.216333, -78.443694	2	518.40			
MW-91	Downgradient Containment Cell	43.217931, -78.441811	2	499.45	496.4	481.4	471.4
MW-92	Downgradient Containment Cell	43.218089, -78.441785	2	499.29	496.4	493.2	483.2
MW-93	Downgradient Containment Cell	43.218472, -78.4425	2	500.67	497.8	493.7	489.2
MW-89	Downgradient Containment Cell	43.218522, -78.442233	2	500.65	497.6	480.6	470.8

Monitoring Well ID	Well Location	Coordinates (longitude/latitude)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-90	Downgradient Containment Cell	43.218417, -78.44175	2	499.51	496.7	480.5	470.5

Note: Elevations for ground surface, top and bottom of screen only provided to 0.1 ft in the well construction logs.

Monitoring well construction logs are included in **Appendix C** of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the groundwater monitoring program are specified in **Section 7.0 – Reporting Requirements**.

4.4.2 Surface Water Sampling

Surface water sampling will be performed annually to assess the performance of the remedy. Surface water samples will be analyzed for the BHC isomers, arsenic, copper, lead, and zinc and the sample results will be compared to the respective groundwater RAOs specified in the ROD (**Table 4**). Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

The network of three on-site surface water sample locations (**Table 6**) has been designed based on the following criteria:

Surface water monitoring of the on-site wetland and the East and West quarries is performed on a periodic basis to assess potential migration of residual contaminated groundwater to surface water. The wetland was constructed as an impoundment of water with shallow vegetated sides, peninsulas, and islands, and was intended to meet the remedial action's wetland mitigation objectives. The wetland currently receives direct precipitation and surface water runoff from the area south of Dublin Road via a shallow drainage swale, and in the past, received treated water from the Water Treatment Plant. Both the East and West quarries are former stone quarries that were dug through the overburden into the upper bedrock and were remediated by removal of impacted soil/sediment to meet RAOs during the remedial construction activities. The East and West quarries

are hydraulically connected and represent an area where residual contaminated groundwater beneath the Site could migrate to surface water.

The surface water locations are provided in Table 6. The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Table 5. Surface Water Locations

Location ID	Well Location	Coordinates (longitude/ latitude)	Surface Elevation (above mean sea level)
SW-1	On-site wetland	43.21649, -78.440418	488.00
SW-2	East Quarry	43.218325, -78.4401619	488.00
SW-3	West Quarry	43.2178076, -78.4407531	488.00

Deliverables for the surface water sampling program are specified in **Section 7.0 – Reporting Requirements**.

4.4.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in **Appendix K – Site Management Forms**. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in Attachment 1 (Standard Operating Procedures) of the Quality Assurance Project Plan (**Appendix J** of this document)

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

The Site is not located within the 100-year flood plain. The containment cell cover system including the soil cover on the top of the cover system is vulnerable to erosion at the Site depending on the intensity and severity of storm events. Erosion is also possible in the drainage area to Jeddo Creek where clean soil has been imported for the remedial action.

This section provides a current vulnerability assessment that evaluates the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding. This section also identifies vulnerability assessment updates that will be conducted for the site in Periodic Review Reports.

The Site will be inspected as necessary following severe weather events. Erosion and stormwater control measures will be inspected and repaired accordingly.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section provides an environmental footprint analysis of the remedy, as implemented at the time of this SMP. This section of the SMP also provides a summary of green remediation evaluations to be completed for the site during site management and reported in Periodic Review Reports (PRRs).

Waste generation, water usage, and emissions will be minimized to the extent possible during the groundwater sampling events and site inspections.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate, (e.g. during significant maintenance events or in conjunction with storm recovery activities).

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities after approval from the DER project manager. Reporting of these modifications will be presented in the PRR.

6.2.2 Building Operations

The former groundwater extraction treatment building will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption. During the decommissioning of the treatment system, the electrical service was removed from the site including the building. There are no existing utility connections.

6.2.3 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.3 Remedial System Optimization

A Remedial System Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

7.0 REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix K**. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of **Table 7** and summarized in the Periodic Review Report.

Table 6. Schedule of Interim Monitoring/Inspection Report

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

Task/Report	Reporting Frequency*
Groundwater Analytical Data Report	Annually (Q2)
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC

All interim

monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and

- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQUIS™ database in accordance with the requirements found at this link <http://www.dec.ny.gov/chemical/62440.html>.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in **Appendix A - Environmental Easement**. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
 - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
 - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
 - O&M data summary tables;
 - A current plume map for sites with remaining groundwater contamination; and
 - A groundwater elevation contour map for each gauging event.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by

the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: <http://www.dec.ny.gov/chemical/62440.html>.

- A site evaluation, which includes the following:
 - The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;
 - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
 - An update to the climate change vulnerability assessment if site or external conditions have changed since the previous assessment, and recommendations to address vulnerabilities.
 - A summary of the Green Remediation evaluation, including a quantitative and qualitative overview of a site's environmental impacts and recommendations to improve the remedy's environmental footprint. The PRR will include the completed Summary of Green Remediation Metrics form provided in **Appendix K**.
 - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document; and
 - The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"For each institutional or engineering control identified for the site, I certify that all of the following statements are true:

- The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;
- The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;
- Nothing has occurred that would impair the ability of the control to protect the public health and environment;
- Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;
- Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;
- If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;
- Use of the site is compliant with the environmental easement;
- The engineering control systems are performing as designed and are effective;
- To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program; and
- The information presented in this report is accurate and complete.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner’s/Remedial Party’s Designated Site Representative] [and I have been authorized and designated by all site owners/remedial parties to sign this certification] for the site.”

The signed certification will be included in the Periodic Review Report. The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

7.4 Remedial System Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in **Appendix L**. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager.

8.0 REFERENCES

- AMEC Geomatrix. 2011. Technical Impracticability Evaluation of Groundwater Restoration at the FMC Dublin Road Site. October.
- Bechtel Environmental, Inc. (BEI). 1988. Remedial Investigation Report for FMC Dublin Road Site.
- BEI. 1989. Remedial Investigation Supplement Report for the FMC Dublin Road Site.
- BEI. 1992. Feasibility Study Report for the FMC Dublin Road Site.
- Bechtel Associates Professional Corporation (New York) (BAPC NY). 1994. Final Design Report for the Remedial Design at the Dublin Road Site.
- BAPC NY. 1996. Installation, Testing and Evaluation of Extraction Wells and Monitoring Wells at the Dublin Road Site. November.
- BAPC NY, 1996. Operation and Maintenance Manuals for Dublin Road, 3 Volumes, Prepared for FMC Corporation, October.
- BAPC NY. 1997. Interim Remedial Action Report for the FMC Dublin Road Site. June.
- USEPA. 1993. FMC Dublin Road Site Record of Decision. Site Number 8-37-001. U.S. Environmental Protection Agency, Region 2, and New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation.
- USEPA. 1995. Close Out Procedures for National Priorities List Sites (Interim Final). EPN540/R- 95/062, OSWER Directive 9320.2-09, Office of Emergency and Remedial Response, Washington D. C.
- USEPA 1995. Explanation of Significant Differences (ESD) Regarding the Selected Remedy for FMC Corporation's Dublin Road Site (No. 837001) prepared by NYSDEC and USEPA (July 1995)
- USEPA. 1997. Superfund Preliminary Site Close Out Report; FMC Dublin Road Site; Towns of Shelby and Ridgeway, Orleans County, New York. U.S. Environmental Protection Agency, Region 2.
- NYCRR. 1993. 6NYCRR, Part 360, Solid Waste Management Facilities, Title 6 of the Official Compilation of New York Codes, Rules, and Regulations. New York State Department of Environmental Conservation, Division of Solid Waste, Albany, New York.
- 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.
- NYSDEC DER-10 – “Technical Guidance for Site Investigation and Remediation”.
- NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).
- Parsons. 2021. Decommissioning of the Groundwater Extraction and Treatment System Work Plan. October.
- Parsons. 2024. Decommissioning Report Dublin Road Site, April.

FIGURES

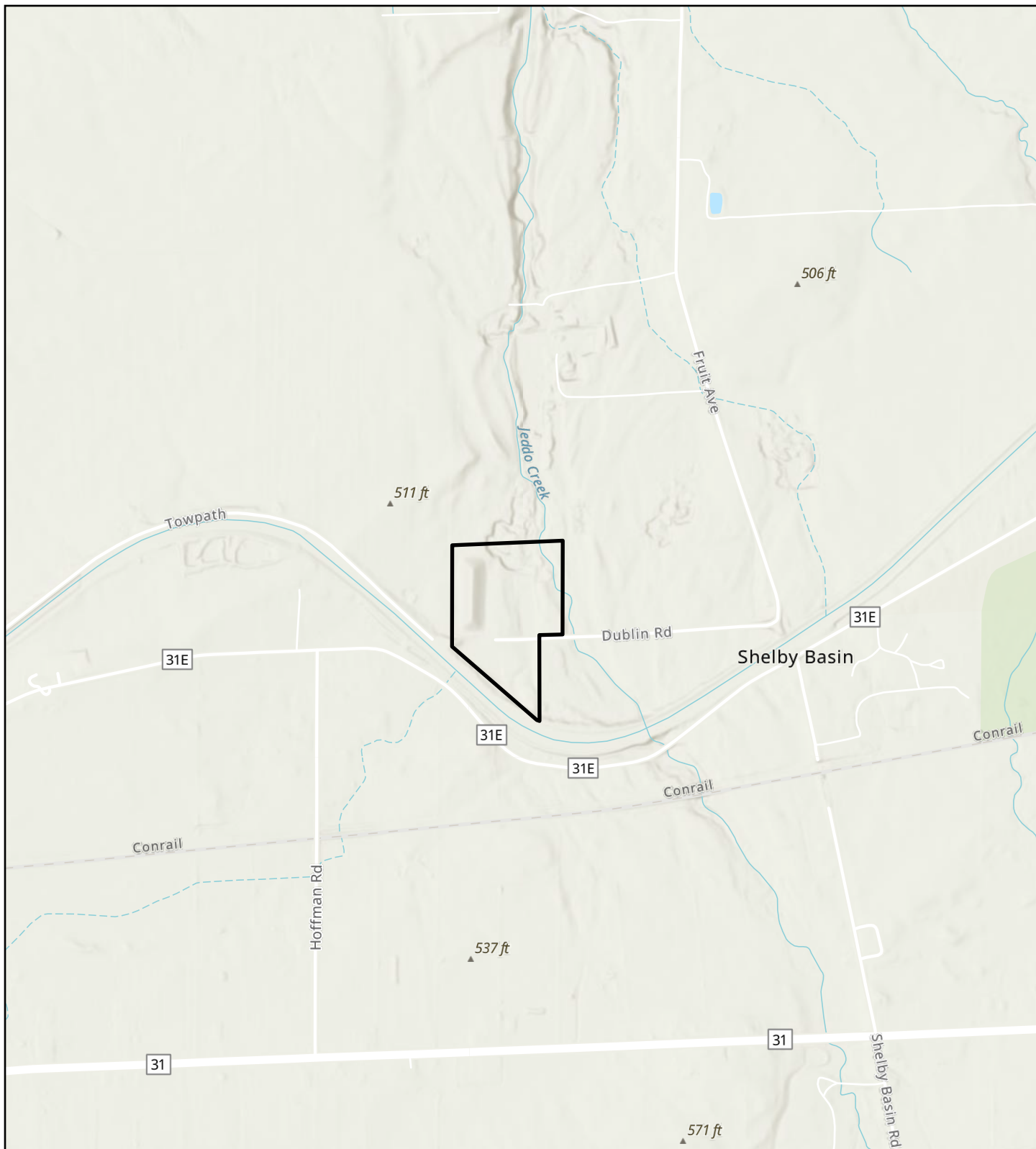


FIGURE 1

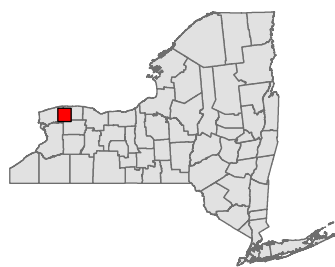
FMC DUBLIN ROAD SITE ORLEANS COUNTY, NEW YORK

SITE LOCATION MAP
10619 DUBLIN ROAD, MEDINA, NY

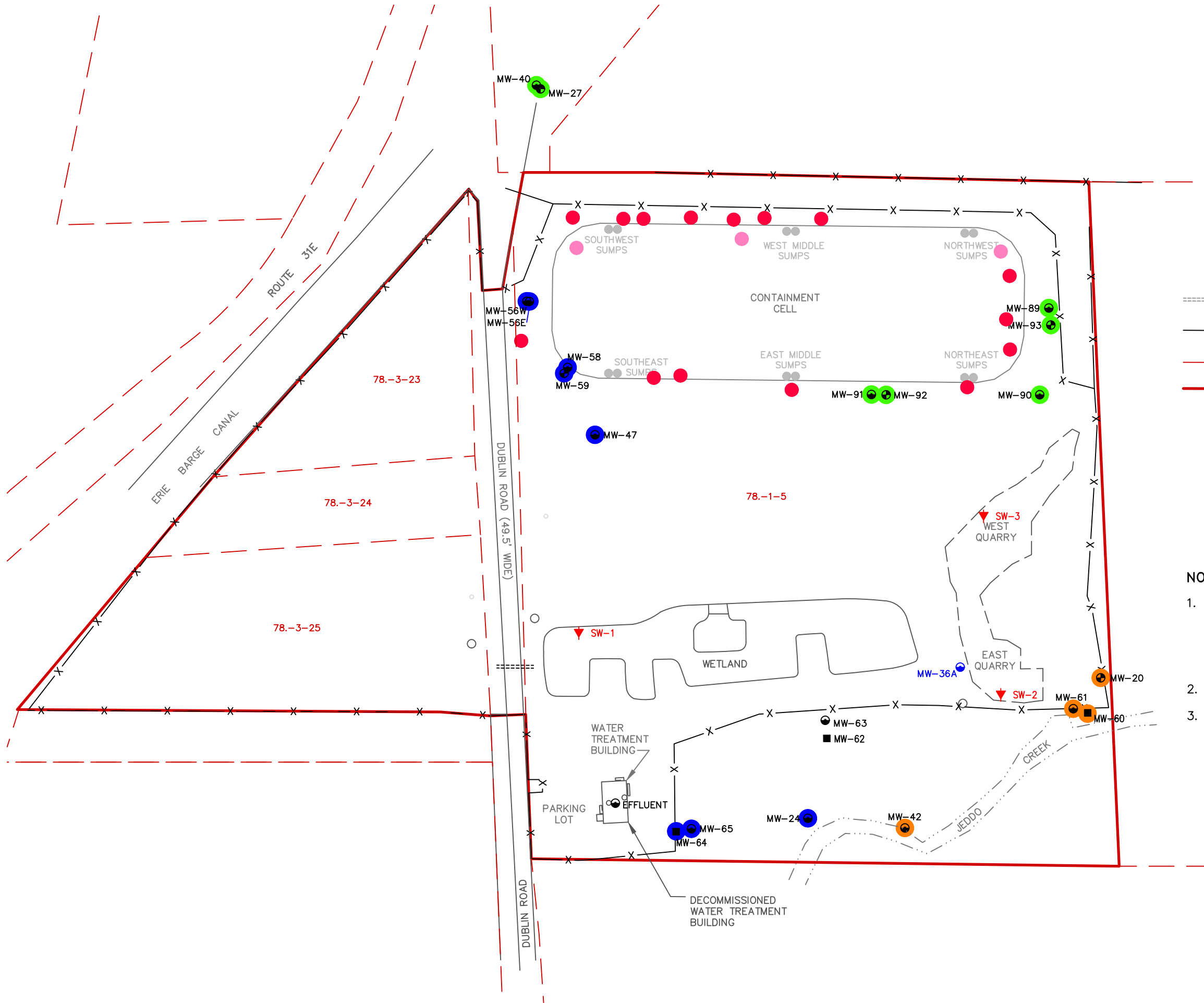
PARSONS

40 LA RIVIERE DRIVE, SUITE 122, BUFFALO NEW YORK 14202 | PHONE: 716-541-0730

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FILE NAME: S:\FMC PROGRAM\MIDDLEPORT\MID-DUBLIN RD FGS\SITE PLAN\FIGURE 2_SITE PLAN_10-2025.DWG
PLOT DATE: 10/14/2025 3:37 PM PLOTTED BY: LELAND, JASON [US-US]



LEGEND:

- SURFACE WATER SAMPLE LOCATION
- OVERBURDEN MONITORING WELL LOCATION
- UPPER BEDROCK MONITORING WELL LOCATION
- LOWER BEDROCK MONITORING WELL LOCATION
- LEACHATE COLLECTION SUMP LOCATION
- POWER POLE
- CULVERT
- FENCE
- PARCEL BOUNDARIES
- SITE BOUNDARY
- PERIMETER MONITORING WELLS
- CONTAINMENT MONITORING WELLS
- LEVEL MONITORING WELLS
- TOE DRAINS/CLEANOUTS (4-INCH PLASTIC DRAINAGE TILE)
- TOE DRAINS/CLEANOUTS (3-INCH SOLID HDPE)

NOTES:

1. BASE MAP PREPARED FROM ELECTRONIC CAD FILE FROM CLIENT MADE BY "CONESTOGA-ROVERS & ASSOCIATES", DRAWING I.D. 07452-10(027)GN-NF002, DATED APRIL 10, 2003, AT A SCALE OF 1"= 150'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. ONLY MONITORING AND EXTRACTION WELLS FROM FIGURE 3.1 OF THE O&M PLAN ARE SHOWN.

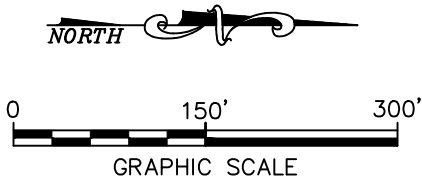


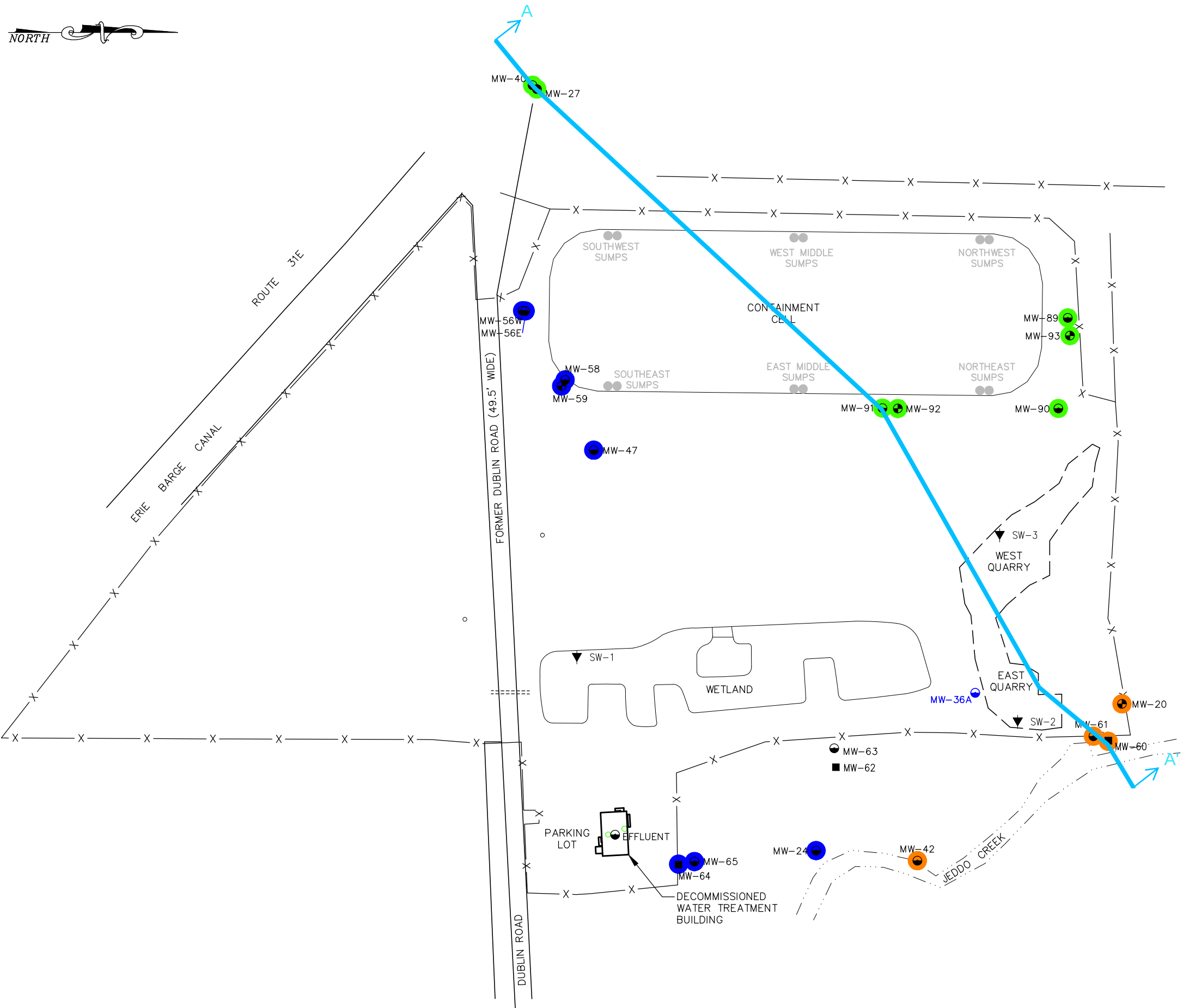
FIGURE 2

FMC DUBLIN ROAD SITE NIAGARA COUNTY, NEW YORK

SITE PLAN

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

FILE NAME: P:\FMC PROGRAM\MIDDLEPORT\MID-DUBLIN RD FIGS\SITE PLAN\FIGURE 1_SITE PLAN_04-2024.DWG
PLOT DATE: 4/26/2024 11:15 AM PLOTTED BY: RUSSO, JILL [US-US]



LEGEND:

- ▼ SURFACE WATER SAMPLE LOCATION
- ⊕ OVERBURDEN MONITORING WELL LOCATION
- ⊙ UPPER BEDROCK MONITORING WELL LOCATION
- LOWER BEDROCK MONITORING WELL LOCATION
- LEACHATE COLLECTION SUMP LOCATION
- ⊗ POWER POLE
- CULVERT
- PERIMETER MONITORING WELLS
- CONTAINMENT MONITORING WELLS
- LEVEL MONITORING WELLS

NOTES:

1. BASE MAP PREPARED FROM ELECTRONIC CAD FILE FROM CLIENT MADE BY "CONESTOGA-ROVERS & ASSOCIATES", DRAWING I.D. 07452-10(027)GN-NF002, DATED APRIL 10, 2003, AT A SCALE OF 1"= 150'.
2. ALL LOCATIONS ARE APPROXIMATE.
3. ONLY MONITORING AND EXTRACTION WELLS FROM FIGURE 3.1 OF THE O&M PLAN ARE SHOWN.
4. SITE IS WITHIN FENCE LINE.

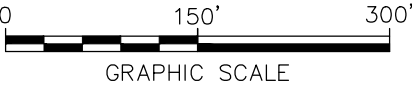


FIGURE 3

FMC DUBLIN ROAD SITE NIAGARA COUNTY, NEW YORK

GEOLOGIC CROSS SECTION PLAN

PARSONS

40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

FILE NAME: P:\FMC PROGRAM\MIDDLEPORT\MID-DUBLIN RD FIGS\SMP-2024\FIGURE 3_CROSS_SECTION_04-2024.DWG
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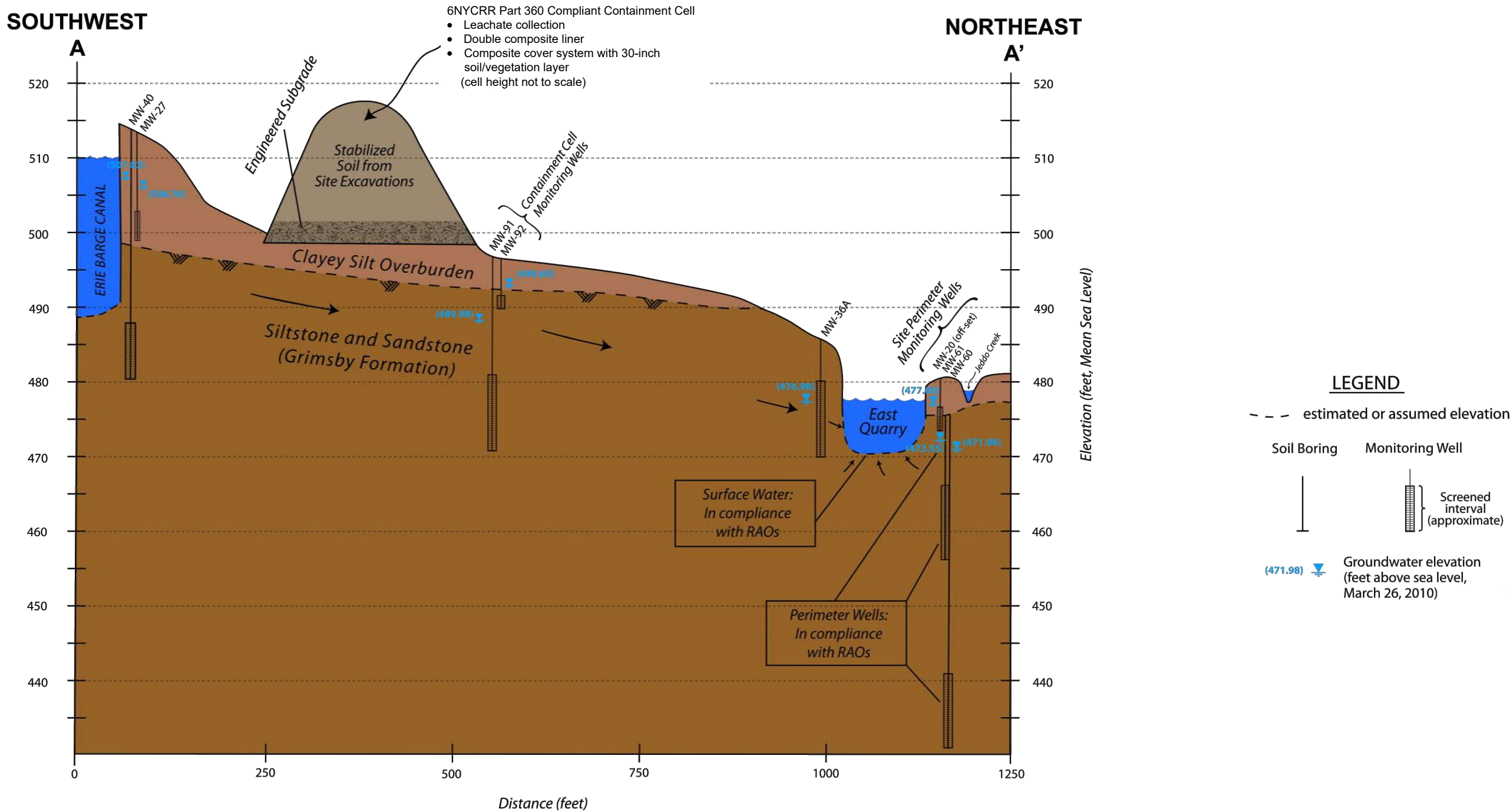


FIGURE 4

FMC DUBLIN ROAD SITE NIAGARA COUNTY, NEW YORK

CROSS SECTION A-A'

PARSONS

40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

APPENDIX A ENVIRONMENTAL EASEMENT/ NOTICE/DEED RESTRICTION

65249
65248

Orleans County
Karen Lake-Maynard County Clerk
3 South Main Street Courthouse Square
Albion NY 14411

Volm-850 Pg-4707

Instrument Number: 2015- 00085723

As

Recorded On: June 29, 2015

Easement

Parties: FMC CORPORATION

To

PEOPLE OF THE STATE OF NEW YORK

Billable Pages: 14

Recorded By: STEWART TITLE

Num Of Pages: 15

Comment: RID/SHE

**** Examined and Charged as Follows: ****

Easement	110.00	Coversheet	5.00	TP584 Affidavit	5.00
Recording Charge:	120.00				
	Amount	Consideration Amount	RS#/CS#		
Tax-Transfer	0.00	0.00	1073	Basic	0.00
RIDGEWAY				Local	0.00
				Additional	0.00
				Special Additional	0.00
				Transfer	0.00
Tax Charge:	0.00				

**** THIS PAGE IS PART OF THE INSTRUMENT ****

I hereby certify that the within and foregoing was recorded in the Clerk's Office For: Orleans County,

File Information:

Record and Return To:

Document Number: 2015- 00085723

STEWART TITLE

Receipt Number: 242402

Recorded Date/Time: June 29, 2015 10:41:12A

Book-Vol/Pg: Bk-D VI-850 Pg-4707

Cashier / Station: D Shampine / Cashier Station 2

Liber: 850 PG: 4707
Jun 29, 2015 10:41A
INST #: 00085723
ORLEANS COUNTY CLERK
Karen Lake-Maynard



Karen Lake-Maynard
Karen Lake-Maynard
Orleans County Clerk

**DECLARATION OF COVENANTS, RESTRICTIONS AND
ENVIRONMENTAL EASEMENT**

This Declaration of Covenants, Restrictions and Environmental Easement ("DCR & EE") is made this 12th day of June, 2015, by and between the FMC Corporation, a Delaware corporation, having an address of 1735 Market Street, Philadelphia, PA 19103 ("Grantor"), and the People of the State of New York, acting through their Commissioner of the New York State Department of Environmental Conservation ("NYSDEC") with its Central Office, located at 625 Broadway, Albany, New York 12233 ("Grantee").

WITNESSETH:

WHEREAS, Grantor is the owner of a parcel of land located in the Towns of Ridgeway and Shelby, County of Orleans, State of New York, more particularly described in Exhibit A, attached hereto and made a part hereof, together with any buildings and improvements thereon and appurtenances thereto (the "Property"); and

WHEREAS, the Property is part of the FMC Dublin Road Superfund Site ("Site") (EPA ID No.: NYD 00511857; NYSDEC Site No.: 8-37-001), the location of an industrial and solid waste landfill that the United States Environmental Protection Agency ("EPA"), pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9605, placed on the National Priorities List, as set forth in Appendix B of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300, by publication in the Federal Register in May of 1986; and

WHEREAS, in a Record of Decision dated March 1993 ("ROD"), as modified by an Explanation of Significant Differences ("ESD") dated July 1995, the NYSDEC selected, and the EPA concurred with, a response action for the Site, which was chosen in accordance with CERCLA and the New York State Environmental Conservation Law ("ECL"), and provided, in part, for the following actions:

- (i) excavation and stabilization of contaminated soils and sediments,
- (ii) construction of an on-Site containment cell,
- (iii) groundwater pumping and treatment,
- (iv) deposition of stabilized material in the containment cell,
- (v) wetlands reconstruction, and
- (vi) placement of deed restrictions on the Site property, in accordance with an EPA and NYSDEC-approved Site Management Plan ("SMP").

A copy of the SMP must be obtained by any party with an interest in the property. The SMP may be obtained from the New York State Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@gw.dec.state.ny.us; and

WHEREAS, the construction activities associated with the remedial action have been completed at the Site and long term monitoring activities are ongoing; and

WHEREAS, the parties hereto have agreed, pursuant to the terms of Administrative Order on Consent, Index No. B8-0013-84-01, dated February 9, 1988, as amended on January 16, 1992, ("Administrative Order"), that Grantor shall grant to the Grantee a permanent Declaration of Covenants, Restrictions and Environmental Easement, including but not limited to: a) providing a right of access over the Property to the Grantee for purposes of implementing, facilitating and monitoring the response action; and b) impose on the Property use restrictions that will run with the land for the purpose of protecting human health and the environment; and

WHEREAS, Grantor wishes to cooperate fully with the Grantee in the implementation of all response actions at the Site.

NOW, THEREFORE:

1. Grant: Grantor, on behalf of itself, its successors and assigns, for ten dollars and other good and valuable consideration, receipt whereof is hereby acknowledged, does hereby give, grant, covenant and declare in favor of the Grantee that the Property shall be subject to this DCR & EE, and Grantor does further give, grant and convey to the Grantee the perpetual right to enforce said restrictions, covenants, right of access and Environmental Easement, all of which shall be of the nature and character, and for the purposes hereinafter set forth, with respect to the Property.
2. Purpose: It is the purpose of this instrument to convey to the Grantee real property rights, which will run with the land, facilitate the remediation of past environmental contamination and to impose use restrictions and covenants to protect human health and the environment by reducing the risk of exposure to contaminants.
3. Restrictions : The following restrictions apply to the use of the Property, run with the land and are binding on the Grantor and its successors in title and assigns:

a. Groundwater underlying the Property shall not be extracted, consumed, exposed or utilized in any way, except as is necessary to comply with the Operations and Maintenance Plan for Remedial Activities at the FMC Dublin Road Site ("O&M Plan"), dated October 1996, the SMP, dated February 2014, and any subsequent revisions to those documents approved in writing by the NYSDEC and, if required, by the EPA, including sampling for the monitoring of contamination levels pursuant to the ROD, and/or treatment and discharge consistent with the ROD, as amended by the ESD, or unless sampling and analysis demonstrates to NYSDEC's satisfaction that the groundwater meets applicable groundwater quality standards.

b. There shall be no disturbance of the surface of the land on which the containment cell and associated structures are located, nor shall there be any activities undertaken which would

disturb, penetrate, pierce, or otherwise breach the integrity of the containment cell, except as is necessary to comply with the O&M Plan and the SMP.

c. There shall be no activities that would interfere with or adversely affect the maintenance or integrity or protectiveness of the containment cell and associated structures, the restored wetlands, the fencing around the Property, and the groundwater extraction and treatment system, except as is required to comply with the O&M Plan and the SMP. The remedy may be modified in the future, if necessary and in accordance with relevant guidance on post-ROD remedy changes, CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan.

4. Modification or termination of covenants, restrictions, and easement: The restrictions and easement specified in the preceding paragraph of this instrument may only be modified or terminated, in whole or in part, in writing, by the Grantee, provided, however, that any modification or termination of said restrictions shall not adversely affect the remedy selected by NYSDEC and EPA for the Site. If requested by the Grantor, such writing will be executed by Grantee in recordable form. Any request by Grantor for a modification or termination of this instrument shall be made in writing by Grantor to NYSDEC and to EPA in accordance with paragraph 15 of this instrument.
5. Right of access: Grantor hereby convey to Grantee a right of access to the Property at all reasonable times for the following purposes, which shall run with the land and be binding on Grantor, its successors and/or assigns, and on any tenants or any other parties having an interest in and/or rights to the Property:
 - a) Implementing the response actions in the ROD, as modified by the ESD;
 - b) Verifying any data or information relating to the Site;
 - c) Verifying that no action is being taken on the Property in violation of the terms of this instrument or of any federal or state environmental laws or regulations;
 - d) Conducting investigations under CERCLA or the ECL relating to contamination on or near the Site, including, without limitation, sampling of air, water, sediments, and/or soils; and
 - e) Implementing additional or new response actions under CERCLA or the ECL.
6. Reserved rights of Grantor: Grantor hereby reserves unto itself, its successors, and assigns, all rights and privileges in and to the use of the Property which are not incompatible with the restrictions, rights, covenants and easements granted herein.

-
7. Federal authority: Nothing in this document shall limit or otherwise affect EPA's rights of entry and access or EPA's authority to take response actions under CERCLA, the NCP, or other federal law.
 8. State authority: Nothing herein shall constitute a waiver of any rights the State may have pursuant to the ECL, regulations and/or relevant provisions of statutory or common law.
 9. No public access and use: No right of access or use by the general public to any portion of the Property is conveyed by this instrument.
 10. Public notice: Grantor, on behalf of itself, its successors and assigns, agrees to include in each instrument conveying any interest in any portion of the Property, including but not limited to deeds, leases and mortgages, a notice which is in substantially the following form:

NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO A DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT, DATED June 12, 2015, RECORDED IN THE ORLEANS COUNTY CLERK'S OFFICE ON June 29, 2015, IN BOOK 850, PAGE 4707, IN FAVOR OF, AND ENFORCEABLE BY, THE PEOPLE OF THE STATE OF NEW YORK AND BY THE UNITED STATES OF AMERICA AS THIRD-PARTY BENEFICIARY.

Within thirty (30) days of the date any such instrument of conveyance is executed, Grantor agrees to provide Grantee and EPA with a certified true copy of said instrument and, if it has been recorded in the public land records, its recording reference.

11. Enforcement: The Grantee shall be entitled to enforce the terms of this instrument by resort to specific performance. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA. Any forbearance, delay or omission to exercise Grantee's rights under this instrument in the event of a breach of any term of this instrument shall not be deemed to be a waiver by the Grantee of such term or of any of the rights of the Grantee under this instrument.
12. Damages: Grantee shall also be entitled to recover damages for breach of any covenant or violation of the terms of this instrument including any impairment to the remedial action that increases the cost of the selected response action for the Site as a result of such breach or violation.
13. Waiver of certain defenses: Grantor hereby waives any defense of laches, estoppel, or prescription.

-
14. Covenants: Grantor hereby covenants that the Grantor is lawfully seized in fee simple of the Property, that the Grantor has a good and lawful right and power to sell and convey it or any interest therein and that the Property is free and clear of encumbrances.
15. Notices: Any notice, demand, request, consent, approval, or communication under this instrument that either party desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Grantor:

Director, Environment
FMC Corporation
1735 Market Street
Philadelphia, PA 19103

General Counsel
FMC Corporation
1735 Market Street
Philadelphia, PA 19103

To Grantee:

Office of General Counsel
NYS Department of Environmental Conservation
625 Broadway
Albany, NY 12233-5500

NYS Department of Environmental Conservation
Division of Environmental Remediation
Site Control
625 Broadway
Albany, NY 12233

A copy of each such communication shall also be sent to EPA in the same manner as to Grantor or Grantee, and addressed to the following two addressees:

U.S. Environmental Protection Agency
Emergency & Remedial Response Division
Western New York Remediation Branch
Attention: FMC Dublin Road Superfund Site Remedial Project Manager
290 Broadway, 20th Floor
New York, NY 10007-1866

U.S. Environmental Protection Agency
Office of Regional Counsel
Attention: FMC Dublin Road Superfund Site Attorney
290 Broadway, 17th Floor
New York, NY 10007-1866

16. General provisions:

- a) Controlling law: The interpretation and performance of this instrument shall, with respect to the Declaration of Covenants, Restrictions, and Environmental Easement, be governed by the laws of the State of New York, and with respect to other matters, shall be governed by the laws of the United States or, if there are no applicable federal laws, by the law of the State of New York.
- b) Liberal construction: Any general rule of construction to the contrary notwithstanding, this instrument shall be liberally construed in favor of the grant to affect the purpose of this instrument and the policy and purpose of CERCLA. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.
- c) Severability: If any provision of this instrument, or the application of it to any person or circumstance, is found to be invalid, the remainder of the provisions of this instrument, or the application of such provisions to persons or circumstances other than those to which it is found to be invalid, as the case may be, shall not be affected thereby.
- d) No forfeiture: Nothing contained herein will result in a forfeiture or reversion of Grantors' title in any respect.
- e) Joint obligation: If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.
- f) Successors: The covenants, easements, terms, conditions, and restrictions of this instrument shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Property. The term "Grantor", wherever used herein, and any pronouns used in place thereof, shall include the persons and/or entities named at the beginning of this document, identified as "Grantor" and their personal representatives, heirs, successors, and assigns. The term "Grantee", wherever used herein, and any pronouns used in place thereof, shall mean the People of the State of New York acting through their Commissioner of NYSDEC or through any successor department or agency of the State of New York.
- g) Captions: The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.
- h) Counterparts: The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an

original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

i) Third-Party Beneficiary: Grantor and Grantee hereby agree that the United States, through EPA, shall be, on behalf of the public, a third-party beneficiary of the benefits, rights and obligations conveyed to Grantee in this instrument; provided that nothing in this instrument shall be construed to create any obligations on the part of EPA.

County: Orleans

Site No: NYD000511857
NYSDEC Site No.: 8-37-001

Order No: B8-0013-84-01, Feb. 9, 1988,
as amended on Jan. 16, 1992

TO HAVE AND TO HOLD unto the Grantee and its assigns forever.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Executed this 12th day of June, 2015.

GRANTOR: FMC Corporation

By:

Robert T. Forbes

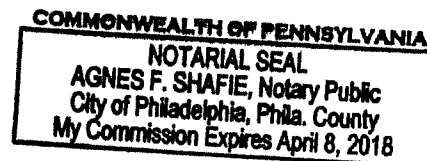
Title: Director, EHS Remediation/Governance

Grantor's Acknowledgment

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF PHILADELPHIA)

On the 12th day of June, in the year 2015, before me, the undersigned, personally appeared Robert T. Forbes, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity as Director, EHS Remediation/Governance of FMC Corporation, and that by his signature on the instrument, the Grantor FMC Corporation, upon behalf of which the individual acted, executed the instrument.


Notary Public - Commonwealth of
Pennsylvania



LIBER: 850 PAGE: 4715

THIS DECLARATION OF COVENANTS, RESTRICTIONS AND ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner.

By: 
Robert W. Schick, Director
Division of Environmental Remediation

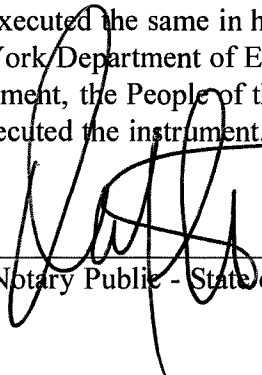
Date: June 17, 2015

Grantee's Acknowledgment

STATE OF NEW YORK)
)
COUNTY OF Albany) ss:

On the 17 day of June, in the year 2015, before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity as designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his signature on the instrument, the People of the State of New York, upon behalf of which the individual acted, executed the instrument.

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018


Notary Public - State of New York

Attachments: Exhibit A: **Description of Property**

Exhibit B: **Description of Portions of Property Where Development or Use
has been Restricted**

EXHIBIT A
Property Description
FMC Dublin Road Superfund Site

Legal Descriptions – Shelby Parcels

PARCEL A

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Shelby, County of Orleans and State of New York, being part of Lot No. 40, Township 14, Range 4 of the Holland Land Company's Survey, being a triangular piece of real property bounded as follows:

On the southwest by the northerly line of lands appropriated by the State of New York from Frank V. E. Bardol for purposes of the Barge Canal so-called, as said line is shown upon a map made a part of said appropriation proceeding and filed in the Office of the Clerk of the County of Orleans and which proceeding was duly recorded in the Office of the Clerk of Orleans County in Liber 148 of Deeds at page 159; on the north by the center line of the old State Road leading westerly from Shelby Basin along the northerly side of the Barge Canal which center line of the northerly line of Township 14 and Range 4; and on the east by the westerly line of lands conveyed to Ed Levenduski and wife by deed recorded in the Office of the Clerk of Orleans County in Liber 129 of Deeds at page 64; excepting so much of said premises as has been appropriated by the State of New York for purposes of the Barge Canal so-called.

PARCEL B

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Shelby, County of Orleans and State of New York, known as part of Lot No. 40 in the Fourteenth Township and Fourth Range of the Holland Land Company's land as surveyed by Joseph Ellicott, bounded and described as follows:

COMMENCING at a point in the center of the State Road at the northeast corner of land conveyed by Daniel Bidleman to Fanny Tibbits; from thence southerly bounding on said land, seven (7) chains, thirty-two (32) links to a post nineteen (19) feet from the inner slope of the towing path; from thence easterly one (1) chain, seventy-four (74) links, to a post nineteen (19) feet from the inner slope of the towing path; from thence northerly eight (8) chains and fifty-four (54) links to a post in the center of the State Road; from thence westerly one (1) chain, seventy-six and one-half (76 ½) links, to the place of beginning, containing one (1) acre, be the same more or less; excepting and reserving from the above described premises all that part thereof conveyed by Ed Levenduski and Anna Levenduski, his wife, to the State of New York by deed dated December 5, 1909, and recorded December 15, 1909, in Book 142 of Deeds at page 45 in the Orleans County Clerk's Office.

PARCELC

ALL THAT TRACT OR PARCEL OF LAND situate in the Town of Shelby, County of Orleans and State of New York, being a part of Lot No. 40, bounded on the east by lands owned by Mrs. John Moriarty; south by the Erie Canal; west by lands owned by John LeValley and wife to Patrick Ready; on the north to the center of the State Road, containing five (5) acres and forty-five hundredths (.45) of an acre, be the same more or less; excepting and reserving from the said premises all that part heretofore conveyed by Lawrence Hoffman and wife to the State of New York by deed dated September 29, 1909, and recorded in the Orleans County Clerk's Office September 29, 1909, in Book 139 of Deeds at page 584.

PARCEL D

ALL THAT TRACT OR PARCEL OF LAND, situate in the Town of Ridgeway, County of Orleans and State of New York, being part of Lot No. 29, Township 15, Range 4 of the Holland Land Company purchase described as follows:

BEGINNING at a point in the southerly line of said Lot No. 29, in the center line of the State Road 28 chains, 82 links (1902.12 feet) east of the southwest corner of said Lot No. 29, measured along the southerly line of said lot; running thence northerly on a line parallel to the west line of said Lot No. 29, 909.6 feet; thence easterly on a line parallel to the southerly line of said Lot No. 29, 1036.2 feet to the easterly boundary of land owned by Eugene J. Dye; thence southerly along said easterly boundary and parallel to the westerly line of said Lot No. 29, 909.6 feet to the southerly line of said Lot No. 29; thence westerly along the southerly line of said Lot No. 29, 1036.2 feet to the point of beginning, excepting from the above described premises about 2/10ths of an acre of land which has been appropriated by the State of New York for canal or highway purposes, leaving 21.4 acres of land hereby conveyed.

EXCEPTING lands appropriated by the State of New York in the following Libers: 139 of Deeds at Page 170; 139 of Deeds at Page 583; 139 of Deeds at Page 584; 142 of Deeds at Page 46; 148 of Deeds at Page 159; 148 of Deeds at Page 164; 150 of Deeds at Page 207 and 150 of Deeds at Page 212.

ALSO EXCEPTING any land lying south of the New York State Barge Canal.

EXHIBIT B
Property Description
Where Development or Use has been Restricted
FMC Dublin Road Superfund Site

Surveyors Description for Declaration of Covenants, Restrictions & Environmental Easement Area

ALL THAT TRACT OR PARCEL OF LAND, situate in the Town of Ridgeway and the Town of Shelby, County of Orleans and State of New York, being part of Lot 29 Township 15 Range 4 and Lot 40, Township 14 Range 4 of the Holland Land Company Purchase described as follows:

Commencing at a point in the southerly line of Lot 29, in the center line of the State Road (Dublin Road) 28 chains 82 links (1902.12 feet from the south west corner of Lot 29, measured along the south line of said Lot;

Thence northerly on a line parallel with the west line of Lot 29 a distance of 70.16 to the northwest corner of lands appropriated by the State of New York from Frank V. Bardol, Parcel 1602-A-1 Liber 148, Page 159, said point being the POINT OR PLACE OF BEGINNING;

Thence along a line parallel with the west line of Lot 29 N 1°07'54" E a distance of 840.14 feet to the north west corner of lands conveyed to Niagara Sprayer & Chemical Co. Liber 205, Page 588;

Thence along the north line of Niagara Sprayer & Chemical Co. and parallel to the south line of Lot 29, N 86°56'41" E a distance of 1036.33 feet to a point on the easterly line formerly of Eugene J. Dye;

Thence along the easterly line of Eugene Dye and parallel to the west line of Lot 29 S 1°07'54" W a distance of 909.60 feet to a point on the south line of Lot 29 and the center line of State Road (Dublin Road), said line also being the north line of Lot 40, Township 14, Range 4;

Thence along the south line of Lot 29, Township 15, Range 4 and the north line of Lot 40, Township 14, Range 4 and the center line of State Road (Dublin Road) S 87°03'34" W a distance of 219.38 feet to the west line of lands conveyed to the Village of Middleport Liber 180, Page 318;

Thence along the west line of lands conveyed to the Village of Middleport S 0°18'51" W a distance of 722.14 feet to the north line of lands appropriated by the State of New York from Lawrence Hoffman, Parcel 1601, Liber 139, Page 584;

Thence along the north line of appropriated lands N 52°00'31" W a distance of 427.02 feet to the northwest corner of appropriated lands Parcel 1601, said point also being the north east corner of lands appropriated by the State of New York from Ed & Anna Levenduski, Parcel 1416, Liber 142, Page 45;

Thence along the north line of appropriated Parcel 1416, N 47°47'30" W a distance of 114.82 feet to the north west corner of appropriated Parcel 146, said point also being the north east corner of lands appropriated by the state of New York From Frank V. Bardol, Parcel 1602-A-2, Liber 148, Page 159;

Thence along the north line of appropriated Parcel 1602-A-2 N 47°59'31" W a distance of 485.83 feet to the North West corner of appropriated Parcel 1602-A-2;

Thence N 47°50'01" E a distance of 22.80 feet to a point on the south line of Lot 29, the center line of State Road (Dublin Road) the north line of Lot 40, Township 14, Range 4 and the south line of lands appropriated by the State of New York From Frank V. Bardol, Parcel 1602-A-1, Liber 148, Page 159;

Thence along the south line of Lot 29, the center line of State Road (Dublin Road), and the north line of Lot 40, Township 14, Range 4 and the south line of appropriated parcel 1602-A-1 N 87°09'59" E a distance of 127.78 feet to the south east corner of appropriated parcel 1602-A-1;

Thence along the east line of appropriated Parcel 1602-A-1 N 0°50'03" E a distance of 28.64 feet to the north east corner of appropriated Parcel 1602-A-1;

Thence along the north line of appropriated Parcel 1602-A-1 N 79°26'26" W a distance of 175.77 feet and the POINT OR PLACE OF BEGINNING.

The above described parcel contains ± 28.234 acres (1229863.259 sq. ft.)

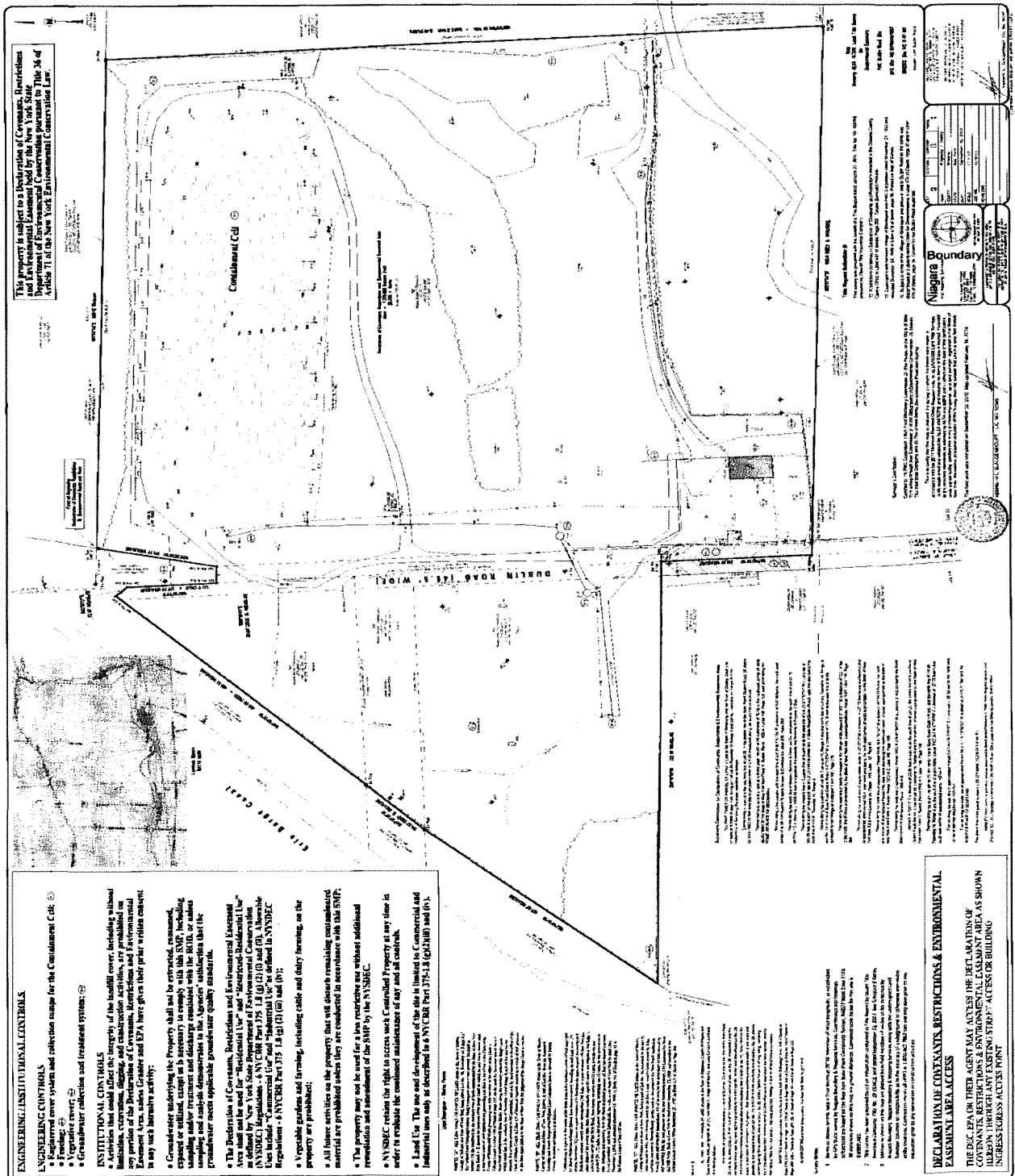
Being the same piece or parcel of land as described in Deed dated February 4, 1946 from Niagara Sprayer and Chemical Co., Inc., recorded on November 29, 1947 in Book 224 at page 4 in the Orleans County Clerk's Office.

County: Orleans

Site No: NYD000511857
NYSDEC Site No.: 8-37-001

Order No: B8-0013-84-01, Feb. 9, 1988,
as amended on Jan. 16, 1992

(See attached As-Built Survey of Property depicting restricted-use areas)



APPENDIX B LIST OF SITE CONTACTS

APPENDIX B

Dublin Road Site List of Contacts Revised October 2025

All incidents occurring on the project site shall be reported. All injuries, spills, and property damage should be reported immediately. Additionally, Notices of Violation and any incident that could be reported in the media should be reported immediately. Reporting must be done to a person and not via voice message, email or fax. One must ensure contact is made. If you unable to contact the first contact on the list, then you should attempt to call the next person on the list.

Company	Position	Name	Phone	Email
FMC	Remediation Project Manager	Chris Moretti	215.299.6252	christina.moretti@fmc.com
	Remediation Manager	Jonathan Bucca	215.299.6358	jonathan.bucca@fmc.com
Parsons	Program Manager	Heather Philip	315.418.0048	heather.philip@parsons.com
	Project Manager	Jeffrey Poulsen	716.432.7685	jeffrey.poulsen@parsons.com
	Health and Safety Lead	Diana Ceaser	908.619.0220	diana.ceaser@parsons.com
Regulators	NYSDEC Spill Line		800.457.7362	
	NYSDEC Project Manager	Mackenzie Rees	585.226.5409	mackenzie.rees@dec.ny.gov
	NYSDEC Hazardous Waste Remediation Supervisor	David Pratt	585.226.5449	david.pratt@dec.ny.gov
	NYSDEC Site Control	Kelly Lewandowski	585.226.5459	kelly.lewandowski@dec.ny.gov
	NYSDOH Project Manager	Kristen Kulow	607.33.4335	kristen.kulow@health.ny.gov
	NYSDOH Chief Region 8	Justin Deming	212.637.4253	justin.deming@health.ny.gov
	USEPA Project Manager	Elizabeth McConnell	518.402.7860	mcconnell.elizabeth@epa.gov

Other Emergency
Contacts
Emergency Services

911

APPENDIX C MONITORING WELL BORING AND CONSTRUCTION LOGS

DUBLIN ROAD
MONITORING WELL AND SAMPLING LOCATIONS
UPDATED APRIL 2024

Location ID	Location Type	Top of Casing Elevation	Ground Elevation	Latitude (Decimal)	Longitude (Decimal)	Notes
MW-20	monitoring well	481.61	471.61	43.218564	-78.440133	Perimeter Well
MW-24	monitoring well	485.54				
MW-27	monitoring well	517.56	507.36	43.21633	-78.443639	Containment Cell Well
MW-35	monitoring well	493.06				
MW-36A	monitoring well	488.01				
MW-40	monitoring well	518.4	508.40	43.216333	-78.443694	Containment Cell Well
MW-42	monitoring well	482.95	472.95	43.218628	-78.439389	Perimeter Well
MW-43	monitoring well	502.11				
MW-47	monitoring well	503.61				
MW-50	monitoring well	496.06				
MW-56E	monitoring well	503.34				
MW-56W	monitoring well	504.98				
MW-58	monitoring well	506.34				
MW-59	monitoring well	506.61				
MW-60	monitoring well	480.92	470.92	43.218508	-78.439828	Perimeter Well
MW-61	monitoring well	480.40	470.40	43.218358	-78.43942	Perimeter Well
MW-62	monitoring well	494.27				
MW-63	monitoring well	492.10				
MW-64	monitoring well	494.39				
MW-65	monitoring well	494.38				
MW-89	monitoring well	500.65	473.85	43.218522	-78.442233	Containment Cell Well
MW-90	monitoring well	499.51	473.31	43.218417	-78.44175	
MW-91	monitoring well	499.45	474.50	43.217931	-78.441811	Containment Cell Well
MW-92	monitoring well	499.29	494.10	43.218089	-78.441785	Containment Cell Well
MW-93	monitoring well	500.67	492.10	43.218472	-78.4425	Containment Cell Well
SW-1	surface water	NA	488.00	43.21649	-78.440418	Wetland/Pond
SW-2	surface water	NA	488.00	43.218325	-78.4401619	East Quarry
SW-3	surface water	NA	488.00	43.2178076	-78.4407531	West Quarry



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	ROLE NO.		
				FMC Dublin Road RA		19714	1 OF 1	89		
SITE		COORDINATES				ANGLE FROM HORIZ		BEARING		
Containment Cell Perimeter		N 1,172,706.11 E 537,611.39				Vertical		-----		
BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL		SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH		
9-18-95	9-26-95	Buffalo Drilling	CME-45		6"	8.0	20.0	28.1		
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK		
17.8/89		2	2	500.65	497.6	9.3/488.3		4.0/493.4		
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH		LOGGED BY:						
140 lb./30 in.		2"/28.0'		L. Young						
SAMP. TYPE AND DIAM.	SAMP. ADV. LEN. CORE	SAMP. REC. CORE REC.	SAMPLE "N" BLOMS "N" CORE RECOVERY	LOSS IN G.P.M.	WATER PRESSURE TESTS P.S.I. TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.1	3-5-9-13			497.6			0 to 4.0 ft CLAYEY SILT: moderate brown (5YR4/4), moist, low plasticity, stiff, trace fine sandstone gravel.	Drilled to auger refusal at 8.0 ft using 7-5/8 in. O.D. hollow stem augers. Reamed hole with 7-7/8 in. tricone roller bit and 11-5/8 in. O.D. hollow stem augers and set 6 in. PVC surface casing to 8.5 ft.
SS	0.1	0.1	100/3"			493.6	5		4.0 to 8.5 ft WEATHERED SILTSTONE AND SANDSTONE: dark reddish brown (10R3/4), weathered and fractured, with thin clayey silt layers.	
NX	10.0	8.8	88%			489.1	10		8.5 to 11.4 ft INTERBEDDED SILTSTONE AND SANDSTONE: color banded dusky red (5R3/4) and medium light gray (N6), slightly weathered to fresh, sandstone is hard, fine-grained, and subrounded, siltstone is medium-soft, fractured.	8.8 to 28.1 ft coring with NX diamond core bit and recirculating water. Run #1
						486.2			8.8 to 10.1 ft vertical fracture, healed, smooth planar, iron oxide filling.	8.8 to 18.8 ft RQD = 64% AP = 0.4 ft LP = 1.5 ft
									9.4 to 9.6 ft bivalve shell fragments.	
									10.1 ft horizontal fracture, healed, smooth planar.	
									10.4 to 10.5 ft abrupt color change to brownish gray (5YR4/1), zone appears brecciated.	
									10.5 to 10.8 ft vertical fracture, open, smooth planar, iron oxide stained.	
									11.4 ft medium gray (N5) shale layer	
NX	9.3	9.0	97%						11.4 to 22.7 ft SANDSTONE: dusky red (5R3/4) with medium light gray (N6) mottling, hard, fresh, fine-grained, subrounded, thin medium light gray (N6) shale partings, zones of cross-bedding, fractured.	Run #2
									13.7 to 14.0 ft vertical fracture, open, smooth planar, iron oxide stained.	18.8 to 28.1 ft RQD = 91% AP = 1.0 ft LP = 1.4 ft
									14.3 ft fracture oriented 45 deg. relative to core axis, silt filled, smooth planar.	
									15.2 to 15.7 ft vertical fracture, healed, smooth planar.	
						474.9			20.0 to 22.6 ft cross-bedded zone.	
									20.7 ft horizontal fracture, open, smooth planar, clay and iron stained, with silt filling.	
									22.7 to 28.1 ft SILTSTONE: very dark red (6R2/6) with thin medium gray (N5) shale layers, medium-soft, fresh, horizontal bedding.	
									25.0 to 26.0 ft dark reddish brown (10R3/4) fine-grained sandstone with thin medium gray (N5) shale interbeds. Top 0.1 ft of layer exhibits disturbed bedding.	
						469.5			Bottom of boring at 28.1 ft. Reamed hole and installed 2 in. PVC monitoring well screened from 17.0 to 28.0 ft.	Reamed hole with 5-3/4 in. tricone roller bit to 28.0 ft. Color descriptions from the GSA Rock-Color chart. AP = Average core Piece and LP = Longest core Piece.
SS = SPLIT SPOON; ST = SHELBY TUBE; O = DENNISON; P = PITCHER; O = OTHER						SITE			HOLE NO.	
Containment Cell Perimeter									89	



MONITORING WELL

FMC Dublin Road RA

89

JOB NO.

SITE

COORDINATES

19714

Containment Cell Perimeter

N 1,172,706.1 E 537,611.4

BEGUN

COMPLETED

PREPARED BY

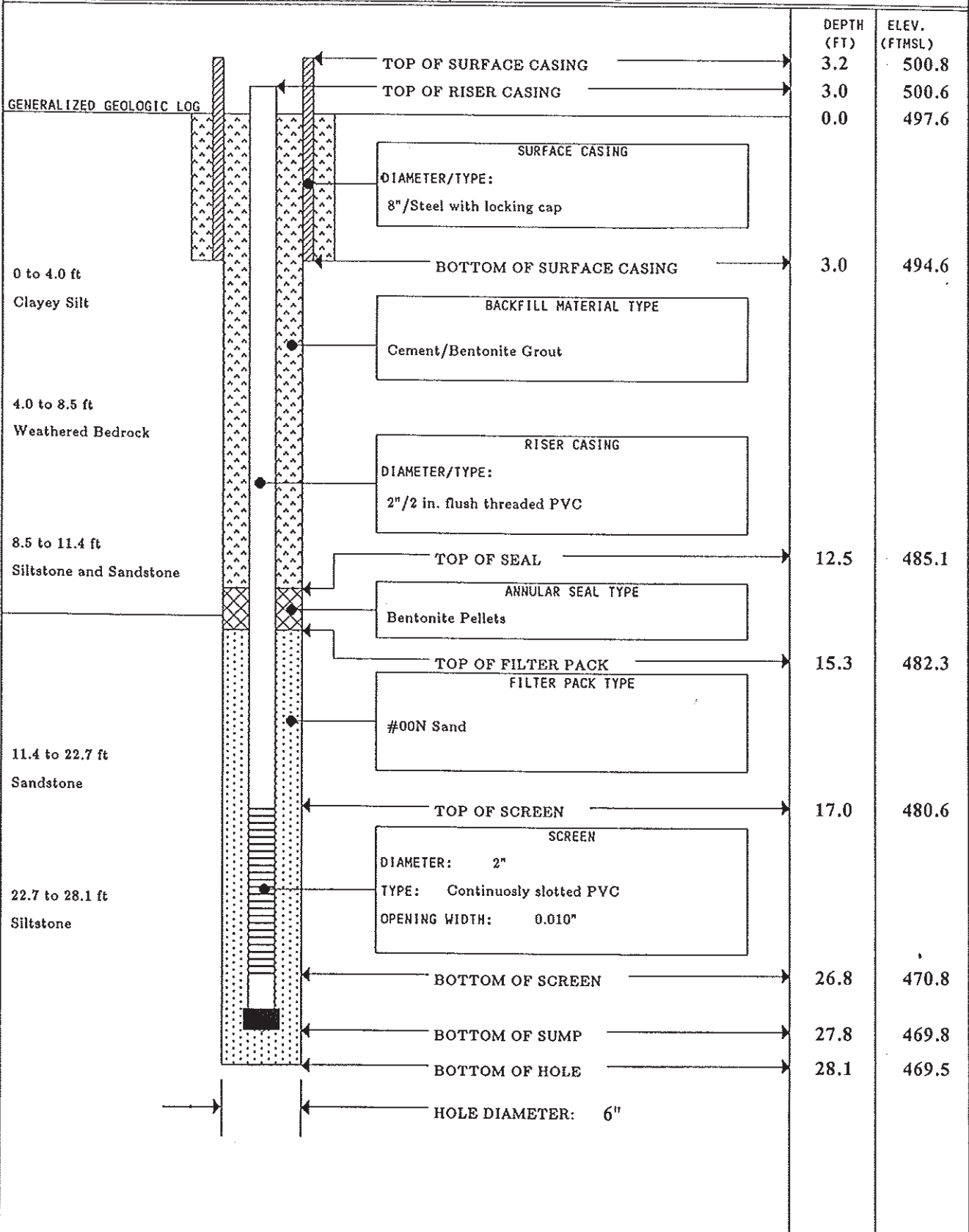
REFERENCE POINT FOR MEASUREMENTS

9/26/95

9/26/95

L. Young

Top of PVC casing





GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.		
SITE				COORDINATES		ANGLE FROM HORIZ		BEARING		
Containment Cell Perimeter				N 1,172,688.82 E 537,742.99		Vertical		-----		
BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL		SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH		
9-19-95	9-27-95	Buffalo Drilling	CME-45		6"	7.5	19.7	27.6		
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK		
19.4/98		2	2	499.51	496.7	9.7/487.0 10/4/95		7.5/489.2		
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH		LOGGED BY:						
140 lb./30 in.		2"/27.2'		L. Young						
SAMP. TYPE AND DIAM.	SAMP. ADV. LEN. CORE	SAMP. REC. CORE REC.	SAMPLE "N" CORE RECOVERY	LOSS IN G.P.M.	WATER PRESSURE TESTS	ELEV.	DEPTH	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.0	3-6-16-26			496.7			0 to 7.5 ft SILT: moderate yellowish brown (10YR5/4) to dusky red (5R3/4), dry to wet, stiff to hard, nonplastic, trace to some fine sandstone gravel.	Drilled to auger refusal at 7.5 ft using 7-5/8 in. O.D. hollow stem augers. Reamed hole with 11-5/8 in. O.D. hollow stem augers and set 6 in. PVC surface casing and grouted in to 7.5 ft.
SS	2.0	1.1	130-25-34-14				5		4.0 ft wet.	
NX	10.0	9.6	96%			489.2			7.5 to 11.3 ft INTERBEDDED SILTSTONE AND SANDSTONE: dusky red (5R3/4) and light gray (N7) mottled, slightly weathered to fresh, fractured, thin medium gray (N5) shale layers, sandstone is hard, fine-grained, subrounded, siltstone is medium-soft. 7.6 to 7.7 ft bedding disturbance. 7.6 to 9.3 bivalve shell fragments. 9.3 to 9.8 ft vertical fracture, open, smooth planar, iron stained. 9.3 to 10.0 ft light gray (N7) fine-grained sandstone. 10.4 to 10.7 ft vertical fracture, silt filling, smooth planar. 11.0 to 11.3 ft vertical fracture, healed, smooth planar.	7.6 to 27.6 ft coring with NX diamond core bit and recirculating water. Run #1 7.6 to 17.6 ft RQD = 78% AP = 0.84 ft LP = 1.95 ft
						485.4	10			
NX	10.0	9.8	98%				15		11.3 to 22.0 ft SANDSTONE: mottled dusky red (5R3/4) and light gray (N7), fresh, hard, fractured, fine-grained, subrounded, with thin medium gray (N5) to black (N1) shale partings. 11.4 to 12.4 ft cross-bedding. 15.6 to 17.6 ft cross-bedding.	Run #2 17.6 to 27.6 ft RQD = 97% AP = 0.45 ft LP = 2.0 ft
							20		19.6 to 20.6 ft vertical fracture, healed, smooth planar.	
						474.7			22.0 ft medium gray (N5) shale layer. 22.0 to 27.6 ft SILTSTONE: very dark red (5R2/6), fresh, medium-soft, thin medium gray (N5) shale and very light gray (N8) fine-grained sandstone layers, horizontal bedding. 24.3 to 25.3 ft very light gray (N8) to dusky red (5R3/4) fine-grained sandstone.	
							25			
						469.1			27.0 to 27.2 ft very light gray (N8) fine-grained sandstone.	Reamed hole with 5-3/4 in. tricone roller bit to 27.2 ft. Color descriptions from the GSA Rock-Color chart. AP = Average core Piece and LP = Longest core Piece.
									Bottom of boring at 27.6 ft. Reamed hole and installed 2 in. PVC monitoring well screened from 16.2 to 26.2 ft.	
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE						HOLE NO.				
O = DENNISON; P = PITCHER; O = OTHER						90				

Containment Cell Perimeter



MONITORING WELL

FMC Dublin Road RA

90

JOB NO.

SITE

COORDINATES

19714

Containment Cell Perimeter

N 1,172,688.8 E 537,743.0

BEGUN

COMPLETED

PREPARED BY

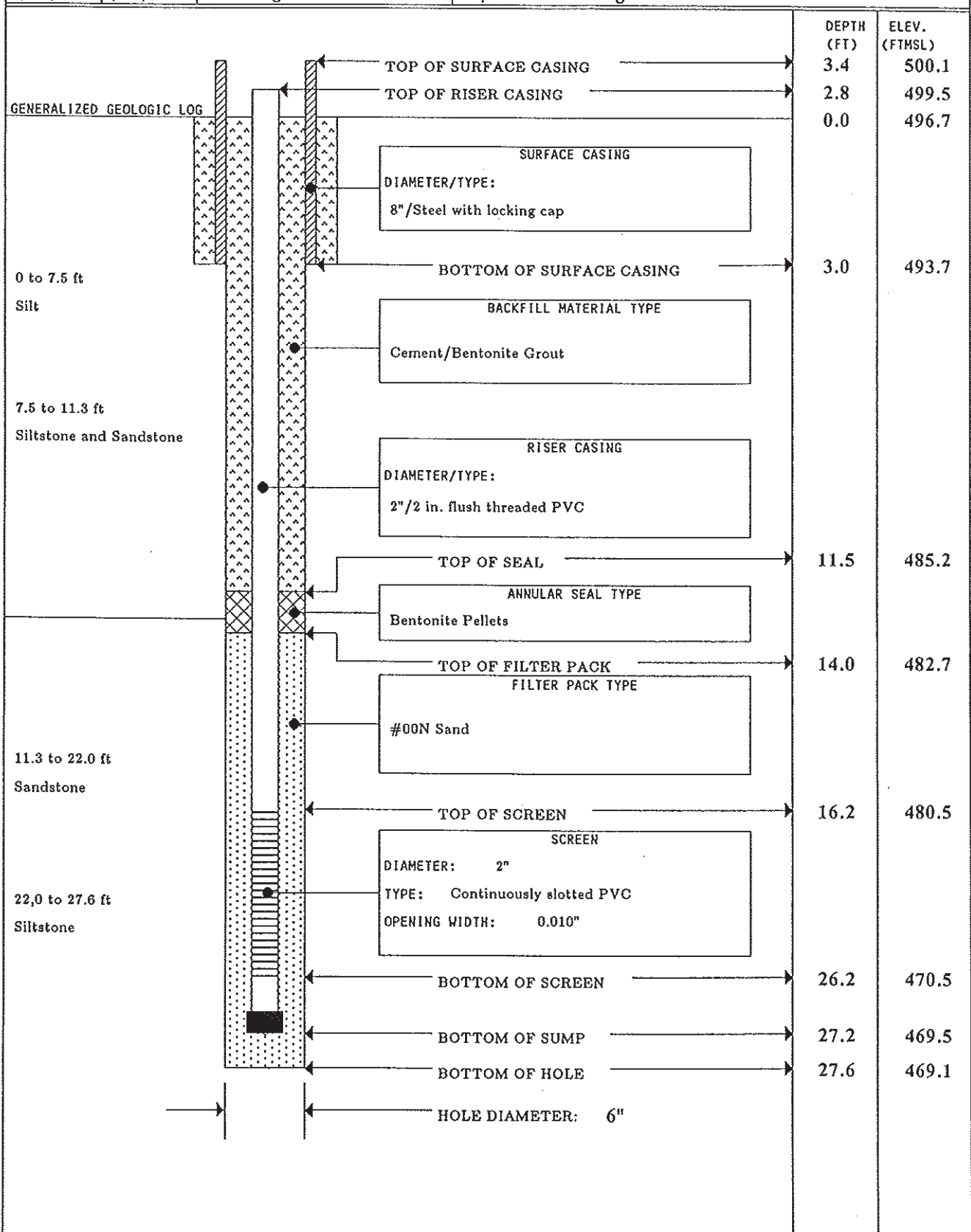
REFERENCE POINT FOR MEASUREMENTS

9/27/95

9/27/95

L. Young

Top of PVC casing





GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.		
SITE				FMC Dublin Road RA		19714	1 OF 1	91		
Containment Cell Perimeter				COORDINATES		ANGLE FROM HORIZ		BEARING		
				N 1,172,457.73 E 537,739.95		Vertical		-----		
BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH			
9-28-95	10-2-95	Buffalo Drilling	CME-45	6"	5.0	21.4	26.4			
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK		
19.1/89		2	2	499.45	496.4	8.0/488.4 10/4/95		3.0/493.4		
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH		LOGGED BY:						
140 lb./30 in.		2"/26.0'		L. Young						
SAMP. TYPE AND DIAM.	SAMP. ADV. LEN CORE	SAMPLE REC. CORE REC.	SAMPLE BL. IN. % CORE RECOVERY	LOSS IN G.P.M.	WATER PRESSURE TESTS	ELEV.	DEPTH	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
SS	2.0	1.1	5-26-16-17			496.4			0 to 3.0 ft SILT: moderate yellowish brown (10YR5/4), moist, hard, nonplastic, trace cobbles and fine sandstone gravel.	Drilled to auger refusal at 5.0 ft using 7-5/8 in. O.D. hollow stem augers. Reamed hole with 11-5/8 in. O.D. hollow stem augers and set 6 in. PVC surface casing and grouted in to 5.0 ft.
SS	0.0	0.0	100/0.25			493.4	5		3.0 to 5.8 ft WEATHERED SANDSTONE AND SILTSTONE: dark reddish brown (10R3/4), weathered and fractured, thin clayey silt layers.	5.8 to 26.4 ft coring with NX diamond core bit and recirculating water.
NX	3.8	3.2	84%			490.6	10		5.8 to 14.8 ft INTERBEDDED SILTSTONE AND SANDSTONE: mottled very dark red (5R2/6) and very light gray (N8), fresh, sandstone is hard, fine-grained, subrounded, siltstone is medium-soft, with thin medium gray (N6) shale layers.	Run #1
NX	8.2	7.7	94%			481.6	15		6.8 to 6.3 ft conglomerate composed of sandstone with black (N1) to dark gray (N3) siltstone and shale subrounded clasts.	5.8 to 9.6 ft
							20		6.8 to 5.9 ft vuggy zone.	RQD = 25%
									6.8 to 6.9 ft bivalve shell fragments.	AP = 0.2 ft
									7.2 to 7.4 ft fracture oriented 45 deg. relative to core axis, silt filling, smooth planar.	LP = 0.4 ft
									7.6 to 8.7 ft horizontal fractures, open, smooth planar, average spacing is 0.2 ft.	Run #2
									9.6 to 9.9 ft bivalve shell fragments.	9.6 to 17.8 ft
									12.2 to 12.4 ft disturbed bedding.	RQD = 87%
NX	8.6	8.2	95%			472.4	25		14.8 to 24.0 ft SANDSTONE: mottled very light gray (N8) and dusky red (5R3/4), fresh, hard, fine-grained, subrounded, fractured, cross-bedded zones, thin medium gray (N5) shale partings.	AP = 0.6 ft
									14.8 to 16.8 ft vertical fracture, healed, smooth planar.	LP = 1.45 ft
									17.8 to 19.4 ft cross-bedded zone.	Run #3
									17.8 to 19.0 ft fracture oriented 45 deg. relative to core axis, healed, smooth planar.	17.8 to 26.4 ft
									19.1 to 19.6 ft vertical fracture, healed, smooth planar.	RQD = 94%
									20.7 ft horizontal fracture, healed, smooth planar.	AP = 0.8 ft
									22.2 to 24 ft fracture oriented 10 deg. relative to core axis, healed, smooth planar.	LP = 3.0 ft
						470.0			24.0 to 26.4 ft SILTSTONE: very dark red (5R2/6), fresh, medium-soft, horizontal bedding, with medium gray (N5) shale and dusky red (5R3/4) fine-grained sandstone layers.	Reamed hole with 5-3/4 in. tricone roller bit to 26.4 ft.
									24.4 to 24.6 ft dusky red (5R3/4) fine-grained sandstone.	Color descriptions from the GSA Rock-Color chart.
									25.8 to 26.4 ft dusky red (5R3/4) fine-grained sandstone.	AP = Average core Piece and LP = Longest core Piece.
									Bottom of boring at 26.4 ft. Reamed hole and installed 2 in. PVC monitoring well screened from 15.0 to 25.0 ft.	
SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER				SITE				HOLE NO.		
				Containment Cell Perimeter				91		



MONITORING WELL

FMC Dublin Road RA

91

JOB NO.

SITE

COORDINATES

19714

Containment Cell Perimeter

N 1,172,457.7 E 537,740.0

BEGUN

COMPLETED

PREPARED BY

REFERENCE POINT FOR MEASUREMENTS

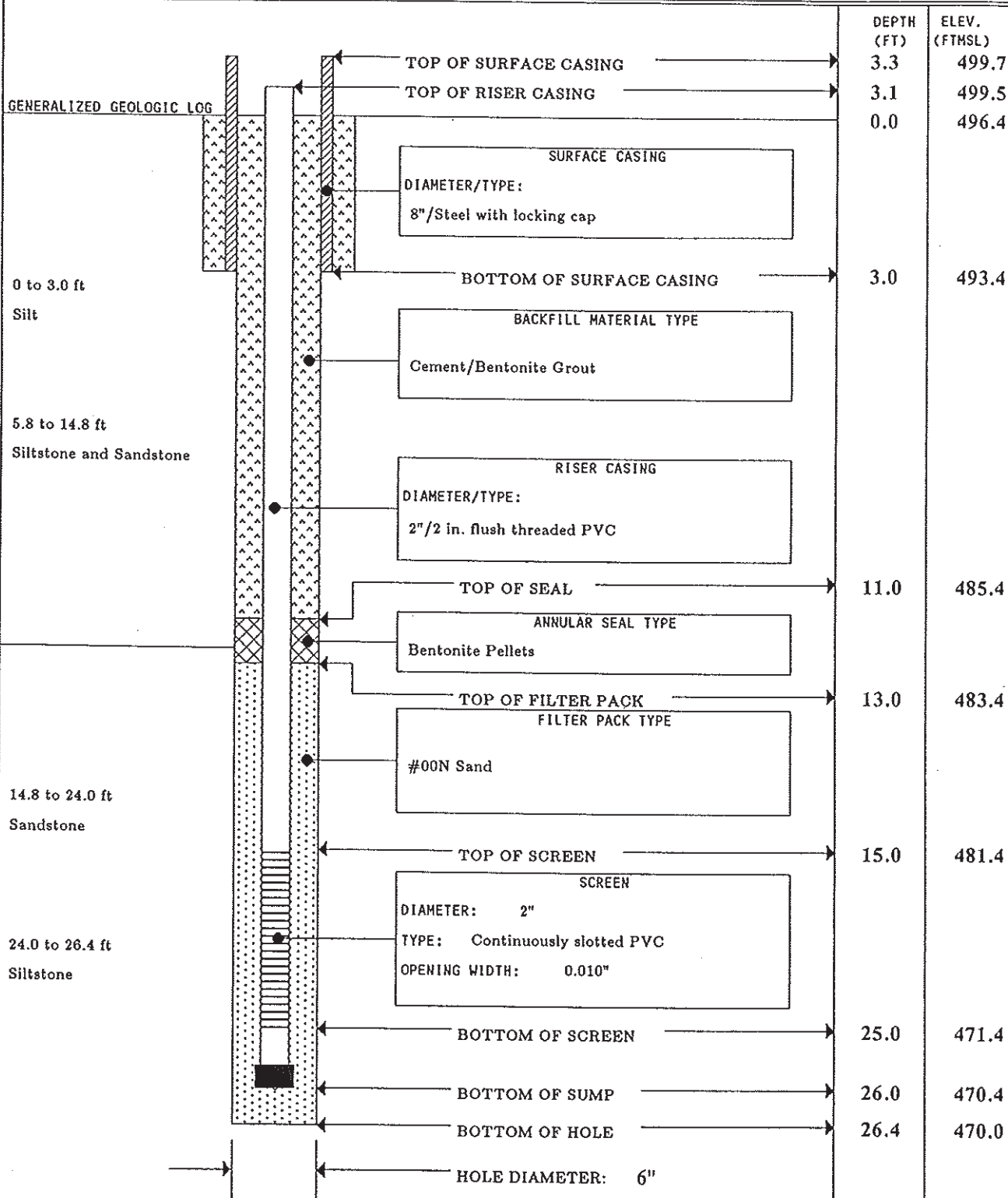
10/2/95

10/2/95

L. Young

Top of PVC casing

GENERALIZED GEOLOGIC LOG





MONITORING WELL

FMC Dublin Road RA

92

JOB NO.

SITE

COORDINATES

19714

Containment Cell Perimeter

N 1,172,464.1 E 537,740.7

BEGUN

COMPLETED

PREPARED BY

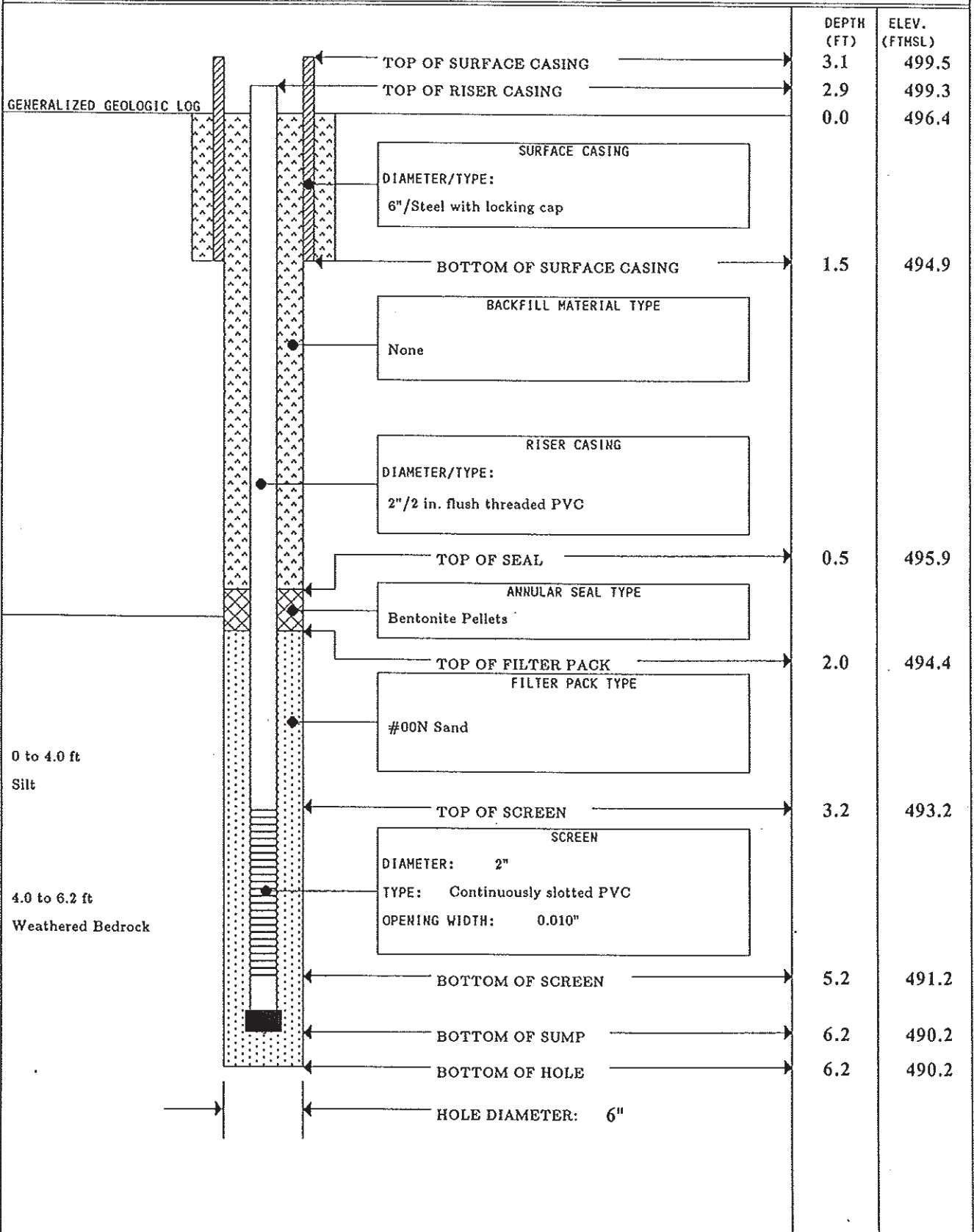
REFERENCE POINT FOR MEASUREMENTS

9/20/95

9/20/95

L. Young

Top of PVC casing





GEOLOGIC DRILL LOG										PROJECT		JOB NO.	SHEET NO.	HOLE NO.							
SITE Containment Cell Perimeter										COORDINATES N 1,172,464.10 E 537,740.65		19714	1 OF 1	92							
BEGUN 9-20-95										COMPLETED 9-20-95		DRILLER Buffalo Drilling		DRILL MAKE AND MODEL CME-45	SIZE 6"	OVERBURDEN 4.0	ROCK (FT.) 2.2	TOTAL DEPTH 6.2			
CORE RECOVERY (FT./%) /										CORE BOXES /		SAMPLES /		EL. TOP CASING 499.29		GROUND EL. 496.4		DEPTH/EL. GROUND WATER 4.6/491.8 10/4/95		DEPTH/EL. TOP OF ROCK 4.0/492.4	
SAMPLE HAMMER WEIGHT/FALL /										CASING LEFT IN HOLE: DIA./LENGTH 2"/6.2'		LOGGED BY: L. Young									
SAMP. TYPE AND DIAM.	SAMP. ADV. LEN. CORE	SAMP. REC. CORE REC.	SAMP. FLOWS IN" 1/2 CORE RECOVERY	LOSS IN G.P.M.	WATER PRESS. TESTS P.S.I.	TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.										
							496.4			0 to 4.0 ft SILT: moderate yellowish brown (10YR5/4), moist, hard, nonplastic, trace cobbles and fine sandstone gravel.	Drilled to auger refusal at 4.0 ft using 7-5/8 in. hollow stem augers with wooden bottom plug. Reamed below augers with 4-1/4 in. tricone roller bit to 6.5 ft and advanced augers to 6.2 ft. Color descriptions from the GSA Rock-Color chart.										
							492.4 491.9	5		4.0 to 4.5 ft SANDSTONE: dusky red (5R3/4), slightly weathered, fine-grained, subrounded, fractured.											
							490.2			4.5 to 6.2 ft SILTSTONE: dusky red (5R3/4), weathered, fractured, with thin shale layers Bottom of boring at 6.2 ft. Installed 2 in. PVC monitoring well screened from 3.2 to 5.2 ft.											
SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER										SITE Containment Cell Perimeter		HOLE NO. 92									



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.					
SITE				COORDINATES		ANGLE FROM HORIZ		BEARING					
Containment Cell Perimeter				N 1,172,706.03 E 537,616.43		Vertical		-----					
BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL		SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH					
9-21-95	9-21-95	Buffalo Drilling	CME-45		6"	8.4	1.2	9.6					
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK					
/				500.67	497.8	8.6/489.2 10/9/95		4.0/493.8					
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH			LOGGED BY:								
		2"/9.6'			L. Young								
SAMP. TYPE AND DIAM.	SAMP. ADV. LEN. CORE	SAMPLE REC. CORE REC.	SAMPLE BLOWS "N" % CORE RECOVERY	LOSS IN G.P.M.	WATER PRESS. P.S.I.	TIME IN MIN.	ELEV.	DEPTH	GRAPHICS	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
							497.8				0 to 4.0 ft CLAYEY SILT: moderate brown (5YR4/4), moist, low plasticity, stiff, trace fine sandstone gravel.	Drilled to auger refusal at 8.4 ft using 7-5/8 in. O.D. hollow stem augers with wooden bottom plug. Reamed below augers with 4-1/4 in. tricone roller bit to 10.0 ft and advanced augers to 9.6 ft.	
							493.8	5			4.0 to 9.6 ft WEATHERED SILTSTONE AND SANDSTONE: dark reddish brown (10R3/4), weathered and fractured, with thin clayey silt layers.		
							488.2				Bottom of boring at 9.6 ft. Installed 2 in. PVC monitoring well screened from 4.1 to 8.6 ft.		Color descriptions from the GSA Rock-Color chart.
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE										Containment Cell Perimeter		HOLE NO.	93
O = DENNISON; P = PITCHER; O = OTHER													

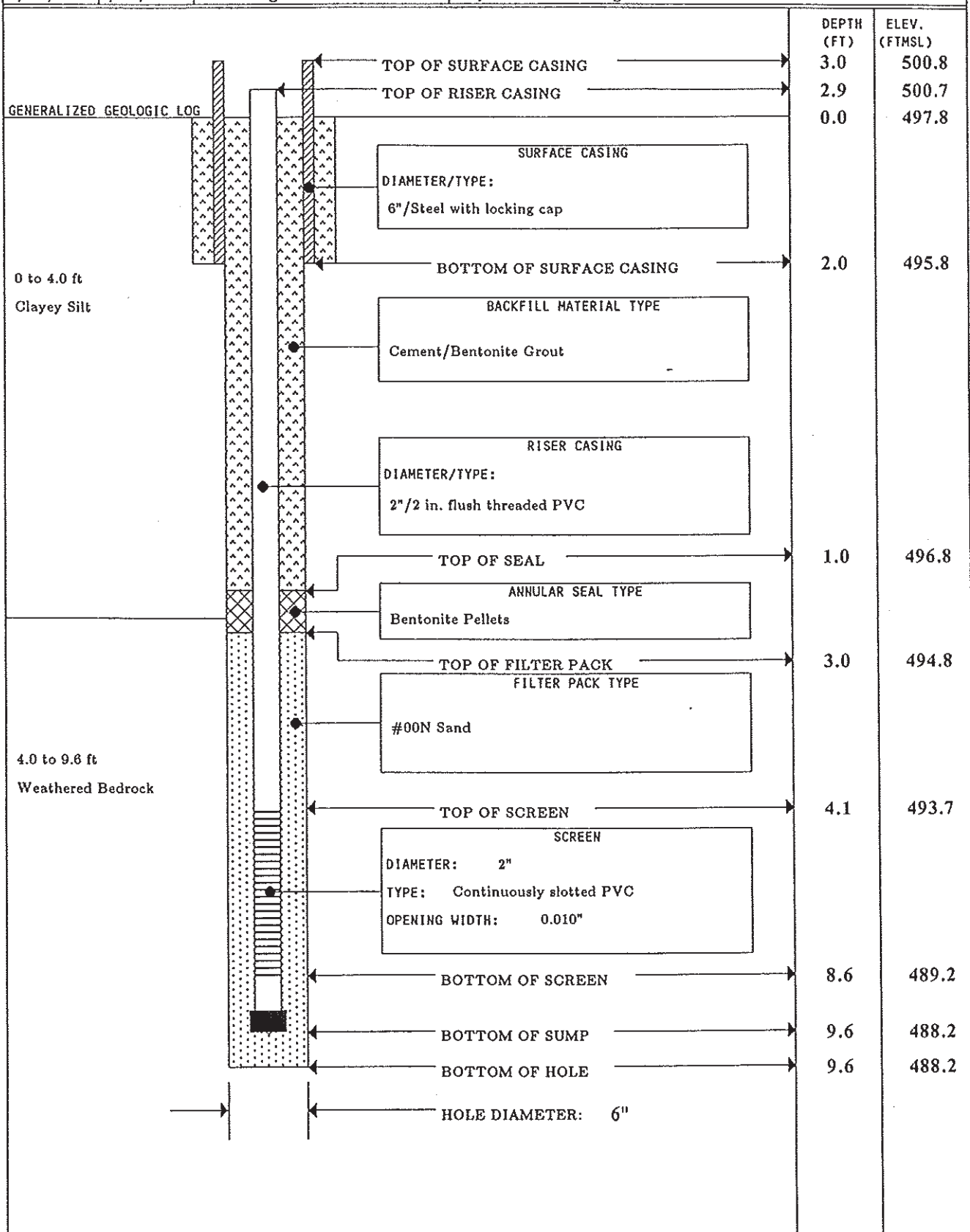


MONITORING WELL

FMC Dublin Road RA

93

JOB NO.	SITE	COORDINATES
19714	Containment Cell Perimeter	N 1,172,706.0 E 537,616.4
BEGUN	COMPLETED	PREPARED BY
9/21/95	9/21/95	L. Young
REFERENCE POINT FOR MEASUREMENTS		
Top of PVC casing		





GEOLOGIC DRILL LOG										PROJECT		JOB NO.	SHEET NO.	HOLE NO.
SITE										COORDINATES		19714	1 OF 1	36A
East Quarry										N 1,172,572.23 E 538,149.98		Vertical		-----
BEGUN	COMPLETED	DRILLER		DRILL MAKE AND MODEL		SIZE	OVERBURDEN	ROCK (FT.)	TOTAL DEPTH					
10-4-95	10-6-95	Buffalo Drilling		CME-45		6"	0.0	16.4	16.4					
CORE RECOVERY (FT./%)		CORE BOXES	SAMPLES	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER		DEPTH/EL. TOP OF ROCK						
12.3/75		2		488.01	485.1	6.3/478.9 10/10/95		0.0/485.1						
SAMPLE HAMMER WEIGHT/FALL			CASING LEFT IN HOLE: DIA./LENGTH			LOGGED BY:								
			2"/16.4'			L. Young								
SAMP. TYPE AND DIAM.	SAMP. ADV. LEN. CORE	SAMP. REC. CORE REC.	SAMPLE "IN" CORE RECOVERY	LOSS IN G.P.M.	WATER PRESSURE TESTS	ELEV.	DEPTH	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.				
						485.1			0 to 2.9 ft WEATHERED SILTSTONE AND SANDSTONE: dark reddish brown (10R3/4), weathered and fractured, with clayey silt layers.	Drill to 2.9 ft using a 7-7/8 in. tricone roller bit. Set 6 in. PVC surface casing and grouted in to 2.5 ft.				
NX	4.9	4.9	100%			482.2	5		2.9 to 6.9 ft INTERBEDDED SILTSTONE AND SANDSTONE: mottled dusky red (5R3/4) and very light gray (N8), slightly weathered to fresh, fractured, sandstone is hard, fine-grained, subrounded, siltstone is medium-soft with thin medium gray (N6) shale partings.	2.9 to 16.4 ft coring with NX diamond core bit and recirculating water. Run #1				
						478.2			2.9 to 5.8 ft horizontal fractures, open, smooth planar, average spacing of 0.1 ft.	2.9 to 7.8 ft RQD = 51% AP = 0.13 ft LP = 0.6 ft				
NX	8.6	7.0	81%				10		6.9 to 13.0 ft SANDSTONE: mottled dusky red (5R3/4) and very light gray (N8), fresh, hard, fine-grained, subrounded, fractured, zones of cross-bedding, thin medium gray (N5) shale partings.	Run #2				
									7.2 to 7.3 ft medium gray (N5) shale layer.	7.8 to 16.4 ft RQD = 77% AP = 0.33 ft LP = 0.55 ft				
						472.1			7.3 to 8.2 ft fracture oriented 5 deg. relative to core axis, open, smooth planar, iron stained.					
							15		10.6 to 12.1 ft cross-bedded.					
						468.7			13.0 to 16.4 ft SILTSTONE: very dark red (5R2/6), fresh, medium-soft, horizontal bedding, with medium gray (N5) shale and very light gray (N8) fine-grained sandstone layers.	Reamed hole with 5-3/4 in. tricone roller bit to 16.4 ft.				
									15.9 to 16.4 ft brecciated zone, sandstone with subangular mudstone fragments.	Color descriptions from the GSA. Rock-Color Chart. AP = Average core Piece and LP = Longest core Piece.				
									Bottom of boring at 16.4 ft. Reamed hole and installed 2 in. PVC monitoring well screened from 5.2 to 15.2 ft.					

SS = SPLIT SPOON; ST = SHELBY TUBE; SITE
 D = DENNISON; P = PITCHER; O = OTHER

East Quarry

HOLE NO.
36A



MONITORING WELL

FMC Dublin Road RA

36A

JOB NO.

SITE

COORDINATES

19714

East Quarry

N 1,172,572.2 E 538,150.0

BEGUN

COMPLETED

PREPARED BY

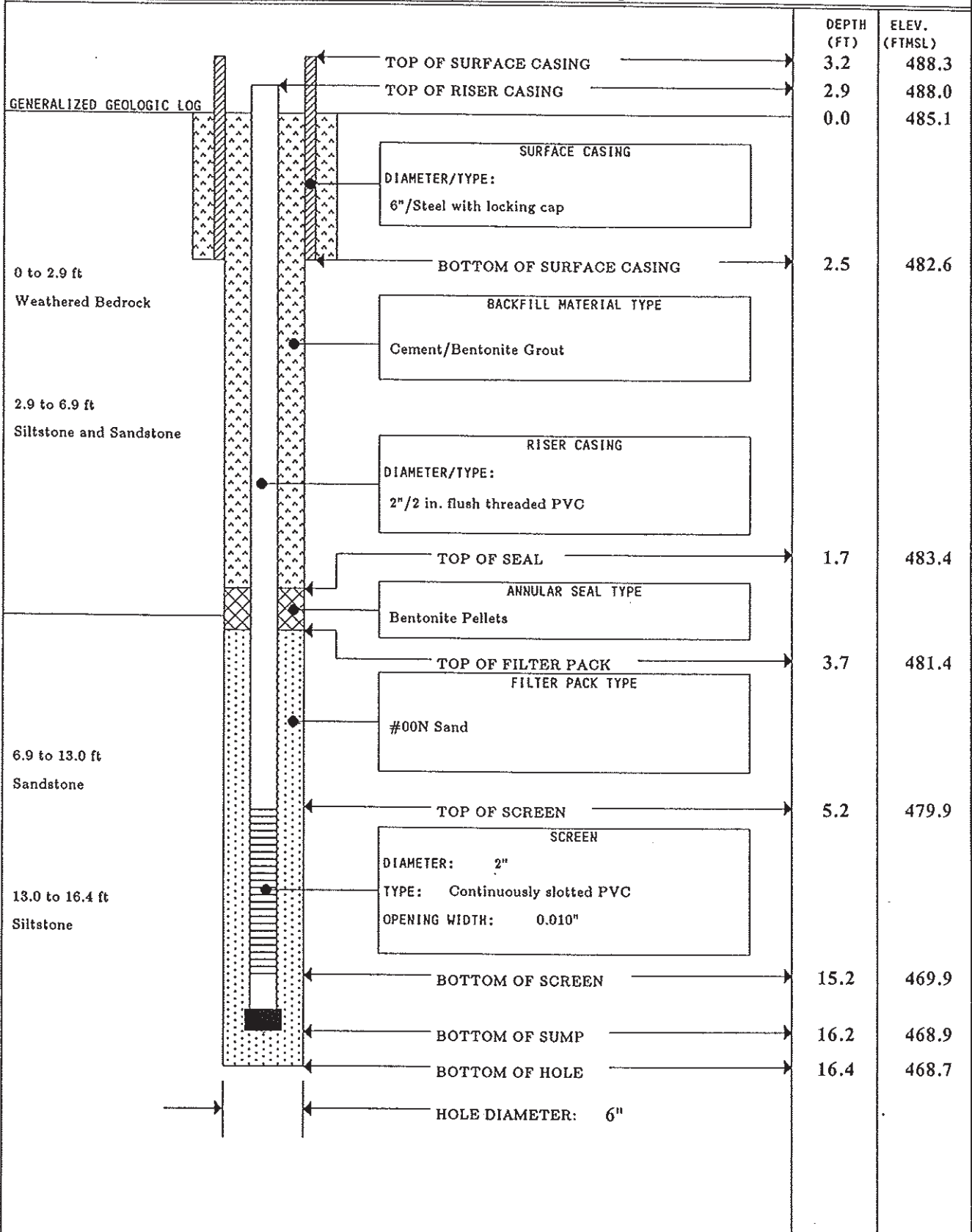
REFERENCE POINT FOR MEASUREMENTS

10/6/95

10/6/95

L. Young

Top of PVC casing



APPENDIX D RECORD OF DECISION



Superfund Record of Decision:

FMC-Dublin Road, NY



REPORT DOCUMENTATION PAGE		1. REPORT NO. EPA/ROD/R02-93/196	2.	3. Recipient's Accession No.	
4. Title and Subtitle SUPERFUND RECORD OF DECISION FMC-Dublin Road, NY First Remedial Action - Final				5. Report Date 03/31/93	
				6.	
7. Author(s)				8. Performing Organization Rept. No.	
9. Performing Organization Name and Address				10. Project Task/Work Unit No.	
				11. Contract(C) or Grant(G) No. (C) (G)	
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460				13. Type of Report & Period Covered 800/800	
				14.	
15. Supplementary Notes PB94-963833					
16. Abstract (Limit: 200 words) The 30-acre FMC Dublin Road site is located partly in the Town of Ridgeway and the Town of Shelby, Orleans County, New York. The site is subdivided by Dublin Road into a 21-acre northern rectangular portion, which contains inactive rock quarries and wooded areas; and a triangular southern property of approximately nine acres, which contains a waste pile, a rectangular pond, and a swamp. The portion of the site containing the waste pile is bounded by the New York State Barge Canal to the southwest, Dublin Road to the north, and a municipal landfill to the east. Land use in the area is predominantly agricultural, with a wetlands area located onsite. The site overlies both an overburdened and bedrock aquifer, and the estimated 23 people who reside within one-half mile of the site use domestic wells to obtain their drinking water supply. From 1933 to 1968, approximately 6 acres of the site was used to dispose of coal ash, cinders, laboratory wastes, chemical and pesticide residuals, and building debris. In or about 1974, FMC Corporation purchased the site. Onsite investigations conducted at the direction of the State from 1981 through 1984, documented elevated levels of organics and pesticides in the 10,000 yd³ waste pile onsite, and in soil, sediment, ground water, and surface water. Contamination appears to have been the result of both contaminant migration through the bedrock aquifer and surface water runoff. The ROD (See Attached Page)					
17. Document Analysis					
a. Descriptors Record of Decision - FMC-Dublin Road, NY First Remedial Action - Final Contaminated Media: soil, sediment, debris, gw, sw Key Contaminants: organics (pesticides), metals (arsenic, lead)					
b. Identifiers/Open-Ended Terms					
c. COSATI Field/Group					
18. Availability Statement		19. Security Class (This Report) None		21. No. of Pages 46	
		20. Security Class (This Page) None		22. Price	

Abstract (Continued)

addresses contaminated onsite soil, sediment, debris, ground water, and surface water, as OUL. The primary contaminants of concern affecting the soil, sediment, debris, ground water, and surface water are organics, including pesticides; and metals, including arsenic and lead.

The selected remedial action for this site includes excavating, consolidating, screening, and stabilizing onsite approximately 10,000 yd³ of contaminated soil, sediment, and debris from the waste pile, rectangular pond, swamp, drainage swell, quarries, and other site areas; temporarily stockpiling the material onsite, and testing it to ensure that it passes TCLP testing; constructing a customized disposal cell onsite, which includes both leachate collection and removal systems; depositing the treated material in the onsite cell, installing a soil cap, and revegetating the area; rinsing, dewatering, and treating, if needed, all material greater than 2 inches in diameter, with subsequent onsite disposal; collecting and treating onsite 126,000,000 gallons of contaminated ground water and surface water using electrochemical treatment, pH adjustment, sedimentation, filtration, and carbon adsorption, with onsite discharge of the treated water to surface water; backfilling and grading excavated areas, as needed; restoring any affected wetlands; monitoring sediment, ground water, surface water, air, and downgradient domestic wells; and implementing institutional controls, including deed restrictions; and site access restrictions, such as fencing. The estimated present worth cost for this remedial action is \$8,416,457, which includes an annual O&M cost of \$218,470 for 20-30 years.

PERFORMANCE STANDARDS OR GOALS:

Remedial goals are based on State ARARs or State RAOs for soil, sediment, ground water, and surface water. Chemical-specific soil cleanup goals include arsenic 35 mg/kg; copper 25 mg/kg; mercury 0.1 mg/kg; zinc 30 mg/kg; DDT and DDE 8.8 mg/kg; DDD 12.4 mg/kg; lead 93 mg/kg; alpha-BHC 0.46 mg/kg; beta-BHC 1.6 mg/kg; and gamma-BHC 2.3 mg/kg. Chemical-specific sediment cleanup goals include arsenic 5 mg/kg; copper 19 mg/kg; lead 27 mg/kg; mercury 0.11 mg/kg; and zinc 85 mg/kg. Chemical-specific ground water cleanup goals include arsenic 0.25 mg/l; copper 0.2 mg/l; lead 0.015 mg/l; and zinc 0.3 mg/l. Chemical-specific surface water cleanup goals include arsenic 0.19 mg/l; copper 0.027 mg/l; lead 0.011 mg/l; BHC (total) 0.00005 mg/l; and DDT, DDE, and DDD 0.00001 mg/l.

ROD FACT SHEET

SITE

FMC, Dublin Road

Towns of Shelby and Ridgeway, Orleans County/New York

EPA Region II

HRS Score (date): 32.89 (10/84)

ROD

Date signed: March 31, 1993

Remedies: Soil and sediment stabilization followed by disposal in an on-site NYS Regulated, Part 360 Cell; groundwater and surface water treatment.

Capital Cost: \$5,693,838

O & M Cost: \$2,722,619

Present Worth Cost: \$8,416,457

LEAD

This site has been a State enforcement lead with EPA enforcement oversight. The PRP has been conducting the work.

Primary contact: Shive Mittal, NYSDEC, (518) 457-0315

Secondary contact: Dale J. Carpenter, EPA, (212) 264-9342

Main PRP: FMC Corporation

PRP Contact: Mark Diamond, FMC Corporation, Environmental Affairs, (716) 735-3761

WASTE

Type: Pesticides and metals

Medium: Soil, Sediments, Surface Water and Groundwater

Origin: Waste Disposal Site used by FMC

Est. quantity: Approximately 25,000 cubic yards of sediments and soils will be treated and disposed. It is estimated that 126,000,000 gallons of water will need to be treated over a 20 to 30 year period.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233



Thomas C. Jorling
Commissioner

April 12, 1993

Mr. Dale J. Carpenter
Project Manager
New York Caribbean Compliance Branch
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Carpenter:

**RE: FMC Dublin Road Site,
Orleans County, New York,
Site No. 8-37-001**

Enclosed please find one 3.5 inch disk containing the Record of Decision (ROD) files for the above-referenced site, as requested by you. The disk contains the following four files on Wordperfect (version 5.1) format:

- 1) FMCROD1
- 2) FMCRESP1
- 3) FMCOVER1
- 4) FMCOVER2

Please note the disk does not contain figures, tables and exhibit B, which are part of the ROD. If you have any questions, please feel free to call me at (518) 457-0315.

Sincerely,

Shive R. Mittal, P.E.
Environmental Engineer
Bureau of Western Remedial Action
Division of Hazardous Waste Remediation

Enclosure

SRM/bs

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II**

DATE:

SUBJECT: Record of Decision (ROD) for the FMC, Dublin Road Site

FROM: George Pavlou, Acting Director
Emergency and Remedial Response Division

TO: William J. Muszynski, P.E.
Acting Regional Administrator

Attached for your approval is the ROD for the FMC, Dublin Road site, located in the Towns of Shelby and Ridgeway, Orleans County, New York. The selected remedial action addresses the soils, sediments, surface water and groundwater contaminated with metals and pesticides. A portion of the site was used for disposal of various wastes and debris by the FMC Corporation in Middleport, N.Y. The resultant waste pile created is acting as a source of contamination for the soils, sediments, surface water and groundwater.

The selected remedy calls for:

- a) Excavation, screening and stabilizing all the contaminated materials (soils and sediments) from the waste pile and other areas of the site that are contaminated above the remedial action objectives (RAOs);
- b) storing the stabilized material in a temporary stock pile and testing it to ensure that it passes the TCLP test, and other tests for those site specific compounds not included in the TCLP test;
- c) construction of the composite liner(s), leachate collection and removal systems(s) of the customized cell, consistent with 6 NYCRR Part 360 regulations of the State of New York;
- d) redepositing the treated material in the customized cell;
- e) rinsing, dewatering, treating if needed, all material greater than two inches in diameter and depositing in the proposed on-site cell; and
- f) installing a cover consisting of a geomembrane, cover soil, top soil, and vegetation for erosion control consistent with NYCRR Part 360 Regulations;
- g) collection of contaminated groundwater from a series of groundwater extraction wells;
- h) treatment of collected groundwater and contaminated surface water, and discharge to Jeddo Creek;
- i) restoration of the wetlands; and
- j) installation of fencing, inclusion of deed restrictions and institution of operation and maintenance (O&M) monitoring.

The estimated costs of the selected remedy are:

- Capital cost - \$ 5,693,838
- Present worth of O&M cost - \$ 2,722,619
- Total cost - \$ 8,416,457

The remedy is the same as the preferred alternative presented in the Proposed Plan.

The remedial investigation and feasibility study report and the Proposed Plan were released to the public for comment on January 26, 1993. A public comment period on these documents was held from January 26, 1993 through March 15, 1993. In addition, a public meeting to discuss these documents and the preferred remedy was held on February 4, 1993. Comments received during the public comment period generally supported the preferred remedial alternative, and are addressed in the attached Responsiveness Summary.

The New York State Department of Environmental Conservation (NYSDEC) has been the lead agency for this site. NYSDEC has written, reviewed and signed this ROD. The New York State Department of Health (NYSDOH) and the appropriate program offices within Region II have also reviewed this ROD. Their input and comments are reflected in this document. NYSDEC and NYSDOH have concurred with the selected remedy for the FMC, Dublin Road site.

If you have questions or comments on this document, I would be happy to discuss them with you at your convenience.

Attachments

RECORD OF DECISION

**FMC DUBLIN ROAD SITE
ORLEANS COUNTY, NEW YORK**

SITE ID NUMBER 8-37-001

PREPARED BY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MARCH 1993

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

FMC Dublin Road Site
Towns of Shelby and Ridgeway
Orleans County, New York
New York State Site Code: 8-37-001

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the FMC Dublin Road Site located in the Town of Shelby and the Town of Ridgeway, Orleans County, New York. The selected remedial action was chosen in accordance with the New York State Environmental Conservation Law (ECL), with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"). This decision document summarizes the factual and legal basis for selecting the remedy for this site.

The information supporting this Remedial Action Decision is contained in the Administrative Record for the site. The Administrative Record Index is attached as Exhibit A.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from or at this site, if not addressed by implementing the response action selected in this Record of Decision ("ROD"), may present an imminent and substantial threat to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy addresses the principal threats posed by the site by stabilizing and containing the waste materials (waste pile, soils and sediments) and by removing contaminants from the groundwater.

The major elements of the selected remedy include:

- (a) excavate, screen and stabilize all the contaminated materials (soils and sediments) from the waste pile, rectangular pond, swamp, drainage swale, the quarries and the other areas that are contaminated above the remedial action objectives;
- (b) store the stabilized material in a temporary stock pile and test it to ensure that it passes the TCLP, and other tests for those site specific compounds not included in TCLP;
- (c) construct the composite liner(s), leachate collection and removal system(s) of the customized cell, consistent with 6 NYCRR Part 360 regulations of the State of New York;
- (d) redeposit the treated material in the customized cell;
- (e) rinse, dewater, treat if needed, all material greater than 2 inches in diameter and deposit it in the proposed on-site cell;
- (f) install a cover consisting of geomembrane, cover soil, top soil, and vegetation for erosion control consistent with 6 NYCRR Part 360 Regulations.

- (g) collect contaminated groundwater from a series of overburden and upper bedrock groundwater extraction wells;
- (h) treat collected groundwater and contaminated surface water, and discharge to the Jeddo Creek;
- (i) restore the wetlands; and
- (j) install fencing, include deed restrictions and institute operation and maintenance (O&M) and monitoring.

DECLARATION

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

Because this remedy will result in contaminants remaining on-site above health based levels, a five year review will be conducted. This Level I evaluation will be conducted within five years after the commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

March 29, 1993
Date

Ann DeBarbieri
Ann DeBarbieri
Deputy Commissioner
Office of Environmental Remediation
New York State Department of Environmental
Conservation

March 31, 1993
Date

William Muszynski
William Muszynski
Acting Regional Administrator
United States Environmental Protection
Agency, Region II

**RECORD OF DECISION
DECISION SUMMARY**

**FMC CORP. DUBLIN ROAD SITE
TOWN OF SHELBY AND TOWN OF RIDGEWAY
ORLEANS COUNTY, NEW YORK
SITE ID NUMBER 8-37-001**

**PREPARED BY
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
MARCH 1993**

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Exhibits

- A. Administrative Record Index
- B. Registry Excerpt
- C. Responsiveness Summary

**RECORD OF DECISION
FMC DUBLIN ROAD SITE
SITE NUMBER 8-37-001**

I. SITE LOCATION AND DESCRIPTION

The FMC Dublin Road Site is located in northwestern New York in Orleans County, and is situated partly in the Town of Ridgeway and partly in the Town of Shelby. The 30 acre site is divided by Dublin Road into a northern rectangular portion consisting of approximately 21 acres containing two inactive rock quarries and wooded property and a southern triangular portion of approximately nine acres containing a waste pile, a rectangular pond and a swamp. Jeddo Creek runs in a northerly direction through the northeast corner of the site. See Figure 1.1 for site location and Figure 1.2 for site features. The site was added to the Federal National Priorities List (NPL) in May 1986. The site is currently classified as a class "2" site in the Registry of Inactive Hazardous Waste Sites, maintained by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH). The class 2 designation means that the site poses a significant threat to public health or the environment and requires action.

The portion of the site containing the waste pile is bounded by the New York State Barge Canal to the southwest, Dublin Road to the north, and a municipal landfill to the east. Land uses immediately adjacent to the site and within the county are predominantly agricultural. An active sandstone quarry exists north of the site.

The principal hydrogeologic units beneath the site include: Overburden, Upper Bedrock, Lower Bedrock, and the Queenston Formation. These units have moderate to low permeabilities with very limited quantities of groundwater suitable for domestic utilization. The area around the Dublin Road site is sparsely populated with about 23 households within 1/2 mile radius (USGS, 1980). These households obtain their drinking water from domestic wells.

II. SITE HISTORY AND ENFORCEMENT STATUS

In or about 1944, the FMC Corporation purchased the 30-acre Dublin Road site as part of its acquisition of the Niagara Sprayer and Chemical Company, Inc. From about 1933 to 1968, approximately six acres of the site south of Dublin Road were used for the disposal of coal ash cinders, laboratory wastes consisting of glass bottles and chemical residues, residues from lime sulfur solution filtration, building debris, and residues from the cleanup of the pesticide production areas and equipment. The wastes, other than the laboratory wastes, were generated at the FMC's Middleport, New York manufacturing plant. The laboratory wastes came from FMC's Tonawanda laboratory.

Previous investigations at the site include: a preliminary assessment of the groundwater contamination performed by Geraghty and Miller, Inc., for FMC in 1978; and a field investigation conducted by Bechtel National Inc., (BNI) for FMC during 1981-84 under a 1982 Order on Consent between NYSDEC and FMC. These investigations have indicated the presence of heavy metals and pesticides in the waste pile, groundwater, surface water, soils and sediments at the site. A second Order on Consent was signed between NYSDEC and FMC on February 9, 1988 to further define the extent of contamination at the site by performing additional investigations, completing the Remedial Investigation/Feasibility Study (RI/FS) and performing the remedial action.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Concurrent with the investigations performed at the site, there has been significant community involvement and input into the project. A public

meeting was conducted by the FMC Corporation in Medina, New York, on May 26, 1988 to discuss the RI Report and respond to questions from the community. A second public meeting was held by FMC in Medina on June 13, 1989 to discuss the supplemental RI Report and to respond to questions from the community. At both meetings, representatives from NYSDEC and NYSDOH were present to respond to questions from the community. A site specific Citizen Participation Plan (CPP) was developed and released to the public in June 1990. As a part of the plan, a public contact list was developed and used to disseminate fact sheets, meeting announcements and other information. A local information repository was established at Lee-Whedon Memorial Library, 620 West Avenue, Medina, New York. Pertinent documents were placed in the repository. A fact sheet was issued to the public in July, 1990 to announce the availability of the documents in the repositories, the CPP, and the public availability session. Another fact sheet was issued in July 1992.

A notice of the availability of the final drafts of the RI/FS Reports and the Proposed Remedial Action Plan (Proposed Plan) was published on January 26, 1993 in a local newspaper. Additional methods used to encourage public participation included publishing a series of announcements in local newspapers, announcements on local television stations, and mailing notices and fact sheets to the public contact list. The RI/FS reports, the Proposed Plan, and other pertinent documents were placed into the repository. A formal public meeting was held on February 4, 1993 to present the Proposed Plan and seek public comment. A public comment period was held from January 26, 1993 to February 25, 1993 which was subsequently extended to March 15, 1993. A responsiveness summary has been prepared containing NYSDEC's and EPA's responses to comments received during the public meeting, and comment period (Exhibit C).

IV. SCOPE AND ROLE OF RESPONSE ACTION

The remedial action selected in this decision document addresses the entire site. As will be discussed in Section V below, the primary media contaminated include the site soils and groundwater. Surface water (Swamp and Quarries) and surface water sediments have also been contaminated as a result of contaminants migrating through surface run-off.

By isolating contaminated soils and sediments from the site and removing and treating contaminants from the site groundwater and site surface water, the response action will isolate and/or remove the source of contaminants from the site. The contaminated soils and sediments will be stabilized and contained in a cell.

V. SUMMARY OF SITE CHARACTERISTICS

For ease of reference, tables attached to this document summarize the main characteristics of the Dublin Road Site.

Summary of Field Investigations

The RI report prepared by BNI under it's new name Bechtel Environmental Inc., (BEI) for FMC was approved by NYSDEC in May 1990. The following paragraphs summarize the components and conclusions of the field investigations performed at the site. For more detailed information regarding the individual investigations or for additional regional information, refer to the RI report listed in the Administrative Record Index (Exhibit A).

(i) Site geology: Overburden at the site ranges from 0 to 25 feet in thickness and consists of natural soils, fill and waste material. The underlying Grimsby Formation, which is up to 52 feet in thickness, consists of red and white sandstone with the upper 25 feet of the formation having intense fracturing. The major hydrogeologic formation consists of an overburden

aquifer, upper bedrock aquifer, and lower bedrock aquifer. The groundwater flow is generally towards the northeast.

(ii) Nature and extent of contamination: The investigations have indicated the presence of various chemicals in the waste pile above background concentrations. These chemicals include: arsenic (As); copper (Cu); lead (Pb); mercury (Hg); zinc (Zn); benzenehexachloride (BHC) and isomers; and DDT (and metabolites). Some of these substances have been detected in groundwater, surface water, soils and sediments on-site. The compounds 2,4-Dichlorophenoxypropionic acid (2,4-D) and 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) have been detected in groundwater. The mean and the range of concentrations of these chemicals in the waste pile, surface water, sediments, groundwater (overburden) and groundwater (upper bedrock) are shown in Tables 1.1, 1.2, 1.4, 1.6 and 1.7 (attached) respectively. Based on the toxic characteristic leaching procedure (TCLP) test for lead, the waste material in the waste pile has been classified as characteristic hazardous waste. The volume of this waste material is approximately 10,000 cubic yards (5,000 cubic yards of waste in the pile above original grade and an additional 5,000 cubic yards of waste and contaminated soil below grade).

The run-off of surface water at the site has resulted in migration of contaminants from the waste pile to the rectangular pond, swamp, drainage swale, and east & west quarries. Although the analytical results performed on the soils and sediments from these areas did not fail TCLP tests, they were above the remedial action objectives (RAOs). The media specific RAOs are summarized in Table 2-4. Therefore, an estimated 15,000 cubic yards of contaminated soils and sediments from these areas which are above the RAOs, will need remediation. The media specific RAOs were developed during FS.

(iii) Contaminant fate and transport: The transport and fate of the contaminants from a source are dependent upon the physical and chemical properties of the waste constituents and characteristics of the environmental media. The migration pathways at the Dublin Road site appear to be surface water run-off and leaching of the chemicals in the groundwater. The salts detected at the Dublin Road site are of low solubility in water. Volatilization is not considered an important mechanism under existing conditions due to the very low concentrations of volatile compounds at the site. Significant chemical and biological transformations of the compounds associated with the Dublin Road site are not likely.

VI. SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site if no remedial action is taken.

Human Health Risk Assessment

The components of the baseline health risk assessment for this site include:

- Identification of indicator chemicals;
- Assessment of the exposure pathways;
- Identification and comparison of Applicable or Relevant and Appropriate Requirements (ARARs) to exposure point concentrations.

The indicator chemicals selected for this site based on persistence, mobility, and toxicity include As, Cu, Zn, Pb, BHC (4 isomers), and DDT (and 2 metabolites). Mercury was not included because the concentration of mercury was not significant in the 1988 data. However, the cleanup level for mercury has been specified. Several of these contaminants are known to cause cancer in laboratory animals and are suspected to be human carcinogens.

The exposure routes are the mechanisms by which contaminants enter the body (e.g., inhalation, ingestion, absorption). Exposure pathways are the environmental media (e.g., soil, surface water, groundwater, air, etc.) through which contaminants are carried. Several potentially significant exposure pathways were identified for this site. These pathways are:

- Surface water pathways for an on-site intruder;
- Surface water and groundwater pathways for the hypothetical future residents at the site boundary;
- Groundwater pathway for the nearest current potential receptor; and
- Surface water and soil pathways for the Dublin Road user. The part of Dublin Road adjoining the site has recently been closed to the public.

A numerical model was used to estimate the contaminant concentrations at varying distances from the waste pile. At the same time ARARs were identified which would be protective of human health and the environment at the identified points. The results of these activities are presented in the 1988 RI report (Section 6 & Appendix C) and the 1989 supplemental RI report (Section 3). The results of the comparisons indicate that the predicted concentrations of various chemicals at the corresponding exposure points would exceed the identified ARARs and would pose an unacceptable risk to human health. Arsenic and zinc concentrations would exceed the recommended requirements for groundwater usage for a receptor at the site boundary. The concentrations of As, Cu, Pb, Zn, BHC, and DDT exceeded the identified ARAR values corresponding to the protectiveness of aquatic life at the rectangular pond and the swamp.

The report was prepared in 1988 and used the "Superfund Public Health Evaluation Manual" (SPHEM, 1986) as guidance. The risk assessment followed the process outlined in SPHEM for groundwater and surface water exposures and compared exposure concentrations to ARARs. In the guidance currently used, "Risk Assessment Guidance for Superfund" (RAGS, 1989), baseline evaluations are not considered complete based on comparisons to ARARs. It should be noted, that the cancer risk calculated using RAGS for ingestion of site groundwater contaminated with arsenic would exceed EPA's acceptable risk range.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

The ARARs and the RAOs for this site are summarized in section 2.0 of the FS report. The media specific RAOs are given in Table 2-4.

Ecological Risk Assessment

For the ecological assessment, a comparison was conducted between estimated exposure point concentrations and ARAR values corresponding to protectiveness of the resident aquatic and terrestrial biological communities. Additional chemical, physical and biological data and information were obtained through site-specific sampling and a literature search to assess bioaccumulation potential and environmental impacts. A habitat based assessment was completed.

The results of the ecological assessment are presented in Section 4.0 of the 1989 supplemental RI report and Section 1 and Appendix J of the 1992 FS report. The rectangular pond had contaminant concentrations exceeding water quality standards for all contaminants of concern. The remaining water bodies at the site exceeded the water quality standards for a fewer number of compounds. The sediments exceeded the criteria for pesticides in all the

surface water bodies. There are no known endangered species on the Dublin Road site or in the immediate area for which the site would pose a potential threat.

VII. DESCRIPTION OF THE REMEDIAL ALTERNATIVES

To determine the most appropriate method for remediating the site, the FS completed a process that can be described in three parts. The first step identified and "screened" a large number of technologies that could be employed at the site to treat, contain, or dispose of the contaminants. Technologies that passed the initial screening phase were then grouped into different combinations to form remedial alternatives for further evaluation. After an initial analysis to identify the most promising alternatives, a detailed analysis was performed to serve as the basis for selecting a preferred alternative. This process is described in more detail in the following subsections.

Compilation and Screening of the Technologies

The results of the RI indicate that four media in and around the site have been contaminated as a result of the improper management of hazardous materials and wastes. These media are site soils, site groundwater, the sediments, and surface water (from the rectangular pond, swamp area, and inactive quarries).

To generate alternatives capable of addressing the contamination of each medium, the three progressively more specific categories of "general response actions," "remedial technologies," and "process options" were identified. For example, regarding soil, one of the general response actions considered was containment. This was then subdivided into the two remedial technologies of capping and vertical barriers which was further subdivided into the process options of clay, asphaltic, concrete, and multimedia caps along with sheet piling, slurry walls, cutoff walls, and subsurface drains as vertical barriers. A summary of the general response actions for soils, surface water and the groundwater is given in Table 2-6 through Table 2-11 of the FS Report.

The initial screening process essentially consists of evaluating all of the identified process options against the three balancing criteria of technical implementability, effectiveness and cost. This also includes the evaluation of the "No Action" alternative which is carried through the entire process to demonstrate the need for remediation at the site and as a requirement of the National Contingency Plan (NCP).

A detailed discussion and evaluation of the initial screening process can be found in Chapter 3 of the FS.

Evaluation of the Alternatives

Initial Screening

The remedial technologies and process options that passed the screening process were then assembled into eight different combinations or remedial alternatives. Theoretically, an immense number of combinations are possible but the NCP provides guidance (40 CFR 300.430(e)(3)) on how to assemble suitable technologies into alternative remedial actions for evaluation.

The following eight groups of remedial alternatives were constructed and evaluated against the short and long-term aspects of three of the balancing criteria; effectiveness, implementability, and cost (see Section VIII below for descriptions of the criteria).

Initial List of Remedial Alternatives

1. No Action/Monitoring.
- 2A. Soil Washing, Off-site Water Treatment
- 2B. Soil Washing, On-site Water Treatment
- 3A. In Situ Vitrification, Off-site Water Treatment.
- 3B. In Situ Vitrification, On-site Water Treatment.
- 4A. Stabilization, Off-site Water Treatment.
- 4B. Stabilization, On-site Water Treatment.
- 5A. Stabilization/On-site Disposal in Part 360 Cell, Off-site Water Treatment.
- 5B. Stabilization/On-site Disposal in Part 360 Cell, On-site Water Treatment.
- 6A. Stabilization/On-site Disposal in Customized Part 360 Cell, Off-site Water Treatment.
- 6B. Stabilization/On-site Disposal in Customized Part 360 Cell, On-site Water Treatment.
- 7A. Stabilization/Off-site Disposal, Off-site Water Treatment.
- 7B. Stabilization/Off-site Disposal, On-site Water Treatment.
- 8A. Containment, Off-site Water Treatment.
- 8B. Containment, On-site Water Treatment.

The initial screening of these alternatives against the three balancing criteria mentioned above took the following factors into consideration.

The effectiveness evaluation considers:

- a. the degree to which the alternative under consideration reduces the toxicity, mobility, or volume of the contaminants through treatment;
- b. how residual risks are minimized;
- c. how long-term protection is provided;
- d. how ARARs are complied with;
- e. how short-term risks are minimized; and
- f. how quickly the alternative achieves protection.

The implementability evaluation considers:

- a. technical feasibility (ability to design, construct, and operate the alternative); and
- b. administrative feasibility (availability and capacity of services, equipment, and personnel along with the ability to obtain the necessary approvals from involved regulatory agencies).

The cost evaluation considers:

- a. capital costs for design and construction;
- b. operation and maintenance costs; and
- c. the present worth of all costs for comparison purposes.

The result of the initial screening process was to reject two of the eight alternatives. The reasons for rejecting these two are given below.

Treatability studies performed on soils from the Dublin Road Site indicate 45 to 82% fines. Soils with high silt and clay content are difficult to decontaminate by a soil washing technology. Therefore alternatives 2A & 2B associated with soil washing were deleted from detailed evaluations. Alternatives 3A & 3B involving in situ vitrification (ISV) were also deleted from detailed evaluations because ISV is undergoing review by the vendor

following a fire during field testing and is not expected to be available in the near future.

Detailed Analysis

The goal of the detailed analysis, as defined by the NCP, is to evaluate each of the viable alternatives against each of the nine criteria given in Section VIII below (Summary of the Comparative Analysis of the Alternatives). These criteria are overall protection of human health and the environment; compliance with ARARs; short-term impacts and effectiveness; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; implementability; cost; community acceptance; and state acceptance.

The information below briefly describes each of the alternatives retained for the detailed analysis. Following the descriptions is a discussion that compares the alternatives with respect to each of the criteria, including State and Community acceptance. It should be noted that the costs and implementation times given are initial estimates. The design time is estimated at 12 months for all the alternatives except the No-action alternative. The present worth values below estimate how much money is needed today to finance projects that will take place over several years. The present worth of each alternative has been calculated based on the time to implement that particular alternative and assuming an interest rate of 5%.

Alternative 1: NO ACTION

Capital Cost: \$0
O & M Cost: \$58,000/yr (for 20 years)
Present Worth O&M: \$722,808 (at 5%)
Total Project Costs: \$722,808
Construction Time: 1 month

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. This alternative involves taking no remedial action to remove or treat the contaminants. The alternative would include: maintain the existing fence; implement institutional controls to limit the use of the site and groundwater; provide for quarterly site inspections; develop and implement a surface water and groundwater monitoring program; and publish a monitoring report.

Alternative 4A: STABILIZATION, OFF-SITE WATER TREATMENT

Capital Cost: \$4,049,500
O & M Cost: \$394,800/yr (for 20 years)
Present Worth O&M: \$4,920,081 (at 5%)
Total Project Costs: \$8,969,581
Construction Time: 12 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative involves stabilization of all the contaminated material from the Waste Pile and any soils/sediments from other areas of the site which fail TCLP; redepositing the stabilized material in the area of the waste pile along with any soils/sediments contaminated above the RAOs; and covering the redeposited material with a 60 mil synthetic geomembrane, 18 inches of cover soil, 6 inches of top soil and a vegetative cover. The stabilization would involve excavation; screening; decontamination and disposal of large objects; and stabilizing the waste with lime in a pug mill. Under this alternative approximately 10,000 cubic yards of the waste material from the waste pile area would be stabilized and redeposited in the waste pile area. Addition of lime would increase the volume of the stabilized material by approximately

30%. An additional 15,000 cubic yards of contaminated soils/sediments above the RAOs from the other areas of the site would be excavated and placed in the waste pile area before capping. The site would be backfilled and graded.

The surface water, process water and the groundwater would be collected and transported to the FMC Middleport plant for treatment before disposal. The contaminated water would be transported to the FMC Middleport Plant via a pipeline or by trucking.

Alternative 4B: STABILIZATION, ON-SITE WATER TREATMENT

Capital Cost: \$4,049,500

O & M Cost: \$218,470/yr (for 20 years)

Present Worth O&M: \$2,722,619 (at 5%)

Total Project Costs: \$6,772,119

Construction Time: 12 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative is identical to Alternative 4A except that the groundwater, process water, and contaminated on-site surface water would be treated on-site and discharged to Jeddo Creek. The on-site water treatment would include electrochemical treatment, coagulation, pH adjustment, sedimentation, filtration, carbon adsorption and/or other process treatment to meet the regulatory requirements for disposal to the Jeddo Creek. A full scale treatment plant would be installed on-site to treat an estimated 126,000,000 gallons of contaminated water over 20 to 30 years. The seasonal average rate of flow from the groundwater extraction system is estimated to be 12 gpm. Any sludge generated would be fed to a filter press for removal of solids. Disposal of the filter cake would be off-site in a RCRA facility, if necessary.

Alternative 5A: STABILIZATION, ON-SITE DISPOSAL IN PART 360 CELL, OFF-SITE WATER TREATMENT

Capital Cost: \$5,989,750

O & M Cost: \$394,800/yr (for 20 years)

Present Worth O&M: \$4,920,081 (at 5%)

Total Project Costs: \$10,909,831

Construction Time: 14 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative involves the stabilization of all the contaminated material from the waste pile area and any soils/sediments from other parts of the site which fail TCLP. The stabilized material along with remaining soils/sediments which are above RAOs would be deposited in an on-site containment cell designed in accordance with 6NYCRR Part 360 (NYS regulation). The key features of the Part 360 cell are: a bottom liner system consisting of primary and secondary composite liners and primary and secondary leachate collection system and a cap consisting of a 40 mil liner with 24 in. of soil cover, 6 in. of top soil and vegetative cover. Under this alternative, approximately 10,000 cubic yards of waste would be stabilized and deposited in a containment cell along with approximately 15,000 cubic yards of unstabilized soils/sediments from other parts of the site.

Groundwater, process water and the surface water would be transported to the FMC Middleport plant for treatment and disposal.

Alternative 5B: STABILIZATION, ON-SITE DISPOSAL IN PART 360 CELL, ON-SITE

WATER TREATMENT

Capital Cost: \$5,989,750

O & M Cost: \$218,470/yr (for 20 years)

Present Worth O&M: \$2,722,619 (at 5%)

Total Project Costs: \$8,712,369

Construction Time: 14 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative is identical to Alternative 5A except that the groundwater, process water and contaminated on-site surface water would be treated on-site and discharged to Jeddo Creek as described in Alternative 4B above.

Alternative 6A: STABILIZATION, ON-SITE DISPOSAL IN CUSTOMIZED PART 360 CELL, OFF-SITE WATER TREATMENT

Capital Cost: \$5,693,838

O & M Cost: \$394,800/yr (for 20 years)

Present Worth O&M: \$4,920,081 (at 5%)

Total Project Costs: \$10,613,918

Construction Time: 13 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative includes the stabilization of all the contaminated materials from the waste pile area and all the contaminated soils/sediments from other parts of the site which are above the RAOs. The stabilized material would be deposited in a customized cell designed to meet the 6NYCRR Part 360 regulations. New York State Regulations 6NYCRR Part 360 allows modifications to a landfill used solely for the disposal of solid waste resulting from industrial or commercial operations. The key features (shown conceptually in Figure 3-8) of the customized Part 360 cell are: a bottom liner system, a leachate collection system and a cap consisting of a liner with a soil cover, six inches of top soil, and a vegetative cover. Under this alternative, all the waste from waste pile area and all the soils/sediments above RAOs from other areas of the site (estimated at 25,000 cubic yards) would be stabilized before placing in a customized Part 360 cell.

Groundwater, process water and the surface water would be transported to the FMC Middleport plant for treatment and disposal.

Alternative 6B: STABILIZATION, ON-SITE DISPOSAL IN CUSTOMIZED PART 360 CELL, ON-SITE WATER TREATMENT (Selected Remedy)

Capital Cost: \$5,693,838

O & M Cost: \$218,470/yr (for 20 years)

Present Worth O&M: \$2,722,619 (at 5%)

Total Project Costs: \$8,416,457

Construction Time: 13 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative is identical to Alternative 6A except that the groundwater, process water, and contaminated on-site surface water would be treated on-site and discharged to Jeddo Creek as described in Alternative 4B above.

Alternative 7A: STABILIZATION AND OFF-SITE DISPOSAL, OFF-SITE WATER TREATMENT

Capital Cost: \$8,462,318

O & M Cost: \$394,800/yr (for 20 years)

Present Worth O&M: \$4,920,081 (at 5%)

Total Project Costs: \$13,382,398

Construction Time: 12 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative includes the stabilization of all the contaminated material in the waste pile and soils/sediments from the rectangular pond, swamp, drainage swale, the quarries, and other areas that are above remedial action objectives. Stabilized material would be transported to an off-site permitted Part 360 landfill.

Groundwater, process water and the surface water would be transported to the FMC Middleport plant for treatment and disposal.

Alternative 7B: STABILIZATION AND OFF-SITE DISPOSAL, ON-SITE WATER TREATMENT

Capital Cost: \$8,462,318

O & M Cost: \$218,470/yr (for 20 years)

Present Worth O&M: \$2,722,619 (at 5%)

Total Project Costs: \$11,184,937

Construction Time: 12 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative is identical to Alternative 7A except that the groundwater, process water, and contaminated on-site surface water would be treated on-site and discharged to Jeddo Creek as described in Alternative 4B above.

Alternative 8A: CONTAINMENT, OFF-SITE WATER TREATMENT

Capital Cost: \$2,921,880

O & M Cost: \$394,800/yr (for 20 years)

Present Worth O&M: \$4,920,081 (at 5%)

Total Project Costs: \$7,841,961

Construction Time: 10 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative includes clearing and grubbing of the waste pile area, excavation of all the contaminated material in other site locations including the rectangular pond, swamp, the drainage swale, the quarries, and other areas that are above remedial action objectives, and consolidating all the excavated material in the waste pile area. A clay cut-off wall would be placed around the waste pile. A multimedia cap would be placed on the top of the waste pile area.

Groundwater, process water and the surface water would be transported to the FMC Middleport plant for treatment and disposal.

Alternative 8B: CONTAINMENT, ON-SITE WATER TREATMENT

Capital Cost: \$2,921,880

O & M Cost: \$218,470/yr (for 20 years)

Present Worth O&M: \$2,722,619 (at 5%)

Total Project Costs: \$5,644,499

Construction Time: 10 months.

The groundwater extraction and treatment is likely to continue for 20 to 30 years.

This alternative is identical to Alternative 8A except that the groundwater, process water, and contaminated on-site surface water would be treated on-site and discharged to Jeddo Creek as described in Alternative 4B above.

Because alternatives 1, 4A, 4B, 5A, 5B, 6A, 6B, 8A and 8B would result in contaminants remaining on-site above health based levels, CERCLA requires that the site conditions be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes or take other actions.

VIII. SUMMARY OF THE COMPARATIVE ANALYSIS OF THE ALTERNATIVES

The remedial alternative selected for the site by the NYSDEC and the USEPA was developed in accordance with the New York State Environmental Conservation Law (ECL) and is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC Section 9601, et. seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The criteria used in evaluating the potential remedial alternatives can be summarized as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. Protection of Human Health and the Environment--This criterion is an overall and final evaluation of the health and environmental impacts to assess whether each alternative is protective. This evaluation is based upon a composite of factors assessed under other criteria, especially short/long-term effectiveness and compliance with ARARs/SCGs (see below).
2. Compliance with Applicable or Relevant and Appropriate New York State and Federal Requirements (ARARs)--ARARs are divided into the categories of chemical-specific (e.g. groundwater standards), action-specific (e.g. design of a landfill), and location-specific (e.g. protection of wetlands). To distinguish between state and federal requirements, New York State refers to its ARARs as Standards, Criteria, and Guidelines (SCGs). Certain policies and guidance that do not have the status of ARARs/SCGs that are considered to be important to the remedy selection process are identified as To-Be-Considered (TBC) criteria. At this site, groundwater is contaminated at levels above New York State standards thereby contributing to the need for site remediation. Table 2-4 summarizes the remedial action objectives (identified ARARs/SCGs/TBCs).

Primary Balancing Criteria - The next five "primary balancing criteria" are to be used to weigh major trade-offs among the different hazardous waste management strategies.

3. Short-term Impacts and Effectiveness--The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment is evaluated. The length of time needed to achieve the remedial objectives is estimated and compared with other alternatives.
4. Long-term Effectiveness and Permanence--If wastes or residuals will remain at the site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude and nature of the risk presented by the remaining wastes; 2) the adequacy of the controls intended to limit the risk to protective levels; and 3) the reliability of these controls.
5. Reduction of Toxicity, Mobility, or Volume--Preference is given to alternatives that permanently and by treatment significantly reduce the toxicity, mobility, or volume of the wastes at the site. This includes assessing the fate of the residues generated from treating the wastes at the site.
6. Implementability--The technical and administrative feasibility of implementing the alternative is evaluated. Technically, this includes

the difficulties associated with the construction and operation of the alternative, the reliability of the technology, and the ability to effectively monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining special permits, rights-of-way for construction, etc.

7. Cost--Capital and operation and maintenance costs are estimated for the alternatives and compared on a present worth basis.

Modifying Criteria - These final criteria are taken into account after evaluation of those above. They are focused upon after public comments have been received.

8. Community Acceptance--Concerns of the community regarding the RI/FS Reports and the Proposed Remedial Action Plan are evaluated. The Responsiveness Summary (Exhibit C) for this project identifies those concerns and presents the agencies responses to those concerns.
9. State Acceptance--In this case, New York State is the "lead agency" for the project and the USEPA is the "support agency." Therefore, "State acceptance" is understood to refer to the concurrence between the agencies on the proposed remedy.

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as ARARs.

The following general remedial objectives were identified for the Dublin Road site:

Adequately protect against ingestion of, or contact with, contaminated soil;

Minimize damage to and provide adequate protection of the saturated zone from contaminants migrating from soil;

Minimize damage from and adequately protect against the spread of the contaminated groundwater;

Adequately protect against future ingestion of, or contact with, contaminated groundwater;

Adequately protect against contamination of surface water and sediments in the site vicinity; and

Adequately protect against contaminated dust emissions into ambient air.

The ARARs and media specific RAOs for the Dublin Road site are given in Table 2-4 (attached) of the 1992 FS report.

The following section addresses the alternatives that have been evaluated to achieve these goals.

As discussed above, the NCP requires that when evaluating potential remedial alternatives, the threshold criteria of overall protectiveness of human health and the environment along with compliance with Applicable or Relevant and Appropriate Requirements (ARARs) must be met. The five primary balancing criteria are then used to weigh trade-offs between the alternatives.

o Overall Protection of Human Health and the Environment

Alternative 7, Stabilization and Off-site Disposal, would likely offer the

highest overall protection of human health and the environment due to the elimination of the source from the site. Alternatives 4, 5, 6, and 8 would offer lesser protection as compared to Alternative 7. Under Alternatives 4 and 5, only part of the waste material would be stabilized. Under Alternative 6, all the waste material would be stabilized resulting in reduced contaminants leaching. Under Alternative 4, stabilized and unstabilized waste would be placed on the ground surface without bottom a liner and leachate collection system, whereas under Alternatives 5 and 6, stabilized and/or unstabilized waste would be placed in a properly designed and constructed cell. Under Alternative 8, no stabilization would be done.

The No-Action alternative (Alt. 1) would not be protective of human health or the environment because the only contaminant removal process available would be natural attenuation. It would take decades to reduce the concentrations to acceptable levels.

Under alternative 6B the waste material would be stabilized and contained in a cell, and contaminated surface and groundwater would be removed and treated. This would result in eliminating the exposure pathways. Therefore alternative 6B would be protective of human health and the environment.

o Compliance with ARARs

The most significant of the ARARs at the site is the New York State groundwater standards. State regulations define the best usage of groundwater as a source of drinking water. Therefore, the assigned standards are stringent. Alternatives 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B, 8A, and 8B include provisions for directly addressing groundwater and surface water contamination and are capable of achieving ARAR's for groundwater and surface water. These alternatives also address soil contamination as a source of contaminants to the groundwater by leaching.

Chemical-specific ARARs (see Table 2-4) are not met by the No Action alternative.

Action-Specific ARARs (6NYCRR Part 360 requirements) are satisfied under Alternatives 5A, 5B, 6A, 6B, 7A, 7B, 8A, and 8B. Action-specific ARARs are not met by Alternative 4A or 4B.

The location-specific ARAR identified for the Dublin Road Site (namely, protection of wetlands) is satisfied under all Alternatives, except the No Action Alternative.

Currently, there are no ARARs for contaminated sediments, but the State of New York has developed guidance values for evaluating sediment contamination. These values are "TBCs" as defined on page 11. The concentration of several contaminants in sediments at the site somewhat exceed these guidance values. Alternatives 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B 8A, and 8B would directly clean up sediments by removing the sediments from the site. Because low concentrations of contaminants in Jeddo Creek sediments would not pose a significant ecological risk, these sediments would not be disturbed. A monitoring program of Jeddo creek sediments would be required to ensure that the sediment contamination does not naturally degrade.

o Long-Term Effectiveness and Permanence

Alternative 1 (No Action) is not considered reliable for the long term due to the continued presence of contaminants above health based levels on-site. Alternatives 8A and 8B (containment) do not stabilize the waste and are considered to be less reliable in providing long-term effectiveness as compared to the other remaining alternatives. The state-of-the-art has not defined

the long-term effectiveness of stabilization (Alternatives 4 through 7). The stabilization process is a chemical reaction characterized by the generation of heat, a change in physical and chemical properties, and a reduction in moisture content. This reaction is not reversible, but may be affected by exposure to the environment. The proposed stabilization technique is expected to be effective indefinitely. This is especially true in the case of Alternatives 5, 6, and 7, since the treated material would be protected from the environment and other destructive forces by a containment cell designed to meet the performance standards.

Upon completion of the source remediation, implementation of either on-site or off-site contaminated water treatment would provide long-term effectiveness and permanence.

o Reduction in Toxicity, Mobility, or Volume

Waste treatment by stabilization (Alternatives 4 through 7) would result in reducing the mobility of the contaminants. However, no reduction in volume or toxicity of the contaminants already present in the waste pile materials or soils/sediments would result. Stabilization would actually result in an increase in volume due to the addition of lime kiln dust. For Alternatives 8A and 8B, the mobility of contaminants would be reduced due to the provision of the cap and the cut-off wall, but to a lesser degree. For these alternatives, no reduction in toxicity or volume would occur. Treatment of the surface water and groundwater would result in a permanent reduction in volume of contaminated water, contaminant mobility, and off-site migration. Alternative 1 (No Action) would not result in the reduction of the toxicity, mobility, or volume of contaminants.

o Short-Term Effectiveness

Alternatives 4A, 5A, 6A, 7A, and 8A which involve off-site transportation of contaminated water pose some risk to the community and workers during handling and transportation operations. Each of the potential short-term effects can be controlled using proper engineering and transportation practices.

Alternatives 4A, 4B, 5A, 5B, 6A, 6B, 7A, and 7B involve significant soil excavations which would expose heavily contaminated soils. Controlling the emissions of vapors and contaminated particulates would be difficult but could be done using engineering controls. Transportation of excavated soil (Alt. 7A, and 7B) would present additional risk associated with the transportation of the waste material.

Alternative 1 would have no short-term effectiveness and existing impacts would continue.

o Implementability

Alternative 1 is easily implementable and results in no change in the existing conditions. Stabilization of the waste material (Alternatives 4 through 7) is straightforward and uses standard construction equipment. Site specific treatability studies indicate that stabilization using 10% lime kiln dust by weight would reduce the leachability of lead by 93% in soil from the waste pile. Many vendors would be available to provide these services. Construction of a cap (Alternatives 4, 5, 6 and 8) can be implemented using standard construction equipment. A cap can be constructed relatively quickly if the ground is not frozen or saturated. Material for the cap is available locally. Liner material is readily available from the manufacturers. Long-term monitoring and maintenance of the cap would be required. Landfill capacity for Alternative 7A or 7B, which would require disposal of approximately 32,000 cubic yards of treated waste material to a permitted sanitary

landfill in the area, is available.

o Cost

The total cost of remediation varies from \$722,808 for the No Action alternative to \$13,382,399 for Stabilization, Off-site Disposal, and Off-site Water Treatment. The comparison of the estimated capital cost, present worth cost, and the total project cost of all of the alternatives is given in the attached Table 4-16 from the FS report. The following table summarize the total present worth cost of the various alternatives. All alternatives include monitoring.

Estimated Present Worth of Costs of Alternatives

Alt. 1 - No action.....	\$722,808
Alt. 4A - Stabilization, Off-site WaterTreatment.....	\$8,969,581
Alt. 4B - Stabilization, On-site Water Treatment.....	\$6,772,119
Alt. 5A - Stabilization, On-site Disposal in Part 360 cell, OffsiteWaterTreatment.....	\$10,909,831
Alt. 5B - Stabilization, On-site Disposal in Part 360 Cell, On-site Water Treatment.	\$8,712,369
Alt. 6A - Stabilization, On-site Disposal in Customized Part 360 Cell, Off-site Water Treatment.....	\$10,613,919
Alt. 6B - Stabilization, On-site Disposal in Customized Part 360 Cell, On-site Water Treatment.....	\$8,416,457
Alt. 7A - Stabilization, Off-site Disposal, Off-site Water Treatment.....	\$13,382,399
Alt. 7B - Stabilization, Off-site Disposal, On-site Water Treatment.....	\$11,184,937
Alt. 8A - Containment, Off-site Water Treatment.....	\$7,841,961
Alt. 8B - Containment, On-site Water Treatment.....	\$5,644,499

o State Acceptance

Based on its review of the RI/FS reports the NYSDEC concurs with the selected remedy identified below.

The New York State Department of Health (NYSDOH) has reviewed the supporting documents and concurs with the selected remedy.

o Community Acceptance

The responsiveness summary (Exhibit C) for this project identifies community concerns and presents responses to those concerns.

IX. SELECTED REMEDY

Based upon the results of the RI/FS, and the criteria for selecting a remedy under the applicable laws and regulations, the NYSDEC and USEPA have selected Alternative 6B (Stabilization, On-site Disposal in Customized Part 360 Cell, On-site Water Treatment) to remediate the site. The NYSDOH concurs with the selected remedy. The estimated present worth and capital costs for the remedy are, respectively, \$8,416,457 and \$5,693,838.

The essential elements of this alternative for source control are as follows:

- (a) excavate, screen and stabilize all the contaminated materials (soils and sediments) from the waste pile, rectangular pond, swamp, drainage swale, the quarries and the other areas that are contaminated above the remedial action objectives;
- (b) store the stabilized material in a temporary stock pile and test it to ensure that it passes the TCLP, and other tests for those site specific compounds not included in TCLP;
- (c) construct the composite liner(s), leachate collection and removal system(s) of the customized Part 360 cell;
- (d) redeposit the treated material in the customized cell;
- (e) rinse, dewater, treat if needed, all material greater than 2 inches in diameter and deposit it in the proposed on-site cell; and
- (f) install a cover consisting of geomembrane, cover soil, top soil, and vegetation for erosion control consistent with Part 360 Regulations.

This alternative includes on-site treatment of the process water, groundwater from the overburden and upper bedrock aquifers, surface water from the rectangular pond, swamp, drainage areas, east and west quarries, and disposal of the treated water to Jeddo Creek. A groundwater extraction system will be designed and installed. The water treatment will include electrochemical treatment, pH adjustment, sedimentation, filtration, carbon adsorption, and/or any other processes which may be necessary to achieve the required water quality for disposal to the Creek.

Under the selected alternative, wetlands will be restored at the swamp and east and west quarry locations. The site will be backfilled and graded where necessary. The selected alternative will limit access and use of the site utilizing the existing fence and signs and by providing new signs where necessary. A new fence will be installed around the customized cell and around part or all of the groundwater treatment and extraction system. The alternative will include provisions for precluding future use of the site and on-site groundwater by deed restrictions.

An operation and maintenance (O&M) program will be part of this alternative and will be developed during the design phase of this alternative. The O&M program will include operation and maintenance of the pump and treat system, and leachate collection system, and the containment cell. A monitoring program will also be developed during the design phase and will include groundwater, surface water, air (during construction), and sediment monitoring. A list of sampling parameters will be developed during design which will include all the compounds detected in site soils/sediments and groundwater.

The conceptual design of the customized Part 360 containment cell is shown in Figure 3-8. Section 360-2.14 of 6NYCRR Part 360 allows modification to the Part 360 containment cell, if a containment cell is solely used for the disposal of the solid waste resulting from commercial or industrial operations. This section states that the requirements of Subpart 360-2 can be modified on a case specific basis if the applicant can demonstrate that a specific landfill requirement is not necessary. The final details of containment cell design will be determined during the design phase of the selected remedy.

The selected alternative achieves the ARARs and RAOs more quickly, or as quickly, and at less cost than the other options. The general RAOs are given on page 12 and media specific RAOs are given in Table 2-4. Therefore, the preferred alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria. EPA, NYSDOH and the NYSDEC believe that the preferred alternative will be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy also will meet the statutory preference for the use of treatment as a principal element.

If monitoring indicates that continued operation of the remedy is not producing significant reductions in the concentrations of contaminants in groundwater, in accordance with the NCP, the NYSDEC and the USEPA will evaluate whether discontinuance or revision of the remedy is warranted. The criteria for discontinuation will include an evaluation of the operating conditions and parameters as well as a statistical determination that the remedy has attained the feasible limit of contaminant reduction and that further reductions would be impracticable.

The selected alternative will include annual monitoring of the downgradient domestic wells for site specific compounds, for a period of five years beginning in 1994. Residential Downgradient wells will include all wells on Dublin Road between the site and the Fruit Avenue, and all wells on Fruit Avenue within one mile north of Dublin Road. Based on the evaluation of the data, the monitoring may be extended beyond five years.

I. STATUTORY DETERMINATIONS

The following discussion describes how the remedy complies with the decision criteria in the laws and regulations.

1. Protection of Human Health and the Environment

The proposed remedy is protective of human health and the environment. Contaminated soils/sediments will be removed, stabilized and contained in a controlled cell. This will provide adequate protection against ingestion of, or contact with, the contaminated soils/sediments; minimize damage to and provide adequate protection of, the saturated zone from contaminants migrating from the soil; and adequately protect against contaminated dust emissions into ambient air. Groundwater will be extracted and treated along with the surface water. The water treatment will include electrochemical treatment, pH adjustment, sedimentation, filtration, and/or carbon absorption to achieve the required water quality for disposal to the Creek. This will adequately protect against future ingestion of, contact with, or spread of the contaminated groundwater. No unacceptable short-term risks or cross-media impacts will be caused by implementation of the remedy.

2. Compliance with ARARs

Alternative 6B, will result in compliance with all applicable or relevant and appropriate federal and state requirements.

The remedy will continue to be operated and improved as necessary until such time that compliance with all ARARs has been obtained or a determination is made that no further reductions in contaminant concentrations are feasible.

3. Cost-Effectiveness

Of the alternatives that can achieve the remedial goals and meet the threshold evaluation criteria (Alt. 5A, 5B, 6A, 6B, 7A, and 7B), Alternative 6B has the lowest cost.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable.

The NYSDEC and the USEPA have determined that the selected remedy provides the best balance of tradeoffs among the alternatives for remediating the site. Of the alternatives that met the threshold criteria of "overall protection of human health and the environment" and "compliance with ARARs," the balancing criteria of "short-term impacts and effectiveness," "implementability," and "cost" were the most critical criteria for selecting the remedy. The remaining alternatives were comparable in their ability to meet the remaining criteria ("long-term effectiveness and permanence", and "reduction of toxicity, mobility, or volume"). The treatment of water will result in a permanent remedy for groundwater.

Alternatives 8A and 8B are considered less reliable for long-term effectiveness as compared to the other remaining alternatives. Alternatives 7A and 7B offer higher overall protection to human health and the environment but scored low due to the higher cost and short-term effectiveness (increased short-term risk to the community due to transportation of the hazardous material). Containment cells under Alternatives 5A, 5B, 6A and 6B can be designed to comply with the latest performance standards. However, Alternatives 6A and 6B are considered more reliable over the long-term as compared to Alternatives 5A and 5B, since under Alternatives 6A and 6B all the material will be stabilized resulting in lesser potential of future leaching and release of contaminants to the environment.

5. Preference for Treatment as Principal Elements

The principal threat is posed by contaminated soils and the contaminants that leach from the soils to the groundwater. As discussed above, stabilization and containment of soils and treatment of contaminated water are the principal elements of the remedy.

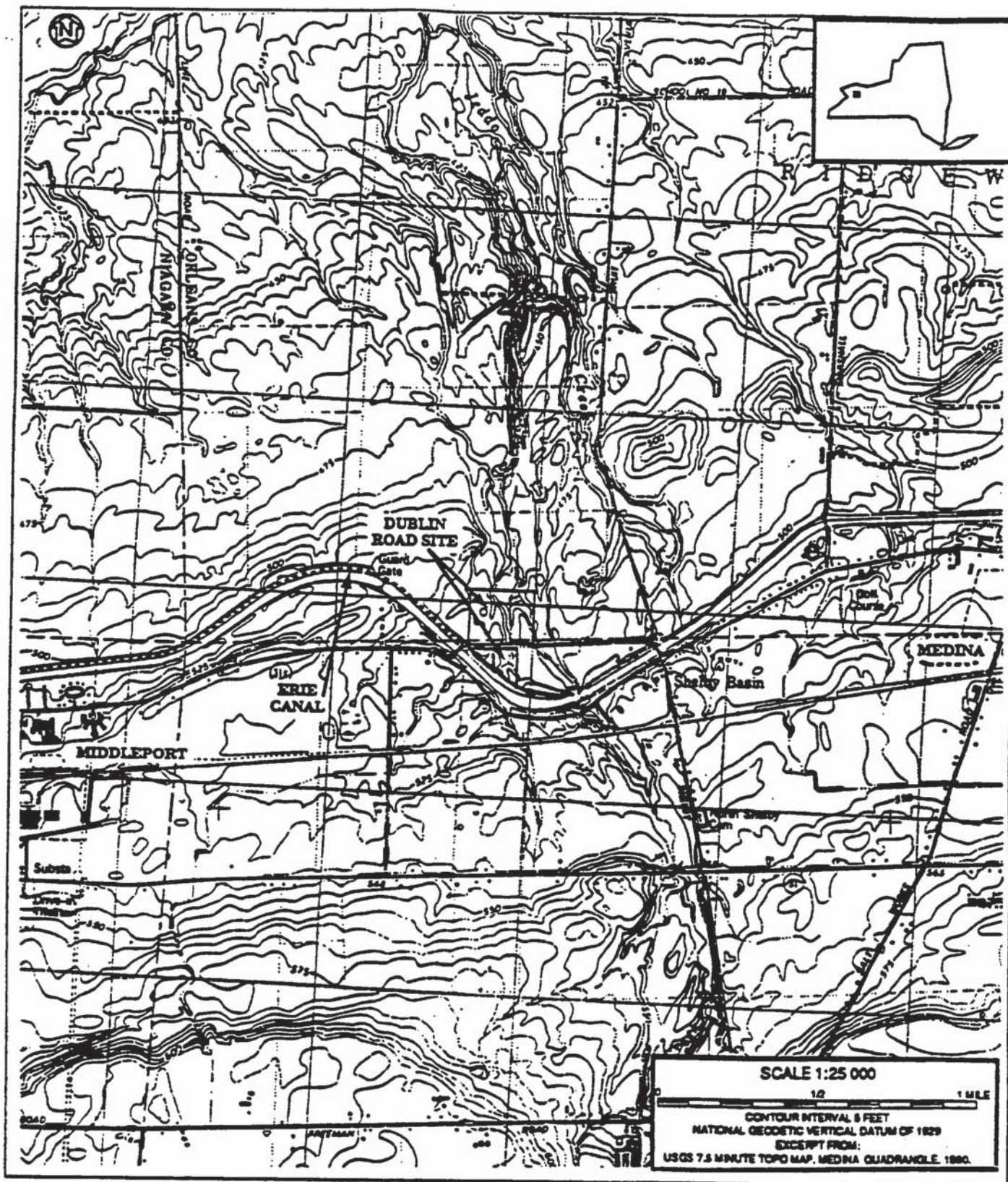


Figure 1-1
Location of the Dublin Road Site

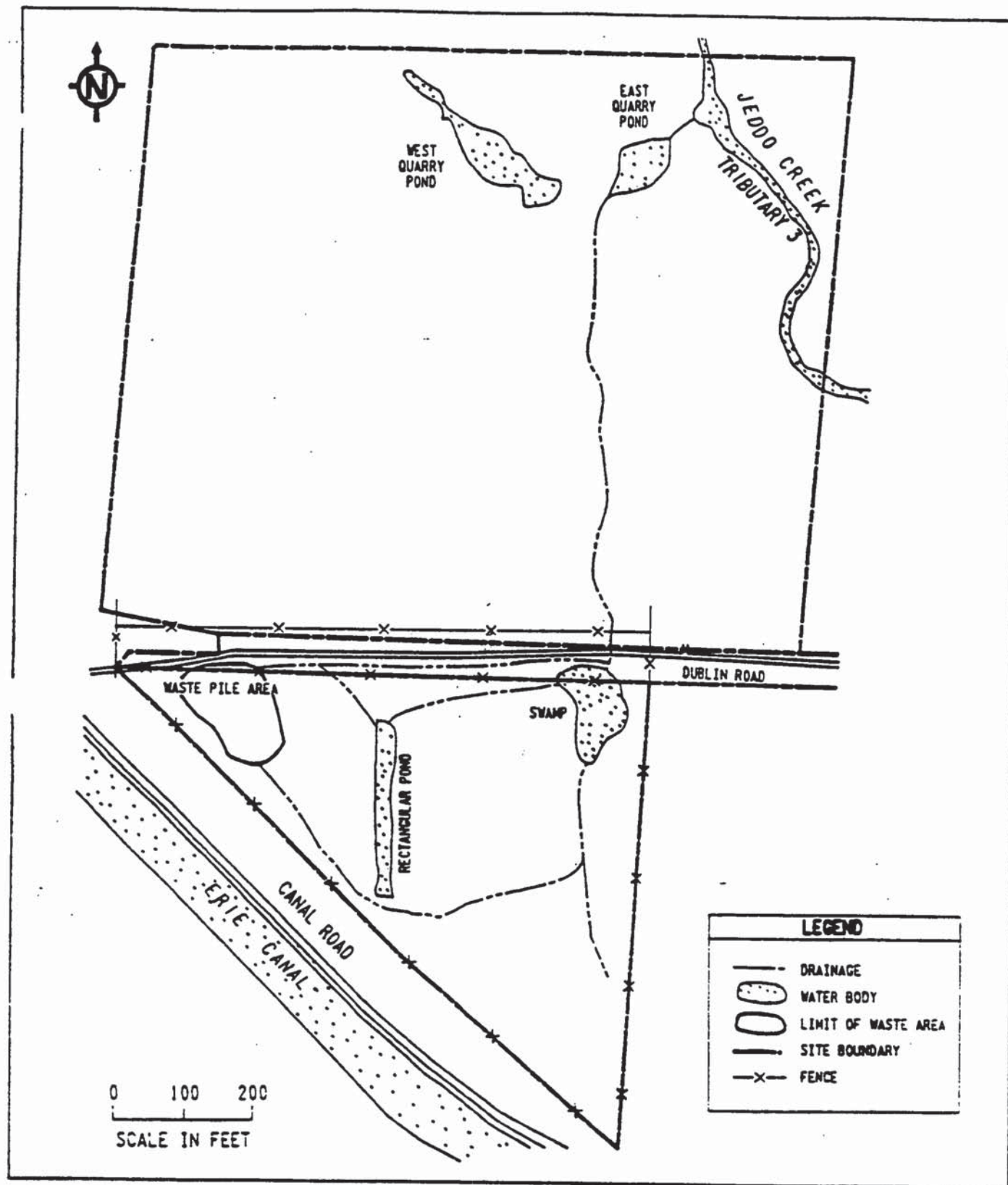


Figure 1-2
Dublin Road Site Features

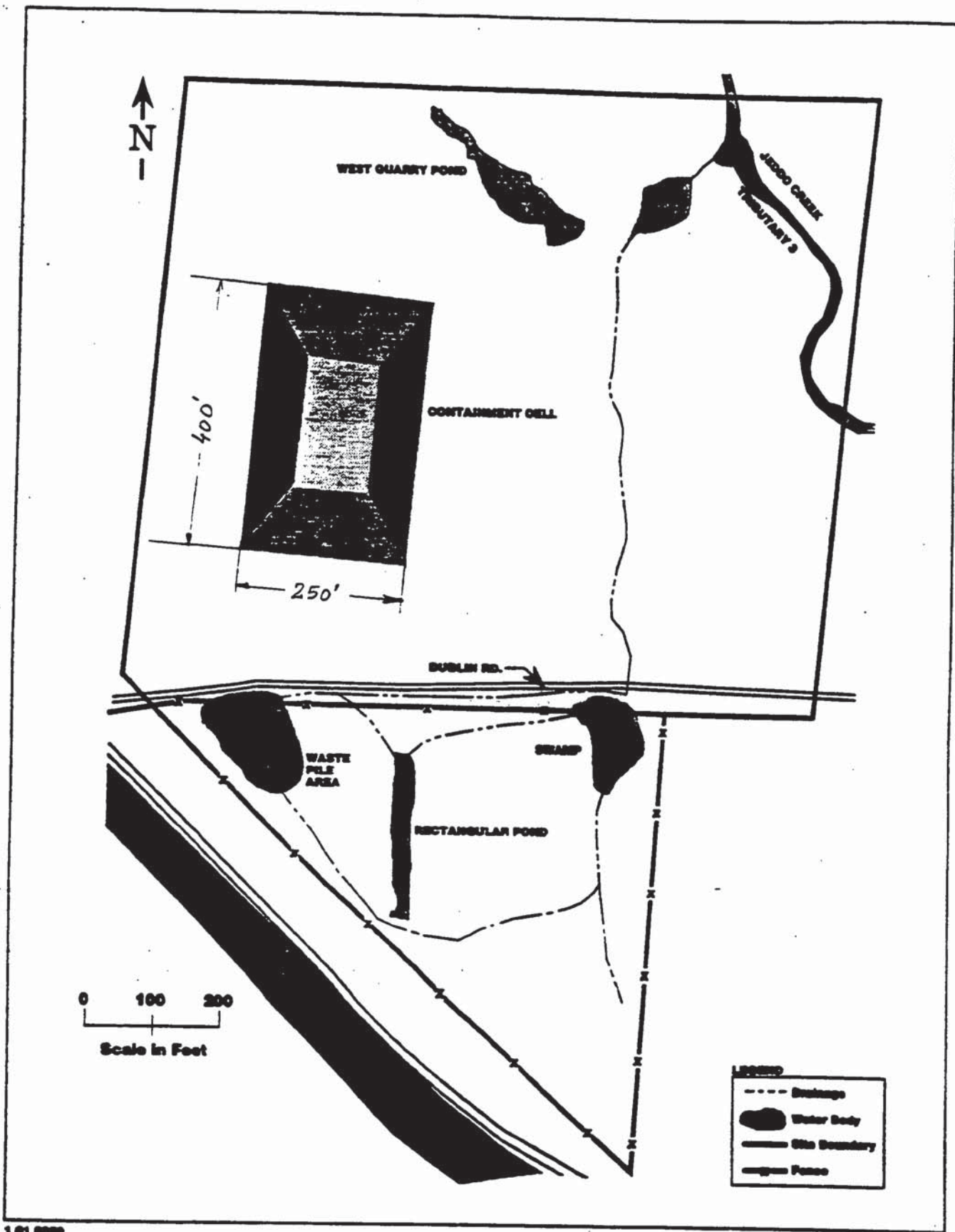


Figure 3-7
Dublin Road Containment Cell Location

TABLE 1-1
SUMMARY OF CHEMICALS IN THE DUBLIN ROAD SITE WASTE PILE^a

	Concentrations (mg/kg)									
	As	Cu	Hg	Zn	Pb	α-BHC	β-BHC	δ-BHC	γ-BHC	
Mean ^a	2,569	168	1.55	162	6,157	1.87	0.41	0.29	0.38	
Maximum	20,400	795	15	1,120	41,600	23	4	3.1	3.3	
Minimum	<10	11	<0.1000	16	38	<0.0092	<0.0092	<0.0092	<0.0092	
Number of Values	24	24	24	24	24	24	24	24	24	
Number of Values Below Method Detection Limit	1	0	3	0	0	18	21	20	19	
Maximum Expected Background Values	40 ^a	100 ^a	3 ^a	300 ^a	200 ^a	NAD ^a	NAD	NAD	2 ^a	
Number of Values Above Maximum Expected Background Values	23	8	3	4	12	NAD	NAD	NAD	2	
Mean ^a	p,p'-DDD									
Maximum	p,p'-DDE									
Minimum	p,p'-DDT									
Number of Values										
Number of Values Below Method Detection Limit										
Number of Values Above Maximum Expected Background Values										

^aValues from BDI 1968 soil borings 81-86.
^bValues reported as below the method detection limit were included as the method detection limit for calculating the mean.
^cValues from Brannan, et al., 1981 and Anderson, et al., 1981. The concentration of some chemicals may be higher for areas in which pesticides were applied to vegetable or fruit crops.
^dNAD = No Available Data establishing maximum background values.
^eValues from EPA, 1975.
^fSource: BDI, 1969.

TABLE 1-2
CHEMICAL CONCENTRATION OF INDICATOR
ANALYTICAL PARAMETERS IN SURFACE WATER
 (ug/l unless specified)

Constituent	Rectangular Pond			Swamp			East Quarry		
	Mean ⁽¹⁾	Range	Number of Values	Mean	Range	Number of Values	Mean	Range	Number of Values
As (mg/l)	31.9	5.0-130	5	1.5	0.2-4.4	5	0.06	0.004-0.12	7
Cu (mg/l)	7.2	2.8-20.0	5	1.0	0.6-1.7	5	0.2	0.1-0.6	7
Pb (mg/l)	0.9	0.7-1.5	5	0.01	ND-0.027	2	0.008	ND	5 ^m
Zn (mg/l)	29.2	5.3-74.0	5	1.7	0.2-3.3	5	0.6	0.1-1.4	7
α-BHC	2,404.5	ND ⁽²⁾ -12,000	5	1.4	ND-4.4	5	0.09	ND-0.35	7
β-BHC	1,452.5	0.63-5,800	4	0.4	ND-1.0	4	0.07	ND-0.11	5
δ-BHC	1,503.0	1.10-6,000	4	0.6	ND-1.9	4	0.04	ND-0.11	5
γ-BHC	1,363.1	0.82-6,800	5	0.7	0.05-2.7	5	0.08	ND-0.25	7
o,p'DDD	17.6	0.18-70	4	0.01	ND-0.025	4	0.003	ND	4 ^m
p,p'DDD	23.0	0.31-90	4	0.01	ND-0.025	4	0.003	ND	4 ^m
o,p'DDE	7.6	ND-30	4	0.01	ND-0.025	4	0.003	ND	4 ^m
p,p'DDE	37.6	ND-150	4	0.02	ND-0.090	4	0.003	ND	4 ^m
o,p'DDT	8.5	1.00-30	4	0.01	ND-0.025	4	0.003	ND	4 ^m
p,p'DDT	189.4	1.90-750	4	0.02	ND-0.025	4	0.003	ND	4 ^m
2,4-D	96.6	ND-470	5	0.78	ND-3.61	5	0.21	ND-1.27	7
2,4,5-T	10.3	ND-50	5	0.51	ND-2.47	5	0.27	ND-0.74	7
pH (s.u.)	2.2	1.9-2.4	5	2.9	2.4-3.3	5	3.5	3.1-4.7	9
EC (umhos/cm)	10,612	5,700-20,000	4	2,625	1,600-4,400	4	1,020	580-1,850	8

Source: BEL, 1988.

NOTE:

⁽¹⁾Laboratory values which were reported as less than the method detection limit were divided by 2 for calculation of the mean.

⁽²⁾ND = Not Detected

⁽³⁾V as not detected at levels above the method detection limit.

TABLE 1-2
(continued)

Constituent	West Quarry			Jeddo Creek, Downstream of East Quarry Discharge			Jeddo Creek, Upstream of East Quarry Discharge		
	Mean ⁽¹⁾	Range	Number of Values	Mean	Range	Number of Values	Mean	Range	Number of Values
As (mg/l)	0.01	ND ⁽²⁾ -0.04	4	0.016	ND-0.139	9	0.005	ND-0.018	4
Cu (mg/l)	0.02	ND-0.03	4	0.007	ND-0.018	5	0.007	ND-0.008	4
Pb (mg/l)	0.01	ND	4	0.007	ND-0.015	3	0.003	ND	2 ⁽³⁾
Zn (mg/l)	0.22	0.02-0.46	4	0.037	0.002-0.161	9	0.021	0.003-0.028	4
α-BHC	0.02	ND-0.04	4	0.011	ND-0.04	9	0.004	ND-0.010	4
β-BHC	0.018	ND-0.04	4	0.004	ND-0.005	8	0.003	ND-0.005	4
δ-BHC	0.03	ND-0.06	4	0.009	ND-0.030	8	0.003	ND-0.005	4
γ-BHC	0.01	ND-0.02	4	0.007	ND-0.020	9	0.003	ND-0.005	4
o,p'DDD	0.005	ND	2 ⁽³⁾	0.003	ND	4 ⁽³⁾	0.003	ND	4 ⁽³⁾
p,p'DDD	0.005	ND	2 ⁽³⁾	0.003	ND	4 ⁽³⁾	0.003	ND	4 ⁽³⁾
o,p'DDE	0.005	ND	2 ⁽³⁾	0.003	ND	4 ⁽³⁾	0.003	ND	4 ⁽³⁾
p,p'DDE	0.005	ND	2 ⁽³⁾	0.003	ND	4 ⁽³⁾	0.004	ND	4 ⁽³⁾
o,p'DDT	0.005	ND	2 ⁽³⁾	0.004	ND-0.010	4	0.004	ND-0.010	4
p,p'DDT	0.005	ND	2 ⁽³⁾	0.003	ND	4 ⁽³⁾	0.003	ND-0.005	4
2,4-D	0.13	ND-0.300	4	0.028	ND-0.100	8	0.210	ND-0.40	3
2,4,5-T	0.16	ND-0.300	4	0.036	ND-0.195	8	0.083	ND-0.20	3
pH (a.s.)	7.0	6.3-7.6	2	7.8	7.2-8.2	5	8.2	7.4-9.0	4
EC (µmhos/cm)	498	425-570	2	558	460-650	5	545	460-620	4

Source: BEI, 1988

NOTE:

⁽¹⁾Laboratory values which were reported as less than the method detection limit were divided by 2 for calculation of the mean.

⁽²⁾ND = Not Detected

⁽³⁾Was not detected at levels above the method detection limit.

TABLE 1-2
(continued)

Constituent	Jeddo Creek at Dublin Road			Jeddo Creek at Highway 31E Background		
	Mean ^{a)}	Range	Number of Values	Mean	Range	Number of Values
As (mg/l)	0.004	ND ^{b)} -0.022	7	0.002	ND-0.003	4
Cu (mg/l)	0.006	0.004-0.008	3	NO DATA ^{c)}		
Pb (mg/l)	0.006	ND-0.015	3	NO DATA		
Zn (mg/l)	0.013	ND-0.023	7	0.012	0.006-0.022	4
α-BHC	0.030	0.01-0.170	7	0.062	ND-0.180	4
β-BHC	0.005	ND	6 ^{d)}	0.005	ND	4 ^{d)}
δ-BHC	0.012	ND-0.050	6	0.018	ND-0.060	4
γ-BHC	0.018	ND-0.050	7	0.020	ND-0.050	4
o,p'DDD	0.005	ND	2 ^{d)}	NO DATA		
p,p'DDD	0.005	ND	2 ^{d)}	NO DATA		
o,p'DDE	0.005	ND	2 ^{d)}	NO DATA		
p,p'DDE	0.005	ND	2 ^{d)}	NO DATA		
o,p'DDT	0.005	ND	2 ^{d)}	NO DATA		
p,p'DDT	0.005	ND	2 ^{d)}	NO DATA		
2,4-D	0.066	ND-0.200	7	0.006	ND-0.10	4
2,4,5-T	0.011	ND-0.610	7	0.014	ND-0.050	4
pH (s.u.)	8.3	8.3-8.4	3	NO DATA		
EC (µmhos/cm)	590	520-650	3	NO DATA		

Source: BEI, 1988

NOTE:

^{a)}Laboratory values which were reported as less than the method detection limit were divided by 2 for calculation of the mean.

^{b)}ND = Not Detected

^{c)}Was not detected at levels above the method detection limit.

^{d)}Samples were not collected or analyzed for this parameter at this sampling location.

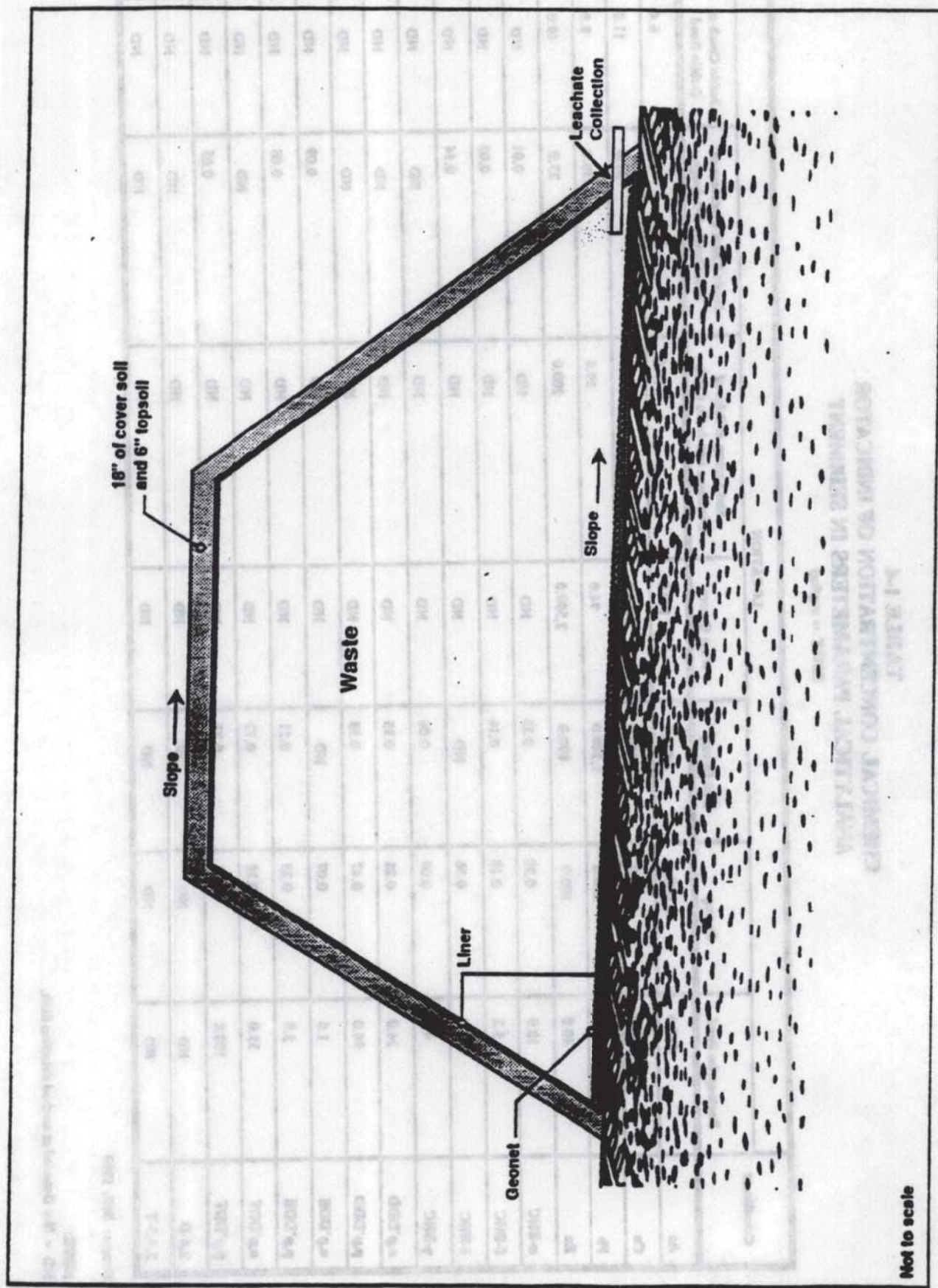


Figure 3-8
Customized Part 360 Containment Cell
 (Conceptual Sketch - Final Details, Consistent with 6 NYCRR Part 360 Regulations, will be provided during the design phase)

TABLE 1-4
CHEMICAL CONCENTRATION OF INDICATOR
ANALYTICAL PARAMETERS IN SEDIMENT
 (UNIT - mg/kg)

Constituent	LOCATION						
	Rectangular Pond	Swamp	East Quarry	West Quarry	East Quarry at Point of Discharge into Jeddoo Creek	Jeddoo Creek Upstream of East Quarry Discharge	Jeddoo Creek at Dublin Road
As	640.0	4,850.0	3,600.0	180.0	19.0	5.9	6.4
Cu	1,020.0	260.0	2,630.0	2,460.0	82.0	35.0	11.0
Pb	400.0	250.0	1,240.0	74.0	29.0	130.0	8.9
Zn	40.0	100.0	890.0	2,580.0	200.0	23.0	49.0
o-BHC	10.0	0.30	0.25	ND	ND	0.01	ND
p-BHC	5.2	0.19	0.16	ND	ND	0.02	ND
o-BHC	4.5	0.56	ND	ND	ND	0.14	ND
γ-BHC	4.1	0.09	0.04	ND	ND	ND	ND
o,p'-DDD	24.0	0.26	0.35	ND	ND	ND	ND
p,p'-DDD	94.0	0.47	0.55	ND	ND	ND	ND
o,p'-DDE	1.6	0.07	ND	ND	ND	0.09	ND
p,p'-DDE	3.9	0.23	0.51	ND	ND	0.06	ND
o,p'-DDT	55.0	0.28	0.72	ND	ND	ND	ND
p,p'-DDT	100.0	0.75	0.33	ND	ND	0.05	ND
2,4-D	ND	ND	ND	ND	ND	ND	ND
2,4,5-T	ND	ND	ND	ND	ND	ND	ND

Source: BEI, 1983

NOTE:

ND = Not Detected at method detection limit.

TABLE 1-6
CHEMICAL CONCENTRATION OF INDICATOR
ANALYTICAL PARAMETERS IN THE OVERBURDEN GROUNDWATER
 (ug/l unless specified)

Constituent	Background ¹⁾			Waste Pile Area ²⁾			Downgradient of Pile ³⁾		
	Mean ⁴⁾	Range	Number of Values	Mean	Range	Number of Values	Mean	Range	Number of Values
As (mg/l)	0.020	ND ⁵⁾ -0.112	12	37.4	ND-366.0	19	0.34	ND-6.79	36
Cu (mg/l)	0.006	ND-0.014	12	2.5	ND-37.2	16	0.37	ND-4.32	34
Pb (mg/l)	0.006	ND-0.015	12	0.02	ND-0.090	10	0.009	ND-0.050	23
Zn (mg/l)	0.035	0.023-0.080	12	7.2	ND-38.9	19	5.1	ND-86.0	36
α-BHC	0.025	ND-0.210	16	14.23	ND-240.0	24	0.169	ND-1.400	45
β-BHC	0.012	ND-0.060	16	1.09	ND-6.60	23	0.044	ND-0.330	45
δ-BHC	0.011	ND-0.060	16	3.31	ND-39.00	23	0.086	ND-1.600	45
γ-BHC	0.008	ND-0.040	16	3.13	ND-24.40	23	0.095	ND-1.200	45
o,p'DDD	0.009	ND-0.040	8	0.016	ND-0.040	5	0.026	ND-0.140	10
p,p'DDD	0.006	ND-0.020	12	0.179	ND-1.490	10	0.042	ND-0.330	19
o,p'DDE	0.005	ND-0.005	12	0.061	ND-0.400	10	0.016	ND-0.090	19
p,p'DDE	0.008	ND-0.040	12	0.015	ND-0.070	10	0.011	ND-0.040	19
o,p'DDT	0.015	ND-0.090	12	0.207	ND-1.850	10	0.040	ND-0.250	19
p,p'DDT	0.005	ND-0.010	12	0.163	ND-1.260	10	0.153	ND-1.290	19
2,4-D	3.797	ND-24.800	12	12.05	ND-53.50	8	5.67	ND-68.30	17
2,4,5-T	1.075	ND-8.530	12	2.20	ND-11.30	8	2.93	ND-19.80	17
pH (a.u.)	7.0	3.8-8.0	16	5.2	1.1-8.1	27	5.4	2.8-11.7	54
EC (umhos/cm)	1,131	400-3,000	16	4,554	530-20,000	27	1,876	375-5,000	55

Source: BEI, 1988

NOTE:

¹⁾Background Wells: 25,26,27,28

²⁾Waste Pile Area Wells: 1,2,5,6,7,8

³⁾Downgradient Wells: 3A,4,9,10,11,12,14,16,18,19,20,21,23,30,57,59

⁴⁾Laboratory value which were reported as less than the method detection limit were divided by 2 for calculation of the mean.

⁵⁾ND = Not Detected

TABLE 1-7
CHEMICAL CONCENTRATION OF INDICATOR
ANALYTICAL PARAMETERS IN THE UPPER BEDROCK AQUIFER
 (ug/l unless specified)

Constituent	Background ⁽¹⁾			Waste File Area ⁽²⁾			Downgradient of File ⁽³⁾		
	Mean ⁽⁴⁾	Range	Number of Values	Mean	Range	Number of Values	Mean	Range	Number of Values
As (mg/l)	0.004	ND ⁽⁵⁾ -0.011	6	6.19	ND-40.0	7	5.60	ND-110	55
Cu (mg/l)	0.004	ND-0.006	6	0.23	ND-1.6	7	0.31	ND-6.57	49
Pb (mg/l)	0.003	ND-0.003	6	0.007	ND-0.015	3	0.004	ND-0.015	25
Zn (mg/l)	0.010	ND-0.017	6	0.13	0.017-0.242	6	5.51	ND-78	55
α-BHC	0.030	ND-0.180	7	4.74	ND-32.0	9	2.68	ND-38.9	69
β-BHC	0.023	ND-0.130	7	0.59	ND-3.8	9	0.43	ND-11.6	69
δ-BHC	0.019	ND-0.100	7	0.77	ND-3.6	9	0.09	ND-2.0	69
γ-BHC	0.008	ND-0.025	7	1.60	ND-14.0	9	0.19	ND-4.2	69
o,p'DDD	0.005	ND-0.005	6	0.014	ND-0.050	4	0.009	ND-0.013	29
p,p'DDD	0.005	ND-0.005	6	0.006	ND-0.020	5	0.006	ND-0.08	31
o,p'DDE	0.011	ND-0.040	6	0.003	ND-0.005	5	0.004	ND-0.03	31
p,p'DDE	0.005	ND-0.005	6	0.006	ND-0.020	5	0.005	ND-0.03	31
o,p'DDT	0.005	ND-0.005	6	0.035	ND-0.16	5	0.022	ND-0.26	31
p,p'DDT	0.005	ND-0.005	6	0.006	ND-0.020	5	0.012	ND-0.021	31
2,4-D	0.157	ND-0.500	6	2.74	ND-13.40	5	0.293	ND-2.94	21
2,4,5-T	0.071	0.025-0.250	8	0.03	ND-0.05	5	0.540	ND-7.57	21
pH (s.u.)	7.3	6.5-8.8	7	6.0	3.0-8.0	8	6.5	4.2-11.5	75
EC (µmhos/cm)	610	260-1,350	6	4,148	480-8,000	6	2,404	300-7,500	59

Source: BEI, 1988

NOTE:

⁽¹⁾Background Wells: 40,87,88

⁽²⁾Waste File Area Wells: 37,53

⁽³⁾Downgradient Wells: 15,24,35,36,42,43,44,45,46,47,48,49,50,51,52,54,55,56,58,61,63,65,66

⁽⁴⁾Laboratory values which were reported as less than the method detection limit were divided by 2 for calculation of the mean.

⁽⁵⁾ND = Not Detected

TABLE 2-4
REMEDIAL ACTION OBJECTIVES FOR THE DUBLIN ROAD SITE

Contaminants	Media			
	Groundwater ¹ (mg/L)	Surface Water ² Class C (mg/L)	Soils ³ (mg/kg)	Sediments ⁴ (mg/kg)
Arsenic	0.025	0.19	35	5
Copper	0.2	0.027	25	19
Lead	0.025**	0.011	93	27
Mercury	NE	NE	0.1	0.11
Zinc	0.3	0.030	30	85
BHC (total)*	ND ⁵	0.00001 ⁶	NR	NE
α-BHC	..	..	0.48	NE
β-BHC	..	..	1.6	NE
γ-BHC	..	..	2.3	NE
DDT	ND ⁴	0.000001 ⁶	8.8	NE
DDE	ND ⁴	0.000001 ⁶	8.8	NE
DDD	ND ⁴	0.000001 ⁶	12.4	NE

¹ ARAR - (NYSDEC, 1991) Title 6 NYCRR Part 703 for Class GA groundwater.

² ARAR - (NYSDEC, 1991) Title 6 NYCRR Part 701 for Class C water. Calculated based on a measured hardness of 268 ppm for Juddo Creek Tributary 3.

³ (BEI, 1990) Remedial Action Objectives (RAOs) established in the FS (Outline and approved by NYSDEC).

⁴ (BEI, 1990) RAOs established in the FS (Outline and approved by NYSDEC).

⁵ The approved RAO for BHC compounds is 0.00005 mg/l based on analytical constraints (BEI, 1990).

⁶ The approved RAO for DDT, DDE and DDD is 0.0001 mg/l based on analytical constraints (BEI, 1990).

ND - not detectable

NE - RAOs for these contaminants not established. It is anticipated that clean-up to the RAOs for the remaining contaminants will remove all or most of this. Sediments in the rectangular pond will be cleaned to the RAOs for soils before backfilling.

NR - Value not required. RAOs for individual BHC compounds will govern.

• Applies to sum of all isomers.

**Effective February 1993, the action level for lead has been revised to now be 0.015 mg/L by USEPA (40 CFR Part 131)(Rev. 3/93, NYSDEC).

Revised 1/93

TABLE 4-16
COST COMPARISON OF REMEDIAL ALTERNATIVES

Remedial Alternative	Capital Cost (1992 \$)	Present Worth of O&M Cost (1992 \$)	Total Cost (1992 \$)
1: No Action	0	722,808	722,808
4A: Stabilization, Offsite WT	4,049,500	4,920,081	8,969,581
4B: Stabilization, Onsite WT	4,049,500	2,722,619	6,772,119
5A: Stabilization/Onsite Disposal in Part 360 Cell, Offsite WT	5,989,750	4,920,081	10,909,831
5B: Stabilization/Onsite Disposal in Part 360 Cell, Onsite WT	5,989,750	2,722,619	8,712,369
6A: Stabilization/Onsite Disposal in Customized Part 360 Cell, Offsite WT	5,693,838	4,920,081	10,613,919
6B: Stabilization/Onsite Disposal in Customized Part 360 Cell, Onsite WT	5,693,838	2,722,619	8,416,457
7A: Stabilization/Offsite Disposal, Offsite WT	8,462,318	4,920,081	13,382,399
7B: Stabilization/Offsite Disposal, Onsite WT	8,462,318	2,722,619	11,184,937
8A: Containment, Offsite WT	2,921,880	4,920,081	7,841,961
8B: Containment, Onsite WT	2,921,880	2,722,619	5,644,499

EXHIBIT A
ADMINISTRATIVE RECORD INDEX
FMC DUBLIN ROAD SITE
SITE ID NUMBER 8-37-001

1. Orders On Consent

- a. Order On Consent No. 837T021282 signed February 17, 1982.
- b. Order On Consent No. B8-0013-84-01, site no. 837001 signed February 9, 1988 for the remediation of the site.
- c. Amendment to Order On Consent no. B8-0013-84-01, Site No. 837001 signed January 16, 1992.

2. Investigation Reports

- a. "Investigation of Ground Water Contamination on FMC Property, Middleport, New York," Dated February 1979, prepared by Geraghty & Miller, Inc.
- b. "Preliminary Investigation of Ground Water Contamination in Bedrock underlying the Dublin Road Site at Middleport, New York," Dated October 1979, prepared by Geraghty and Miller, Inc.
- c. "Dublin Road Waste Site Field Investigation Report," Dated September, 1984, prepared by Bechtel National, Inc.
- d. "Remedial Investigation Report for the FMC Dublin Road Site Volume I", Dated May 1988, including August 9, 1988 revisions, prepared by Bechtel Environmental, Inc.
- e. "Remedial Investigation Report for the FMC Dublin Road Site Volume II," Dated May 1988, prepared by Bechtel Environmental, Inc.
- f. "Remedial Investigation Supplemental Report for the FMC Dublin Road Site Volume I," dated May 1989, including January 31, 1990 revisions, prepared by Bechtel Environmental, Inc.
- g. "Remedial Investigation Report for the FMC Dublin Road Site Volume II, Analytical Results," Dated May 1989, prepared by Bechtel Environmental, Inc.

3. Community Relations

- a. "Citizen Participation Plan FMC Dublin Road Site, Site no. 8-37-001, Orleans County, New York" issued June 1990, prepared by NYSDEC.
- b. Site Information Sheet FMC Dublin Road Site, issued July 1990, prepared by NYSDEC.
- c. Site Information Sheet FMC Dublin Road Site, issued July 1992, prepared by NYSDEC.
- d. Summary Report issued by the U.S. Environmental Protection Agency, Region 2, for the FMC Dublin Road

Site, dated March 1990.

4. Miscellaneous Reports and Correspondences

- a. "Preliminary Health Assessment FMC - Dublin Road Site, dated June 1989," prepared by N.Y.S. Department of Health under a cooperative agreement with the ATSDR.
- b. "NYSDOH Human Exposure Potential Ranking Model for the FMC Dublin Road Site," May 23, 1988, draft.

5. Feasibility Study Report

- a. "Feasibility Study Report for the FMC Dublin Road Site, Volumes 1 & 2" dated September 1992 (including January 1993 revisions), prepared by Bechtel Environmental Inc.

6. Proposed Plan

- a. "Proposed Remedial Action Plan for the FMC Dublin Road Site," dated January 1993, prepared by NYSDEC in consultation with USEPA.
- b. Public Notice of the availability of the administrative records, Public meeting, and of the opportunity to comment on the Proposed Plan.
- c. Transcript of the February 4, 1993 public meeting to present the Proposed Action Plan, prepared by Trio Reporting Service, Rochester, New York, dated February 24, 1993.
- d. Responsiveness Summary, included as Exhibit C of the Record of Decision.

Note: Literatures, guidance documents and correspondence referenced in various documents mentioned above are part of the Administrative Records.

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DIVISION OF HAZARDOUS WASTE REMEDIATION
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

CLASSIFICATION CODE: 2

REGION: 8

SITE CODE: 837001

EPA ID: NYD000511857

NAME OF SITE : FMC Corporation

STREET ADDRESS: Dublin Road

TOWN/CITY:

Shelby

COUNTY:

Orleans

ZIP:

14103

SITE TYPE: Open Dump-

Structure- Lagoon- Landfill-X Treatment Pond-

ESTIMATED SIZE: 6

Acres

SITE OWNER/OPERATOR INFORMATION:

CURRENT OWNER NAME....: FMC Corporation

CURRENT OWNER ADDRESS.: 2000 Market St., Philadelphia, PA

OWNER(S) DURING USE....: FMC

OPERATOR DURING USE....: FMC Corporation

OPERATOR ADDRESS.....: 2000 Market St., Philadelphia, PA

PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From 1933 To 1968

SITE DESCRIPTION:

Lat. 43 12'55"N Long. 78 26'30"W

Flat topography: Rural area with the nearest dwelling 1500 feet

Nearest waterbody: Jeddo Creek (Class D); 50 feet east of site

Barge Canal (Class B); 75 feet south of site

This is an inactive site at which the previous owner, Niagara Sprayer Corp., and the present owner, FMC Corp., disposed approx. 5,000 cu. yds. of hazardous waste. FMC and DEC entered into a Consent Order in 1982 in which FMC agreed to conduct a field investigation. They submitted a field investigation report to the DEC in September of 1984. A Remedial Investigation (RI) was started in April of 1986. The preliminary report for the RI was submitted under a DEC Consent Order signed in February of 1988, & has since been reviewed. An additional supplemental RI report was required and was submitted to the DEC in May of 1989. The RI report was reviewed and approved in May of 1990. A proposed draft Feasibility Study (FS) was submitted by FMC in January of 1991. The FS identified the need for treatability studies of soil, sediment and groundwater. In April of 1991, FMC began to implement the treatability study. In July of 1991, FMC took sediment samples from nearby Jeddo Creek in order to determine the extent of contamination in it. FMC has also performed a pump test to develop a groundwater extraction system. A finalized Feasibility Study (FS) report was submitted in December of 1992. A Record-of-Decision (ROD) is anticipated in the spring of 1993. A remedial design is scheduled to begin afterwards, and should continue into 1994.

HAZARDOUS WASTE DISPOSED: Confirmed-X
TYPE

Suspected-
QUANTITY (units)

Coal ash with iron, chlorides, arsenic
and unknown wastes

unknown

Sulfur and sulfur lime residues

unknown

Pesticides

unknown

Lab chemical wastes

unknown

ANALYTICAL DATA AVAILABLE:

Air- Surface Water-X Groundwater-X Soil-X Sediment-X

CONTRAVENTION OF STANDARDS:

Groundwater-X Drinking Water- Surface Water- Air-

LEGAL ACTION:

TYPE...: Consent Order State- X Federal-
STATUS: Negotiation in Progress- Order Signed- X

REMEDIAL ACTION:

Proposed- Under design- In Progress-X Completed-
NATURE OF ACTION: RI-FS

GEOTECHNICAL INFORMATION:

SOIL TYPE: Cazenovia gravelly silt loam
GROUNDWATER DEPTH: Approximately 5-15 feet

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

Groundwater monitoring has confirmed contamination above standards.
Surface water contamination has also been confirmed.

ASSESSMENT OF HEALTH PROBLEMS:

Chemicals found in on-site waste pile were found to contain elevated levels of arsenic, lead, mercury, hexachlorocyclohexanes and DDT. Some of these substances have also been detected in groundwater and surface water samples in excess of the NYS Groundwater Standards. Groundwater is used as a primary source of drinking water in the vicinity of the site. DOH has sampled residential wells in the vicinity and no contaminants in excess of State drinking water standards were detected. Site access and potential exposure to contaminated surface water runoff from the site on Dublin Road was restricted by construction of a fence.

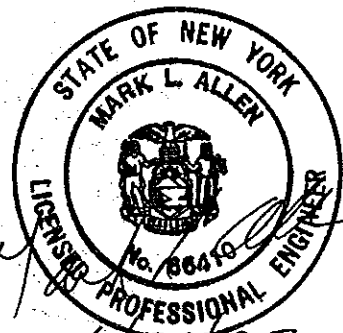
APPENDIX E INTERIM REMEDIAL ACTION REPORT

Interim Remedial Action Report
for the
FMC Dublin Road Site
Orleans County, New York

Prepared for:
FMC Corporation

Prepared by:
Bechtel Associates Professional Corporation
(New York)

June 1997



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ACRONYMS AND INITIALISMS

BAPC	Bechtel Associates Professional Corporation (New York)
BEI	Bechtel Environmental, Inc.
BNI	Bechtel National, Inc.
BHC	benzenehexachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DCN	design change notice
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	1,1,1-trichloro-2,2-bis(chlorophenyl)ethane
EPA	U.S. Environmental Protection Agency
FCR	field change request
FCN	field change notice
FMC	FMC Corporation
FS	feasibility study
GCL	geosynthetic clay liner
HDPE	high-density polyethylene
NPL	National Priorities List
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PHSO	project health and safety officer
PUF	polyurethane foam
RA	remedial action
RAO	remedial action objective
RI	remedial investigation
ROD	record of decision
SHSO	site health and safety officer
TCLP	toxicity characteristic leaching procedure
VOC	volatile organic compound

UNITS OF MEASURE

cfm	cubic foot per minute
cm/s	centimeters per second
ft	feet
gal	gallon
in.	inch
kg	kilogram
L	liter
m ³	cubic meter
mg	milligram
mil	one thousandth of an inch
min	minute
msl	mean sea level
ppm	parts per million
psi	pounds per square inch
s	second
μm	micrometer
μg	microgram
yd ³	cubic yard

1.0 EXECUTIVE SUMMARY

This Remedial Action (RA) report documents the completion of the construction phase RA activities at the FMC Corporation (FMC) Dublin Road Site (Dublin Road). This report was prepared in accordance with the U.S. Environmental Protection Agency's (EPA) *Close Out Procedures for National Priorities List Sites* (EPA, 1995). The RA at the Dublin Road site was conducted over three construction seasons (1994-96) and implemented the remedy selected in the Record of Decision (ROD) for the site (EPA 1993). Modifications to the selected remedy were approved by the New York State Department of Environmental Conservation (NYSDEC).

The Dublin Road site is a former waste disposal facility located in northwestern New York. The site is owned by FMC. An Administrative Consent Order was entered into between NYSDEC and FMC in 1982 to conduct a field investigation during 1983/84. In 1984, the Dublin Road Site was also proposed for inclusion on the National Priorities List (NPL) by EPA under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The site was included on the NPL in May 1986. FMC and NYSDEC executed a second Consent Order in February 1988 for remediation activities, including further remedial investigation (RI). This 1988 order superseded and replaced the 1982 Order. A RI for the site, including a supplemental field investigation, was completed in May 1989 and approved by NYSDEC in June 1990. The Proposed Feasibility Study (FS) for the site was approved in January 1993 and a ROD was issued by NYSDEC and EPA in March 1993.

The remedy selected in the ROD and detailed in Section 2 of this report required FMC to: (1) stabilize materials that failed toxicity characteristic leaching procedure (TCLP); (2) construct, consistent with 6 NYCRR Part 360, an onsite containment cell complete with leachate collection system and permanent cap; (3) deposit stabilized material and other soil/sediment contaminated above remedial action objectives (RAOs) in the onsite containment cell; (4) collect contaminated groundwater in a series of extraction wells; (5) treat contaminated runoff water, construction water, and groundwater in an onsite groundwater treatment system; (6) restore the wetlands that existed onsite; (7) install permanent fencing around the site; (8) place deed restrictions on the property at the completion of remediation; and (9) perform long-term operation, maintenance, and monitoring of the site.

The remedial design for the site was completed and approved in May 1994 (BAPC 1994). The RA phase began in May 1994 and construction was completed in September 1996. FMC conducted an inspection with representatives of NYSDEC, New York State Department of Health (NYSDOH), and EPA, and confirmed that the soil remediation work was complete and that the groundwater extraction and treatment system was operational and functional, subject to collection and submittal of operational and monitoring data under the operations and maintenance (O&M) Plan. EPA documented completion of construction activities in the Preliminary Close Out Report (EPA 1997).

The soil/sediment remedy began in May 1994 and was completed in September 1996. The entire site was cleared of trees and vegetation except for a small area north of Dublin Road. The wood was chipped, stockpiled, and later used as road bed material onsite. Surface water runoff from the controlled areas was collected, treated, and discharged to Jeddo Creek (1994) or the onsite wetlands (1995 and 1996). Excavated material that failed TCLP was stabilized and placed in the Containment Cell. Materials that passed TCLP but had contaminants greater than the RAOs were excavated and placed directly in the Containment Cell. Verification sampling was performed after a predetermined

depth of material was removed from an area. Generally most areas south of Dublin Road did not meet the RAOs and more material was removed during 1994 and 1995 construction season. The Containment Cell was expanded in 1995 to accommodate the extra material that was required to be removed. The Containment Cell was closed at the end of the 1995 construction season. FMC and NYSDEC agreed to resample the quarries and the area between the quarries during a meeting in February 1996. The analytical results showed that the sediments and soils within these areas did not meet the RAOs. In June of 1996, the Quarries were dewatered and the contaminated materials were excavated and transported offsite to a secure landfill at the Chemical Waste Management facility in Model City, NY. A new wetland was constructed north of Dublin Road and the area south of Dublin Road was graded and a soil layer placed over the bedrock. To control the surface water runoff from the adjacent municipal landfill and prevent it from flowing onto the Dublin Road Site, FMC recontoured the surface of a portion of the landfill using borrow from an offsite source. The disturbed areas were seeded and the construction equipment was demobilized from the site. In the fall of 1996, the groundwater extraction and treatment systems were placed into operation. The treated groundwater is being discharged to the onsite wetland in accordance with the established discharge limits.

1994 Season

- Began soil remediation in May 1994.
- Installed permanent fencing around the perimeter of the site and abandoned monitoring wells located in future construction and/or excavation areas.
- Constructed an area for the stabilization process equipment, a temporary storage pad for stabilized material, a temporary water treatment unit, and an onsite containment cell (consistent with 6 NYCRR Part 360) to contain stabilized soils and soils with levels of contaminants above RAOs.
- Surveyed site grid system in preparation for excavation and verification sampling of onsite contaminated areas.
- Excavated contaminated soils and sediments from the Waste Pile, Rectangular Pond, Quarries, Exclusion Zones, and other contaminated areas.
- Operated the pug mill to stabilize excavated soil and sediments during 1994
- Placed stabilized material that passed TCLP testing and soils contaminated above RAOs in the containment cell.
- Implemented site winterization plan.

1995 Season

- Restarted soil remediation in April 1995.
- Installed onsite permanent groundwater treatment system.
- Constructed containment cell extension to hold additional material.
- Installed groundwater extraction system.
- Excavated contaminated soils and sediments from the Waste Pile, Rectangular Pond, Drainage Swale (future wetland area).
- Completed stabilization operations and placing material in containment cell/cell extension.
- Installed permanent cap over containment cell/cell extension (consistent with 6 NYCRR Part 360) and completed cell closure.
- Implemented site winterization plan.

1996 Season

- Restarted remediation in April 1996.
- Began annual monitoring of domestic wells downgradient (within 1 mile) of site.
- Removed and transported sediments from onsite Quarries to an offsite secured landfill.
- Expanded and restored former Drainage Swale as a wetland area and established vegetation.
- Completed permanent fence installation around the site.
- Reversed drainage gradient of adjacent municipal landfill to drain away from site.
- Graded site using clean fill material using revised RAO Guidelines and seeded.
- Completed site construction activities in September 1996.
- Implemented approved long-term O&M program in November 1996.
- Commenced operation of groundwater extraction and treatment system.

FMC prepared and submitted proposed deed restriction language to the NYSDEC where it is currently under review. This language would prohibit certain uses of the property and provide notice to future potential owners of the property or other affected parties with respect to the implementation of the selected remedy, including the presence of the engineered containment cell. Upon acceptance of this RA Report by the agencies and approval of the "as built drawings" which were submitted in June 1997, and agreement on the terms of the deed restriction, FMC will execute the deed restriction document and have it recorded with the property records.

2.0 INTRODUCTION

The FMC Dublin Road site was an inactive waste disposal site located between Middleport and Medina, New York (Figure 2-1). The site has been remediated by FMC under a Consent Agreement with the NYSDEC.

The ROD selecting the remedy was issued by NYSDEC and EPA in March 1993. An explanation of significant differences was issued in July, 1995, which amended the ROD to address the direct placement of additional contaminated soils into the containment cell.

The selected remedy specified in the ROD required the following actions:

- Excavate, screen, and stabilize all contaminated materials (soils and sediments) from the Waste Pile, Rectangular Pond, Swamp, Drainage Swale, the Quarries, and other areas contaminated above RAOs.
- Store the stabilized material in a temporary stock pile and test it to ensure that it passes the TCLP, and perform other tests for those site specific compounds not included in TCLP (modified in 1994, with NYSDEC approval, to sample material for TCLP and RAOs prior to excavation, and place material passing these tests directly into the containment cell thereby eliminating the need to stabilize and stockpile them).
- Construct the composite liner(s), leachate collection and removal system(s) of the customized containment cell, consistent with 6 NYCRR Part 360 (modified in 1995, with NYSDEC approval, to construct cell extension and corresponding leachate collection and removal system for holding additional contaminated material).

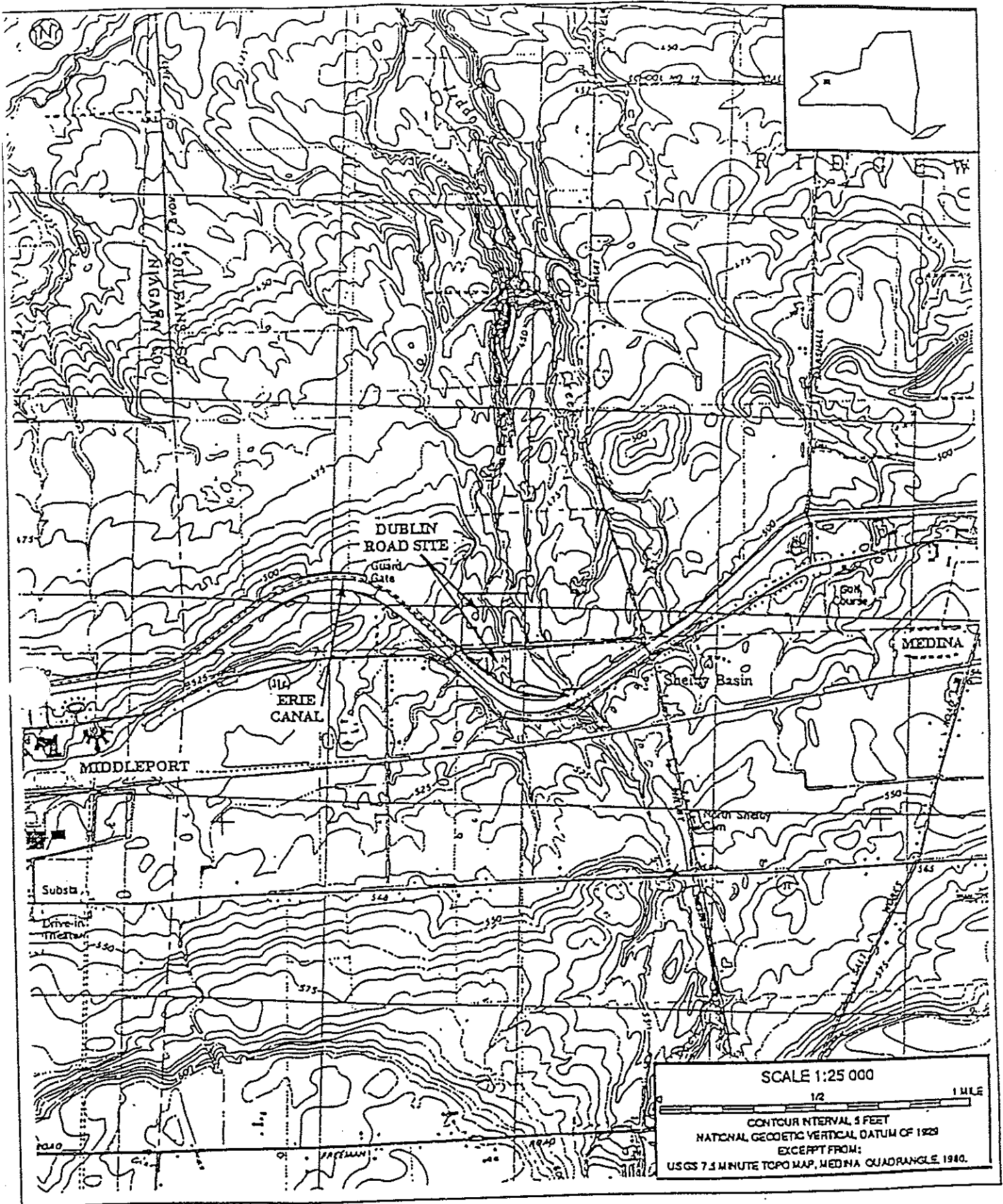


Figure 2-1
Dublin Road Site Location

- Redeposit the treated material in the containment cell.
- Rinse, dewater, and treat if needed, all materials greater than 2-in. diameter and deposit it in the cell.
- Install a cover consisting of geomembrane, cover soil, top soil, and vegetation for erosion control consistent with 6 NYCRR Part 360 (modified in 1995, with NYSDEC approval, to include cover on cell extension).
- Collect contaminated groundwater from a series of overburden and upper bedrock groundwater extraction wells.
- Treat collected groundwater and contaminated surface water, and discharge to Jeddo Creek (or the onsite wetland (provision added later)).
- Restore the wetlands.
- Install fencing, record deed restrictions and institute O&M and monitoring.

3.0 SITE DESCRIPTION

This section summarizes the physical conditions, history and description of waste at the FMC Dublin Road site.

3.1 PHYSICAL CONDITIONS

The site consists of (1) a rectangular portion of approximately 21 acres lying north of Dublin Road, and (2) triangular portion of approximately 9 acres lying south of Dublin Road (Figure 3-2). The northern section is partially wooded and contains a wetland, a drainage swale, and two inactive rock quarries (West and East Quarries). The southern portion contained the Waste Pile, the Rectangular Pond, and the Swamp.

Jeddo Creek runs in a northerly direction through the northeast corner of the site. The southern portion of the site is bounded by the New York State Barge Canal to the southwest, Dublin Road to the north, and a municipal landfill to the east. Land use immediately adjacent to the site and within the county is predominantly agricultural. An active sandstone quarry exists north of the site on adjacent property.

3.2 SITE HISTORY

FMC acquired the 30-acre Dublin Road site in 1943–46 as part of its acquisition of the Niagara Sprayer and Chemical Company, Inc. From 1933 to 1968, approximately 6 acres of the southern portion of the Dublin Road site had been used for disposal of coal ash cinders, industrial debris and other materials, primarily from the Niagara Sprayer/FMC manufacturing plant in Middleport, New York. These waste materials were placed in the Waste Pile, which consisted of a surface pile and a below-grade burial zone.

FMC took the initiative to investigate environmental conditions resulting from waste disposal at the Dublin Road site. In 1978, a preliminary assessment of groundwater contamination indicated the presence of site-related chemicals in onsite surface water and groundwater (Geraghty & Miller 1979).

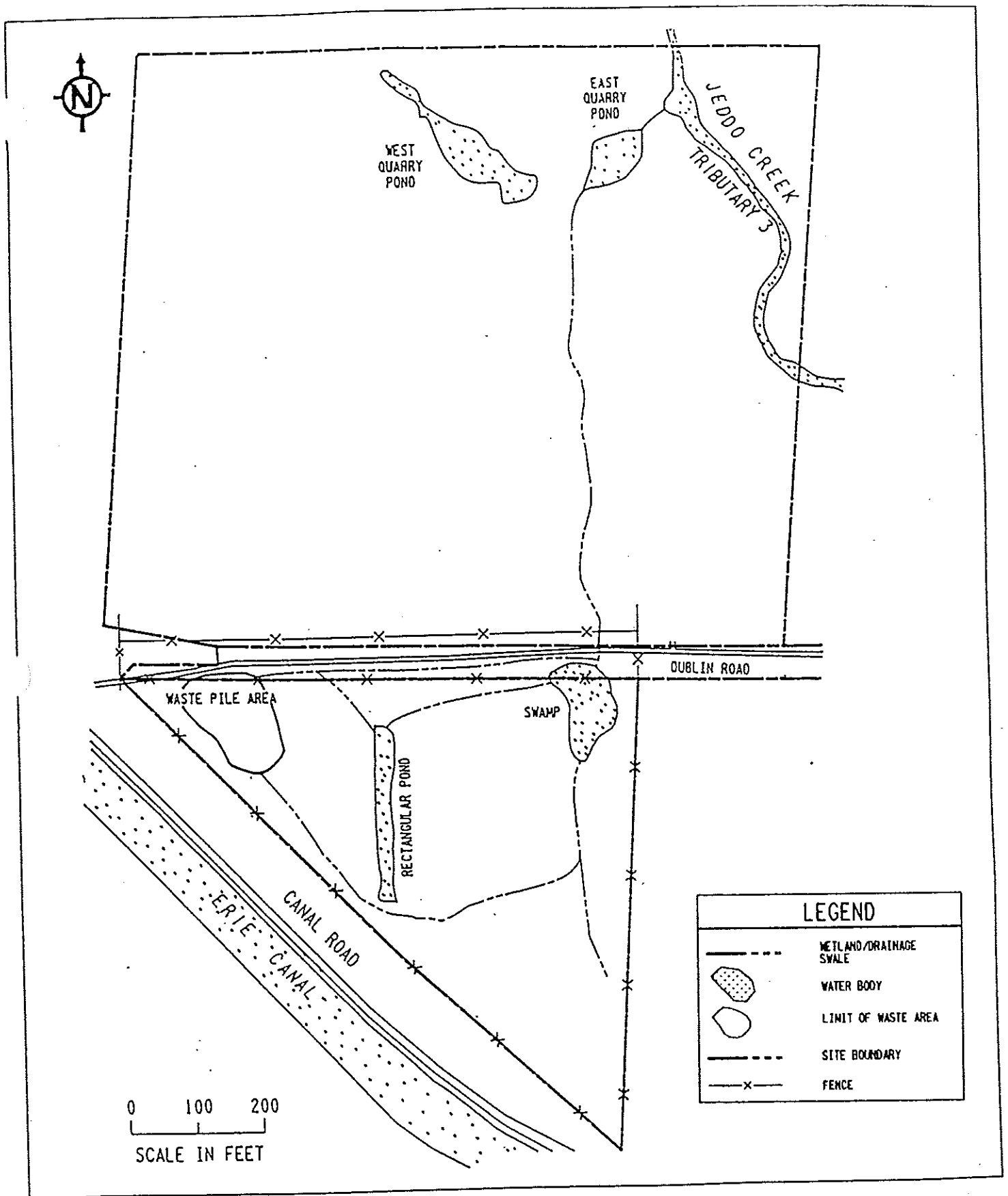


Figure 3-2
Dublin Road Site Layout Prior to Remedial Action

In 1981, additional monitoring wells were installed in the overburden and bedrock, and samples of soil, sediment, and water were collected and analyzed. Based on these results, it was concluded that the chemicals were not migrating offsite through the lower bedrock aquifer.

An Administrative Consent Order was entered into between NYSDEC and FMC in 1982, to conduct a field investigation during 1983-84. Results of this investigation were submitted to NYSDEC in October 1984 (BNI 1984). In 1984, the EPA proposed the Dublin Road site for inclusion on the NPL. The site was included on the NPL in May 1986. FMC and NYSDEC entered into a second Consent Order in February 1988 to authorize site remediation, which superseded and replaced the 1982 Order.

FMC submitted a RI report in May 1988 (BEI 1988). Results of a supplemental field investigation to further define subsurface conditions and chemical dispersion were included in a supplemental RI report submitted in May 1989 (BEI 1989). The RI (as supplemented) was approved by NYSDEC in June 1990. The proposed FS for the site was submitted to NYSDEC in September 1992 and approved in January 1993. A ROD for the site was issued by NYSDEC and EPA in March 1993. Remedial design was completed and approved in May 1994 (BAPC 1994).

3.3 WASTE DESCRIPTION

Wastes were disposed of on or near the surface in the Waste Pile. Wastes disposed of included ash cinders from burning of coal for power at the Middleport plant, lime-sulfur solution residues from a filtration process, building debris, and a minimal amount of laboratory wastes from the FMC Buffalo plant. Chemicals detected in the Waste Pile in excess of background concentrations include arsenic, copper, mercury, zinc, lead, benzenehexachloride (BHC) and its isomers, and DDT (and its metabolites). Concentrations of these chemicals detected in soil are summarized in Table 3-1.

Surface water runoff transported contaminants from the Waste Pile to the Rectangular Pond, Swamp, and Quarries. Chemicals detected in sediment and surface water there consist of arsenic, copper, lead, zinc, BHC and its isomers, DDD, DDE, and DDT (see Tables 3-2 and 3-3). Water exits the East Quarry by either over land flow to Jeddo Creek or by discharge to adjacent property north of the property boundary.

4.0 SUMMARY OF REMEDIAL WORK

Remediation activities included excavation, stabilization, containment of stabilized material in an onsite containment cell, and treatment of contaminated runoff/construction water and groundwater in an onsite groundwater treatment system.

The primary contractors who performed the RA and supplied remedial systems included:

Remcor, Inc.	General contractor for 1994 construction season
FMC, Corp.	General contractor for 1995 construction season
Smith Environmental, Inc.	General contractor for 1996 construction season
Andco Environmental Processes, Inc.	Water treatment equipment and engineering services

Table 3-1
Summary of Indicator Chemicals in Waste Pile Soil (mg/kg) ¹

	Mean ²	Maximum	Minimum	No. Values	No. Values Below MDL ³
As	2,569	20,400	<10	24	1
Cu	168	795	11	24	0
Hg	1.55	15	<0.1	24	3
Zn	162	1,120	16	24	0
Pb	6,157	41,600	38	24	0
α-BHC	1.87	23	<0.0092	24	18
β-BHC	0.41	4	<0.0092	24	21
δ-BHC	0.29	3.1	<0.0092	24	20
γ-BHC	0.38	3.3	<0.0092	24	19
p,p'-DDD	0.46	5.8	<2.018	24	----
p,p'-DDE	1.43	28	<0.018	17	----
p,p'-DDT	31	400	<0.018	12	----

¹ Based on information gathered during the site Remedial Investigation (BEI 1988 and 1989).

² Values reported as below the method detection limit were included as the method detection limit for calculating the mean.

³ MDL - method detection limit

Table 3-2
Summary of Indicator Chemicals in Sediment (mg/kg)¹

	Rectangular Pond	Swamp	East Quarry	West Quarry	Jeddo Creek at Dublin Road
As	640	4,850	3,600	180	6.4
Cu	1,020	260	2,630	2,460	11
Zn	40	250	1,240	74	8.9
Pb	400	100	890	2,580	49
α-BHC	10	0.3	0.25	ND ²	ND ²
β-BHC	5.2	0.19	0.16	ND ²	ND ²
δ-BHC	4.5	0.56	ND ²	ND ²	ND ²
γ-BHC	4.1	0.09	0.04	ND ²	ND ²
o,p'-DDD	24	0.26	0.35	ND ²	ND ²
p,p'-DDD	94	0.47	0.55	ND ²	ND ²
o,p'-DDE	1.6	0.07	ND ²	ND ²	ND ²
p,p'-DDE	3.9	0.23	0.51	ND ²	ND ²
o,p'-DDT	55	0.28	0.72	ND ²	ND ²
p,p'-DDT	100	0.75	0.33	ND ²	ND ²
2,4-D	ND ²	ND ²	ND ²	ND ²	ND ²
2,4,5-T	ND ²	ND ²	ND ²	ND ²	ND ²

¹ Based on information gathered during the site Remedial Investigation (BEI 1988).

² Not detected at method detection limit.

Table 3-3
Summary of Indicator Chemicals in Surface Water (mg/L)¹

Chemical	Rectangular Pond		Sounding		East Quarry		West Quarry		Heads Creek at Franklin Road	
	Mean ²	No. Values	Mean ²	No. Values	Mean ²	No. Values	Mean ²	No. Values	Mean ²	No. Values
As	31.9	5	1.5	5	0.06	7	0.01	4	0.004	7
Cu	7.2	5	1.0	5	0.2	7	0.02	4	0.006	3
Zn	0.9	5	0.01	2	0.008	5	0.01	4	0.006	3
Pb	29.2	5	1.7	5	0.6	7	0.22	4	0.013	7
α-BHC	2,404.5	5	1.4	5	0.09	7	0.02	4	0.03	7
β-BHC	1,452.5	4	0.4	4	0.07	5	0.018	4	0.005	6
δ-BHC	1,503.0	4	0.6	4	0.04	5	0.3	4	0.012	6
γ-BHC	1,363.1	5	0.7	5	0.08	7	0.01	4	0.018	7
o,p'-DDD	17.6	4	0.01	4	0.003	4	0.005	2	0.005	2
p,p'-DDD	23.0	4	0.01	4	0.003	4	0.005	2	0.005	2
o,p'-DDE	7.6	4	0.01	4	0.003	4	0.005	2	0.005	2
p,p'-DDE	37.6	4	0.02	4	0.003	4	0.005	2	0.005	2
o,p'-DDT	8.5	4	0.01	4	0.003	4	0.005	2	0.005	2
p,p'-DDT	189.4	4	0.02	4	0.003	4	0.005	2	0.005	2
2,4-D	96.6	5	0.78	5	0.21	7	0.13	4	0.066	7
2,4,5-T	10.3	5	0.51	5	0.27	7	0.16	4	0.011	7

¹ Based on information gathered for the site Feasibility Study (BEI 1992).

² Laboratory values reported as less than the method detection limit were divided by 2 for calculation of the mean.

Bechtel National, Inc. (BNI),	Site investigations, and RI/FS
Bechtel Environmental, Inc. (BEI)	
Bechtel Associates Professional Corporation (NY) (BAPC)	Remedial design for site; engineering reviews and quality control inspections
Solmax Geosynthetics, Inc.	Supplied and installed liner systems (containment cell/leachate collection system/cap)

Section 4.1 summarizes the scope of work for the Dublin Road RA.

4.1 GENERAL OVERVIEW

The Dublin Road RA included the following:

- Verifying the limits of soil contamination.
- Establishing of a site grid and performing construction surveys.
- Providing electrical power to the site.
- Providing a process to stabilize soil.
- Dewatering the Swamp, Rectangular Pond, and Quarries.
- Constructing an engineered containment cell, consistent with 6 NYCRR Part 360, for placement of treated soils.
- Constructing a groundwater extraction system and developing a monitoring program.
- Constructing erosion control barriers.
- Constructing a permanent groundwater treatment facility.
- Excavating contaminated soils and sediments.
- Stabilizing contaminated materials as needed.
- Backfilling excavated areas and restoring the site.
- Constructing a new wetland north of Dublin Road.

1994 Season:

Construction activities performed by Remcor during the 1994 season included:

- Clearing, grubbing, and chipping.
- Installing fencing around perimeter of excavation and treatment areas.
- Abandoning onsite monitoring wells located in future construction and/or excavation areas.
- Constructing an area for the stabilization process.
- Constructing an onsite containment cell and leachate collection system (consistent with 6 NYCRR Part 360) to contain stabilized material and soils contaminated above RAOs.
- Constructing temporary water treatment unit.
- Collecting surface water runoff from the site.

- Surveying in a site grid system in preparation for excavation and verification sampling of contaminated areas.
- Excavating contaminated soil and sediment from the Waste Pile, Rectangular Pond, Quarries, Exclusion Zones, and other areas with contamination exceeding RAOs.
- Storing stabilized material in a temporary stockpile and testing to ensure it passed the TCLP for lead and other tests for site-specific compounds (not included in TCLP).
- Redepositing of treated material into the containment cell.
- Implementing of a winterization program that included: demobilization of shower trailer, decontamination trailer, treatment area equipment, and temporary water treatment unit; installation of temporary geomembrane liners over containment cell, treatment area, and decontamination pad; installation of erosion control measures at containment cell and treatment area; surface water controls (without collection); containment cell leachate monitoring; routine security monitoring by local law enforcement; and both weekly and monthly site inspections.

1995 Season:

Construction activities performed by FMC during the 1995 season included:

- Installing an onsite permanent groundwater treatment system.
- Constructing a containment cell extension including composite liner and leachate collection/removal system, to hold additional material exceeding RAOs.
- Sampling areas prior to excavation and analysis for comparison to RAOs.
- Excavating and disposing of contaminated soil (following grid system set-up in 1994) and sediment from the Waste Pile, Rectangular Pond, Swamp, and other areas with soils contaminated in excess of RAOs (stabilized Block 27 material in situ, prior to excavation and placement in containment cell).
- Completed placing material in containment cell extension and installing of permanent cap of containment cell/cell extension.
- Installing and testing groundwater extraction system.
- Implementing a winterization program that included: installation of erosion control measures around wetland stockpiled material, installation of a culvert crossing Dublin Road; pumping of leachate into a temporary holding basin for storage; implementing surface water controls; installation of heating system on water treatment unit; routine security monitoring by local law enforcement; and weekly and monthly site inspections.

1996 Season:

Construction activities performed by Smith Environmental during the 1996 season included:

- Pumping leachate collection system/runoff/construction/Quarry water through onsite groundwater treatment system.
- Resampling of sediment in Quarries, removing contaminated sediment and transporting it to an offsite secure landfill at Chemical Waste Management in Model City, NY.
- Expanding, restoring and vegetating former drainage swale wetland area.
- Grading excavated areas with clean fill and seeding to prevent ponding of surface water.
- Completing installation of permanent fence around site.
- Reversing drainage gradient of adjacent municipal landfill to drain away from site.
- Beginning operation of groundwater extraction and treatment systems in November 1996.

In addition, BAPC sampled domestic wells downgradient (within 1 mile) of the site.

FMC conducted an inspection with representatives of NYSDEC, NYSDOH, and EPA on September 11, 1996, and confirmed that the soil remediation work was complete and that the groundwater extraction and treatment system was operational and functional, subject to collection and submittal of operational and monitoring data under the O&M Plan. EPA documented completion of construction activities in the Preliminary Close Out Report (EPA 1997).

4.1.1 Milestones

Milestones accomplished during each construction season (1994–96) are summarized in Tables 4-1, 4-2, and 4-3.

4.1.2 Quantities

Quantities of material excavated during each construction season (1994–96) are shown in Tables 4-4, 4-5, and 4-6. Also represented are material excavated, treated, and backfilled, and water that was treated and discharged to Jeddo Creek. These quantities represent the survey results of FMC and FMC contractors. BAPC did not independently verify the survey results.

4.2 SITE PREPARATION

Preparation of the site for remediation included: clearing, grubbing, and well abandonment; permanent fence installation; construction of a containment cell and cell extension to receive treated and untreated material (that passed TCLP); construction of a temporary soil/sediment stabilization system and groundwater treatment unit; and construction of a groundwater extraction and treatment system. The following subsections summarize these activities.

Table 4-1
Milestones - 1994

Month	Operation	Description
May 1994	Site Mobilization	• Received submittals • Site electricity hookup • Field office/trailer setup
June 1994	Site Prep	• Clearing and grubbing operations • Onsite well abandonment
	Containment Cell	• Stripped topsoil and graded containment cell for subgrade and leachate collection system
	Soil Stabilization	• Laid out stabilization process area and exclusion zones
July 1994	Site Prep	• Completed onsite well abandonment • Installed permanent fencing around site • Surveyed in site grid system for excavation and verification sampling • Sampled borrow source location soil
	Containment Cell	• Hauled, graded, and compacted offsite fill material for containment cell subgrade • Constructed containment cell floor and berms • Began installation of containment cell bottom liner system (geosynthetic clay liner (GCL) and first high-density polyethylene (HDPE) geomembrane layer) and leachate collection system
	Excavation	• Graded Exclusion Zone area • Conducted pre-excavation survey of North Exclusion Zone (wetlands to Quarries) and containment cell area to determine fill quantities
	Soil Stabilization	• Prepared subgrade for stabilization area and retention pond • Installed stabilization area liner
	Temporary Water Treatment	• Initiated construction of temporary water treatment unit

Table 4-1 (cont.)

Month	Operation	Description
August 1994	Containment Cell	- Completed installation of containment cell liner elements and leachate collection system - Began hauling and placing 8-in. layer of bedding sand on floor of containment cell - Began hauling, placing, and compacting stabilized material (meeting TCLP criteria) into containment cell
	Soil Stabilization	- Completed construction of stabilization area (included: a screener, pug mill, mixing vessel for lime, and portable silo) - Began screening contaminated material from Waste Pile - Began stabilizing and stockpiling screened material - Completed screening 1-in. material for stabilization, and began screening 3-in. material - Stabilized contaminated material
	Temporary Water Treatment	Began processing water (construction/surface runoff, and decon water) through temporary water treatment unit
September 1994	Excavation	- Completed direct haul excavation operation and excavation of Waste Pile (to elevation of 503 ft msl) - Began excavation of Rectangular Pond and Quarries - Determined additional excavation required in Waste Pile (based on remediation screening sample results) - Completed initial excavation of Quarries
	Soil Stabilization	- Began direct haul operations in South Exclusion Zone - Began remediation screening sampling of South Exclusion Zone - Adjusted stabilization mix to compensate for arsenic leachability (ordinary portland cement, Type I) and began reprocessing previously stabilized material - Stabilized contaminated material
	Temporary Water Treatment	Continued processing water (construction, surface runoff, and decon water) through temporary water treatment unit

Table 4-1 (cont.)

Month	Operation	Description
October 1994	Containment Cell	Revised cell geometry due to greater volume of contaminated material
	Excavation	- Additional excavation of North and South Exclusion Zones and Waste Pile (excavated with the exception of hardened contaminated material) - Decided to complete additional excavation of South Exclusion Zone and Waste Pile next year
	Soil Stabilization	- Completed reprocessing of previously stabilized material - Determined additional excavation required from Waste Pile, North and South Exclusion Zones, and Dublin Road (based on remediation screening sample results)
	Temporary Water Treatment	Continued processing water (construction water, surface runoff, and decon water) through temporary water treatment unit
	Winterization	Began implementing site winterization program and temporary closure of containment cell
November 1994	Containment Cell	- Completed direct haul operations and hauling stabilized material from treatment area to containment cell - Installed temporary liner over containment cell and silt fencing and hay bales to prevent erosion during winter
	Treatment Area	Installed temporary liner over stabilization area for winter
	Excavation	Performed post-excavation topographic survey
	Soil Stabilization	Received NYSDEC approval for in situ TCLP testing of Waste Pile
	Temporary Water Treatment	Dismantled temporary water treatment unit
	Winterization	Continued winterization program installation of erosion controls at containment cell/stabilization area and demobilization activities

Table 4-1 (cont.)

Month	Operation	Description
December 1994	Water Treatment	Began installation of footers and floor slab for permanent water treatment plant
	Winterization	Completed winterization program including temporary closure of containment cell
December 1994 to April 1995	Inspections and Maintenance	- Performed weekly site inspections (perimeter fence, erosion controls, temporary containment cell cover, leachate collection system, and site drainage) to ensure all controls were functioning as designed - Maintenance and repairs conducted as needed

Table 4-2
Milestones - 1995

Month	Operation	Description
April 1995	Site Mobilization	• Remobilized to Dublin Road site • Began receiving equipment and trailers onsite to support remedial activities
	Water Treatment	• Received all permanent water treatment equipment from Andco and began system setup • Poured concrete pads for tanks and equipment • Began installation of permanent groundwater treatment system equipment, piping, and wiring
	Site Security	• Restarted security guard service
May 1995	Site Prep	• Re-established exclusion zone • Removed part of 20-mil liner from southern portion of stabilization area • Removed fence along canal • Finished setting up trailers • Removed retention basin
	Containment Cell	• Removed soil cover and liners on south side of containment cell for the cell extension • Hauled in 800 yd³ of fill for containment cell extension
	Excavation	• Removed liner from stabilization area and placed in containment cell
	Water Treatment	• Completed installation of water treatment system • Andco ran 6-day test on system with clean water • Began transferring water from 100,000 gal storage pool through water treatment system

Table 4-2 (cont.)

Month	Operation	Description
June 1995	Containment Cell	- Completed containment cell extension subgrade and leachate collection system - Completed subgrade and installed geocomposite liner and trenches for leachate collection system - Completed excavating runoff/runoff control ditches
	Treatment Area	- Completed removing and screening material from stabilization area - Decontaminated screening unit and shipped offsite
	Excavation	- Completed excavating areas north of Dublin Road, except for sediment removal from quarries. - Completed excavating Waste Pile - A second excavation of the sediments from and between the two quarries was required and was implemented in June 1996.
	Temporary Water Treatment	- Decontaminated and demobilized temporary water treatment equipment from site - Removed liner from retention pond and filled and graded area
	Water Treatment	- Set up empty drum storage area - Collected influent/effluent samples - Treated batch of construction water (passed release criteria after treatment) - Continued pumping and treating 100,000 gal temporary storage pool water
	Site Restoration	Constructed access road from permanent water treatment facility to Quarries

Table 4-2 (cont.)

Month	Operation	Description
July 1995	Containment Cell	• Pumped, cleared out, and added riser pipes to containment cell leachate sumps • Mucked out, graded, and covered drainage swale ditches • Excavated containment cell extension anchor trenches • Began work on containment cell extension leachate collection system (including liners and secondary leachate collection system) and installed silt fences for erosion control • Placed GCL and 60-mil HDPE liners over containment cell • Repaired temporary liner on containment cell • Completed construction of haul road from Exclusion Zone to containment cell extension • Completed installing bottom liner systems for containment cell extension • Backfilled containment cell extension and anchor trench • Began moving stockpile of screened material to containment cell extension
August 1995	Containment Cell	• Completed backfilling anchor trench around containment cell extension • Established exclusion zone around and began placing material into containment cell extension • Dewatered, placed dike across, and completed excavating Rectangular Pond • Removed temporary liner from existing containment cell • Placed overflow material from existing containment cell into cell extension
	Excavation	• Excavated remainder of Waste Pile • Excavated area between Dublin Road, west side of the drainage swale, and former decon pad location and placed in containment cell extension • Excavated site grid blocks 13, 14, and 15; and sub-area in situ stabilized block 27 (Figure 4-2)
	Water Treatment	• Processed 17,000 gal through water treatment plant from 100,000 gal temporary storage pool

Table 4-2 (cont.)

Month	Operation	Description
September 1995	Containment Cell	- Continued moving material from existing containment cell to cell extension - Began construction of haul road to containment cell extension - Placed excavated soil and screened material in cell extension
	Excavation	- Excavated material from site grid blocks 2, 5, 6, 8, 9, 10, 12, 13, 16, 17, and 18; and sub-grid blocks 20, and 21 (Figure 4-2) - Placed backfill material in Dublin Road excavation and area south of Dublin Road - Set pipe for wetland restoration - Excavated material between two Quarries - Excavated 100 ft of anchor trench around containment cell extension
	Soil Stabilization	- Conducted verification sampling on site grid blocks 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 17, and 19 (Figure 4-2) - Completed collection of verification samples from the Dublin Road Area
	Water Treatment	- Began installation of groundwater extraction system - Installed additional monitoring well 92 adjacent to the engineered containment cell to provide data on groundwater quality immediately downgradient of the cell - Dewatered south end of the Rectangular Pond
October 1995	Containment Cell	- Completed excavation of anchor trench and final grading of containment cell and extension in preparation for cap installation - Installed cap along southern end of containment cell - Installed geotextile, HDPE liner, and geonet composite on containment cell - Installed pipe in anchor trench around containment cell

Table 4-2 (cont.)

Month	Operation	Description
October 1995 (cont.)	Soil Stabilization	• Installation of cap in north area • Completed in situ stabilization operations • Testing and evaluation of groundwater extraction system
	Water Treatment	• Pumped water accumulated in cell extension to 100,000 gal temporary storage pool • Pumped 100,000 gal temporary storage pool water through water treatment plant
November 1995	Containment Cell	• Finished grading east side of containment cell • Completed hauling stabilized material from treatment area to containment cell • Moved material from north side of Dublin Road • Compacted containment cell and conducted compaction testing • Installed permanent cap over containment cell/cell extension including topsoil placement and final grading • Graded stockpile south of Dublin Road and placed hay bales around three sides of area for erosion control • Installed silt fence north and south of Dublin Road • Prepared slope of containment cell for seeding • Installed road along west side of containment cell
	Treatment Area	• Placed temporary cover over storage piles
	Excavation	• Completed excavation of wetland area • Excavated ditches on east and west sides of containment cell, placed topsoil in ditch, and seeded
	Water Treatment	• Installed additional toe drain laterals in leachate collection system around containment cell • Installed safety signs at entrance to water treatment plant

Table 4-2 (cont.)

Month	Operation	Description
November 1995 (cont.)	Winterization	• Set up guard shack to begin 24-hour security operations through winter months • Pumped water from containment cell into winterized 100,000-gal pool • Pumped leachate collection system pipes down to 2-in. depth through water treatment plant • Insulated area from water tank to trailer with hay bales in preparation for winter • Demobilized crew for winter
	Containment Cell	• Fertilized and seeded containment cell/cell extension cap • Placed jute mat on north end of containment cell
December 1995	Water Treatment	• Measured water in leachate collection system around containment cell
	Winterization	• Placed tarp over excavated stockpiled wetland area soil • Placed silt fenceline along the downgradient edge of the containment cell • Placed hay bales around the inlet of the culvert crossing Dublin Road • Placed erosion control material over entire containment cell • Completed and began operation of heating system with water treatment plant

Table 4-3
Milestones - 1996

Month	Operation	Description
April 1996	Water Treatment	• Remobilized to site after winter • Continued pumping leachate from the containment cell leachate collection system and discharged to the 100,000 gal temporary storage pool
	Wetland Restoration	• Completed wetland outcrop replacement activities • Began grading, topsoil, and dike installation activities in wetland area
May 1996	Site Work	• Completed general site work on west and east drainage ditches • Set up pumps to drain water from Quarries • Completed permanent site fence installation
	Water Treatment	• Tested groundwater extraction and treatment system • Installed wellhead piping, well pumps, pump air supply, and piping insulation to groundwater extraction and treatment system • Began treating water from 100,000 gal temporary storage pool with the onsite groundwater treatment system • Conducted an annual sampling and analysis of domestic wells down gradient and within 1 mile of site
	Wetland Restoration	• Completed installation of dikes in wetland area • Planted wetland area
June 1996	Water Treatment	• Installed electrical system to groundwater treatment and extraction system • Dewatered Quarries
	Excavation	• Excavated additional contaminated sediment from Quarries and soil from between Quarries
	Town Landfill	• Removed fence to reverse drainage gradient of landfill • Surveyed and staked limits of landfill clearing activities • Cleared and chipped trees from landfill

Table 4-3 (cont.)

Month	Operation	Description
July 1996	Town Landfill	- Placed fill material to change landfill drainage direction away from Dublin Road site - Placed topsoil over fill material - Revegetated disturbed areas and replaced fencing that had been removed
	Offsite Disposal	Hauled contaminated sediment excavated from Quarries to offsite disposal facility (Chemical Waste Management, Model City, NY)
	Site Demobilization	- Completed site cleanup - Completed final grading and placement of clean fill on excavated areas - Completed seeding graded areas - Completed installation of permanent fencing around site
August 1996	Pre-Final Inspection	- NYSDEC conducted pre-final site inspection on August 1, 1996. - The punch list of minor deficiencies (e.g. missing bolts, numbering on pipe supports, loose covers on circuit boxes, minor regrading needed to promote drainage) detected was corrected
September 1996	Final Inspection	FMC conducted an inspection with representatives of NYSDEC, NYSDOH, and EPA, and confirmed that the soil remediation work was complete and that the groundwater extraction and treatment system was operational and functional, subject to collection and submittal of operational and monitoring data under the O&M Plan.
November 1996		Began operation of groundwater extraction and treatment system, with discharge to wetland

Table 4-4
Quantities During 1994 Construction Season

Location	Excavated Quantity (yd ³)	Treated Quantity (yd ³ or gal)	Backfill Quantity ¹ (yd ³)
West Quarry	1,171		
East Quarry	274		
Rectangular Pond and Swamp	10,200		
Waste Pile Area	25,131	376	
Drainage Swale	8,155		
Stabilized Material		27,356 ³	
Containment Cell Subgrade			5,750
East Slope			1,210
TOTAL QTY	44,931	27,732	6,960
Water ²		728,400	

¹ Clean fill material from offsite approved borrow pit.

² Construction and run-off water treated by the onsite temporary treatment unit.

³ Material that passes TCLP was desposited in the engineered containment cell.

Note: Data obtained from FMC and FMC contractor records.

Table 4-5
Quantities During 1995 Construction Season

Location	Excavated Quantity (yd ³)	Treated Quantity (yd ³ or gal)	Backfill Quantity ¹ (yd ³)
Excavated Material	25,947		
Stabilized Material		18,422 ³	
Containment Cell Subgrade			3,159
Culvert (South of Dublin Road)			1,770
Road Embankment (North of Wetland)			900
Canal			2,000
TOTAL QTY	25,947	18,422	7,829
Water ²		180,670	

¹ Clean fill material from offsite approved borrow pit.

² Construction and leachate collection system water treated at the onsite groundwater treatment facility.

³ Material that passed TCLP was deposited in the engineered containment cell.

Note: Data obtained from FMC and FMC contractor records.

Table 4-6
Quantities During 1996 Construction Season

Location	Excavated Quantity (yd³)	Treated Quantity (gal)	Backfill Quantity¹ (yd³)
Quarry Sediment	771		
Area South of Dublin Road			7,000
Wetland			5,000
TOTAL QTY	771	None	12,000
Water²		932,000	

¹ Clean fill material from offsite approved borrow pit.

² Construction leachate collection system, and Quarry water treated at the onsite groundwater treatment facility.

Note: Data obtained from FMC and FMC contractor records.

4.2.1 Clearing, Grubbing, and Well Abandonment

All trees and brush and some stumps from contaminated soils areas were chipped and placed in the containment cell. The remaining stumps were buried in the containment cell at the end of the 1994 construction season. Trees, brush, and stumps from uncontaminated areas were chipped and stockpiled in an area southeast of the containment cell. This stockpiled material was used in place of gravel for haul roads constructed onsite. All onsite clearing work was completed by the end of the 1995 construction season.

1994 Season:

The majority of site clearing and grubbing work for excavation and remedial systems setup areas was completed by Remcor, Inc. in June 1994. In August 1994, additional contaminated material was discovered in an area south of FMC's property along the Erie Canal. This required the clearing of trees along the canal to allow access to the contaminated area. In total, 19 acres of land were cleared.

Thirteen monitoring wells were abandoned onsite between June and July 1994 in preparation for construction and excavation activities. All wells were abandoned except Well 25, (a background well located along the barge canal bank) which was destroyed by the New York Thruway Authority during routine maintenance of the canal tow path. Attempts to locate and abandon any remnants of this well were unsuccessful. Well abandonment summary sheets are included in Appendix B and well locations are shown on Figure 4-1.

1995 Season:

After limited clearing along the canal bank in 1994, general clearing work was completed by the end of the 1995 construction season.

1996 Season:

Limited additional clearing was required in 1996 along the adjacent Middleport municipal landfill in preparation for directing drainage from the landfill away from the site.

4.2.2 Temporary Facilities and Site Services

Temporary facilities constructed and used onsite included: support zone and tool trailers; decontamination pad; portable restrooms; personnel protective equipment and decontamination facility (with personnel shower); temporary drainage ditch for stormwater management; groundwater treatment area; water retention basin; and stabilization area.

A temporary water treatment system for surface water runoff and construction water was constructed and used during the 1994 construction season and was demobilized thereafter because the permanent treatment system was activated. The temporary water treatment unit included: a temporary retention pond, a temporary settling basin (100,000-gal storage pool), bagfilter, and activated carbon system. Details regarding the temporary water treatment system and retention pond are provided in Section 4.7 of this report. The stabilization area is discussed in Section 4.2.4.

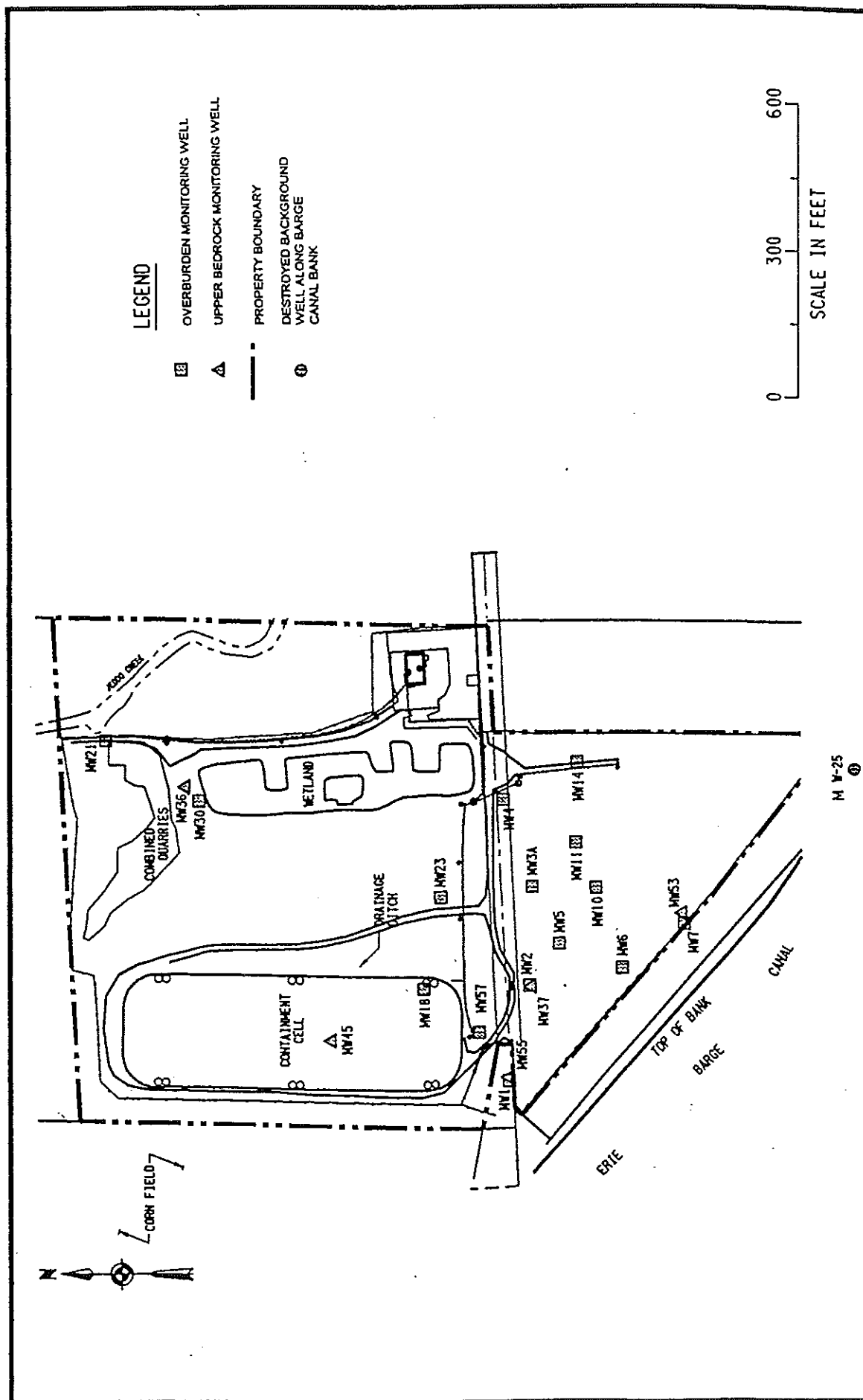


Figure 4-1
Abandoned Monitoring Wells

19714 FIG03.DGN

1994 Season:

Support services provided by Remcor subcontractors during 1994 included the following:

• Air monitoring	SSM Laboratories, Inc.
• Analytical services	Zenon Environmental Laboratories, Inc.
• Clearing/grubbing	Monroe Tree Service
• Electrical services	R. Macdonald Electric, Inc.
• Extraction well installation	Buffalo Drilling Co., Inc.
• Fencing/gate installation	New York State Fence, Inc.
• Geotechnical analysis	Huntington-Empire Soils Investigation, Inc.
• Mechanical	John W. Danforth Company
• Groundwater treatment building construction	Fast Trak Structures, Inc.
• Surveying	Niagara Boundary & Mapping Services

1995 Season:

Support services provided by FMC contractors during 1995 included the following:

• Air monitoring	SSM Laboratories, Inc.
• Analytical services	Zenon Environmental Laboratories, Inc.
• Electrical services	R. Macdonald Electric, Inc.
• Well drilling and abandonment	Buffalo Drilling Co., Inc.
• Geotechnical analysis	Huntingdon-Empire Soils Investigation, Inc.
• Waste cell extension construction	Sevenson Environmental, Inc.
• Mechanical	John W. Danforth Company
• Groundwater treatment building construction	Fast Trak Structures, Inc.
• Surveying	Niagara Boundary & Mapping Services
• Clearing/grubbing	Monroe Tree Service

1996 Season:

Support services provided by Smith Environmental subcontractors during 1996 included the following:

• Air monitoring	SSM Laboratories, Inc.
• Analytical services	Zenon Environmental Laboratories, Inc.
• Electrical services	R. Macdonald Electric, Inc.
• Well drilling and abandonment	Buffalo Drilling Co., Inc.
• Geotechnical analysis	Huntingdon-Empire Soils Investigation, Inc.
• Mechanical	John W. Danforth Company
• Groundwater treatment building construction	Fast Trak Structures, Inc.
• Surveying	Niagara Boundary & Mapping Services
• Clearing/grubbing of Middleport landfill	Monroe Tree Service

4.2.3 Containment Cell

FMC and its contractors constructed the containment cell in accordance with the approved remedial design specifications and drawings. BAPC performed quality control oversight of the RA contractor's compliance with the approved design to provide reasonable assurance that construction was in accordance with the design requirements.

The Dublin Road containment cell meets the requirements for a solid waste landfill imposed by 6 NYCRR Part 360, *Solid Waste Management Facilities, Title 6 of the Official Compilation of Codes, Rules, and Regulations*. This design was approved by NYSDEC. The containment cell was designed and constructed as shown in Appendix A, Drawing 19714-C-06 and as described below.

- A chemical compatibility study was performed on the HDPE liner using the Dublin Road materials to demonstrate that the liner was chemically and physically resistant to materials it will come in contact with in the future. Reference Treatability Study for FMC Dublin Road Site (BEI 1992).
- The containment cell was designed to meet the minimum horizontal separation requirements of 100 ft between deposited solid waste and the property line, and a minimum of 100-ft separation from the mean high water elevation of a water surface.
- The separation between the containment cell and groundwater is greater than the 5 ft requirement.
- The separation between the containment cell and bedrock is less than the 5 ft requirement. NYSDEC reviewed and approved the containment cell design with this variance.
- A foundation analysis based on data collected by Remcor showed that the subgrade is structurally sound and capable of supporting loads from the waste material. The subgrade was stripped of the topsoil, scarified, and compacted. A visual inspection was performed by BAPC, Solmax and NYSDEC prior to installing the bottom synthetic clay layer of the liner system.
- The containment cell has a double composite liner system consisting of upper (primary) and lower (secondary) liner systems as shown in Appendix A, Drawing 19714-C-06. The upper liner is directly below the primary leachate collection system and the bottom composite liner system is directly below the secondary leachate collection system. The composite liner system consists of GCL and 60-mil HDPE. The leachate collection system consists of geonet overlain with a filter fabric.
- The bottom of the containment cell was designed and constructed to meet the minimum 2 percent slope from the center of the cell to the edge. A 4-in. perforated pipe collects the leachate and transfers it to sumps at the base of the landfill. The geonet drainage layer installed meets the required minimum permeability of 1×10^{-2} cm/s.
- A protective layer of washed graded gravel and limestone aggregate material was placed over the primary leachate collection system before contaminated material was placed in the containment cell.

- A gas venting layer and piping were determined not to be required for this containment cell during the design stage and this approach was approved by NYSDEC.
- The final cover system consists of a geotextile, 60-mil textured very low-density polyethylene liner, geonet, filter fabric, and 30-in. soil/vegetation layer as shown in Appendix A, Drawing 19714-C-06. The final slope of the cell is the maximum allowable 33 percent.

During the 1994 construction season, the modified 6 NYCRR Part 360 containment cell was constructed by Remcor as shown in Appendix A, Drawings 19714-C-06, 19714-C-10, and 19714-C-12. The containment cell was originally designed to hold approximately 40,000 yd³ of material. An additional 40,000 yd³ of capacity was added in 1995 to handle the additional volume of material required to be placed in the cell. During 1995 the containment cell was extended. The cell extension was constructed using the same design basis. The cell was closed at the end of the 1995 construction season after capping with a synthetic liner covered by a geonet filter fabric, a 24-in.-thick layer of cover soil, and a 6-in. layer of topsoil. Topsoil was seeded with a regional grass mix to prevent erosion. Containment cell extension and cap placement field inspection reports and quality control surveillance inspection reports are included in Appendix C.

Containment cell subgrade material was placed to grades shown on as-built drawings and compacted to the specified density. Compaction tests including subgrade compaction and moisture grade testing were performed on the containment cell and cell extension subgrades. Compaction tests were performed on the containment cell subgrade in 1994 by Huntington-Empire Soils Investigation, Inc. Division; results are included in Appendix D. Subgrade compaction and moisture control testing for the original containment cell were completed in July 1994. Twenty-eight in-place density and moisture content tests were performed on the subgrade of the original cell. Three tests failed to meet the required in-place density. This lift was re-disked twice, followed by six passes with a vibratory roller, and retested. The three retests all passed the required in-place density requirements of 95 percent of the maximum dry density.

Compaction tests were also performed on the containment cell extension in 1995 by Huntington-Empire Soils and are included in Appendix D. Subgrade compaction and moisture control testing was performed in May, June, and July 1995 for the cell extension. Fifty in-place density and moisture content tests were performed on the subgrade of the cell extension. All tests passed for density, but six tests failed to be within 3 percent of the optimum moisture content. Retests were performed on May 30 and July 13, 1995. All locations retested met the requirements of the technical specification—95 percent of the maximum dry density and within 3 percent of the optimum moisture content.

The original containment cell and the extension were constructed with a five-layer geosynthetic lining system (bottom to top: GCL, 60-mil HDPE, geonet, 60-mil HDPE, single-sided geonet/geotextile composite) as shown in Appendix A, Drawing 19714-C-06. The geomembrane panels were placed and cut to minimize longitudinal (structural) seams and T-seams. Panels were overlapped approximately 5 to 6-in. to allow adequate materials for double fusion seaming and in situ peel and seam tests. All seams between panels were made using an automated fusion process and using a double hot wedge.

Destructive tests were performed by Solmax on trial seams prior to any onsite seaming to calibrate the welding equipment. Two peel tests and two shear tests were performed on each sample. Seams were made in the geomembrane only after a satisfactory destructive trial test. All results from these tests are

presented in Appendix E. All seams were verified for continuity along their total length by nondestructive test methods implemented by Solmax and witnessed by BAPC. Testing methods included the air pressure test (minimum pressure of 30 psi) and the vacuum-box test (negative pressure of 5 psi). Any seam that failed these tests was rebuilt or repaired until the result was satisfactory. Seams were tested by air pressure whenever possible; the test consists of injecting air into the center air channel of the fused air seams at a predetermined pressure. If the seam was continuous, no leak would occur and the pressure could be maintained almost indefinitely. If leaks were present, they were located and repaired. Whenever air pressure testing could not be used (e.g., corners), the vacuum-box test method was used. In this test, a film of soapy water was formed over the area to be tested. A box fitted with a transparent upper cover and a neoprene lower rim was placed over that area and connected to a vacuum pump; a negative pressure of 5 psi was then applied. Apparent punctures or discontinuities (evident when bubbles appeared) were repaired.

The geomembranes were visually inspected by Solmax, BAPC, and NYSDEC for blemishes, bubbles, pockmarks, punctures, and other defects or damage that may have occurred during transport and panel placement. All such defects were marked and repaired. Any defect or damage observed which was smaller than the tip of an extruder gun was covered with extrusion beads. Prior to any fillet-extruded geomembrane welding, the geomembrane was buffed to ensure adequate adhesion. Any defect or damage observed which was wider than the tip of the extruder gun was repaired with extrusion-welded patches. All seams shown to be defective were entirely rebuilt using the fusion seaming process.

The single-side geocomposite was deployed after a final visual inspection of the installation work was completed by Solmax and BAPC. All liner activities, including the cap liner, were completed by the end of the 1995 construction season. The cell was seeded, jute net was placed to prevent erosion, and it was closed.

The leachate collection system shown in Appendix A, Drawing 19714-C-06, was installed by Remcor. The leachate collection system (consisting of both primary and secondary systems) was installed in the containment cell in 1994 and in the cell extension in 1995. Final locations of risers and drains are shown on the as-built topographic survey map produced by Niagara Boundary (Appendix A).

Secondary collection piping was installed after the first layer of 60-mil HDPE liner and geonet. The secondary collection system was constructed with 6-in. solid HDPE riser pipe with a T-connection at the bottom. Ten feet of 6-in. perforated HDPE header pipe wrapped in a nonwoven geotextile was connected to the T. A layer of drainage sand was placed around all secondary leachate collection piping.

The primary collection piping was installed over a second layer of 60-mil HDPE liner. The primary collection system was constructed with 6-in. perforated HDPE riser pipe with a T-connection at the bottom. Approximately 200 ft of perforated 4-in. HDPE header pipe wrapped in a nonwoven geotextile was connected to the T. Each length of 4-in. header pipe was heat fusion welded.

The leachate collection system installed in the cell extension during 1995 is identical in material and method of construction to the system installed in 1994 in the containment cell. The six primary and six secondary collection riser pipes are monitored by FMC monthly for levels of water. Leachate is pumped out and transferred to the groundwater treatment facility prior to discharge to the onsite wetland.

The leachate collection system continued to be monitored from January 1996 to the present. The volume of water pumped from the leachate collection system and treated in 1996 is discussed in Section 4.7.

4.2.4 Stabilization Area

The temporary area for soil stabilization operations was constructed in 1994 adjacent to the containment cell. The process included: a screener; pug mill; mixing vessel for lime; and portable silo. Soil was stabilized using this process only during 1994.

1994 Season:

The soil stabilization area was constructed by Remcor and was graded and compacted with bank-run gravel (sand) and lined with 40-mil HDPE. A nonwoven geotextile was placed over the liner to act as a cushion beneath a 6-in. lift of #2 crusher run. The wastewater retention pond was also constructed according to design drawings. The treatment area and retention pond liners were installed and inspected with the same quality assurance procedures used for the containment cell.

Storm water was collected in a sump at the northeastern corner of the soil treatment area, pumped through the retention pond, and then pumped to the temporary water treatment unit. The water was treated to meet the discharge criteria and discharged to Jeddo Creek.

1995 Season:

The containment cell was extended over the former stabilization area. The rock fill and liner that comprised the treatment area and water retention pond were excavated, stockpiled, and disposed of in the cell extension.

4.3 CHARACTERIZATION/PRE-EXCAVATION SAMPLING

The following pre-excavation characterization samples were collected and analyzed by Remcor during July 1994.

- Seventeen soil samples from an offsite borrow pit to be used for fill material were submitted for analysis. Results indicated no contamination and this material was approved to be used as backfill onsite (Appendix F).
- Based on visual observation of the potential contamination associated with the site along the excavation margin outside the fence line along the canal south of the property boundary, four soil samples were collected. These samples were submitted for analysis and found to contain arsenic and lead contamination. Results of these analysis are included in Appendix F.

4.4 SOIL AND SEDIMENT STABILIZATION

Material was excavated from contaminated areas and stabilized and/or directly deposited in the onsite containment cell. A temporary treatment area was used to stabilize material from the Waste Pile and other soil failing TCLP analysis prior to placement in the containment cell. Materials that passed TCLP analysis were deposited directly into the containment cell.

BAPC observed Remcor's stabilization activities and monitored its sampling events for consistency with the approved remedial design. BAPC has relied on Remcor's data for the conclusions set forth herein and has not independently verified this data.

4.4.1 Excavation

Equipment used to excavate contaminated material included: Hydraulic excavators (hoes), bulldozers, rubber tired front-end loaders, and dump trucks.

1994 Season:

Contaminated material was excavated from the Waste Pile Area, Rectangular Pond, Exclusion Zones, and Quarries in 1994. Screening samples were collected for TCLP analysis of contaminants of concern; material that failed the TCLP test was stabilized with portland cement and lime. Material that passed TCLP analysis was placed directly into the containment cell.

Excavation work began in the Waste Pile Area in early August and proceeded to the Rectangular Pond, Quarries, and Exclusion Zones. Material requiring stabilization was temporarily stockpiled; stabilization of the contaminated Waste Pile material was completed by late October.

The total volume of contaminated material excavated in 1994, based on FMC and Remcor records, was 44,931 yd³.

1995 Season:

Material was excavated from the entire area south of Dublin Road (from the canal bank on the west to the toe of the slope along the municipal landfill on the east) in 1995. The depth of excavation varied, but most areas were excavated down to bedrock as shown in Figure 4-2. The roadbed of Dublin Road was also excavated.

Contaminated soils passing TCLP analysis were directly deposited into the containment cell. Except for approximately 230 yd³ from sub-grid Block 27 shown in Figure 4-2, which was treated in situ prior to excavation and placement in the containment cell, the remainder of excavated material required no treatment and was placed directly in the containment cell.

The total volume of contaminated material excavated in 1995, based on FMC records, was 25,947 yd³.

1996 Season:

In 1996 the Quarries and the area between them were sampled. Sample results showed that the material exceeded RAOs. The Quarries were dewatered, sediments were removed, soil between them was excavated, and the material was disposed of offsite at the Chemical Waste Management facility in Model City, New York.

The total volume of contaminated sediment disposed of offsite in 1996, based on FMC and Smith Environmental records, was 771 yd³.

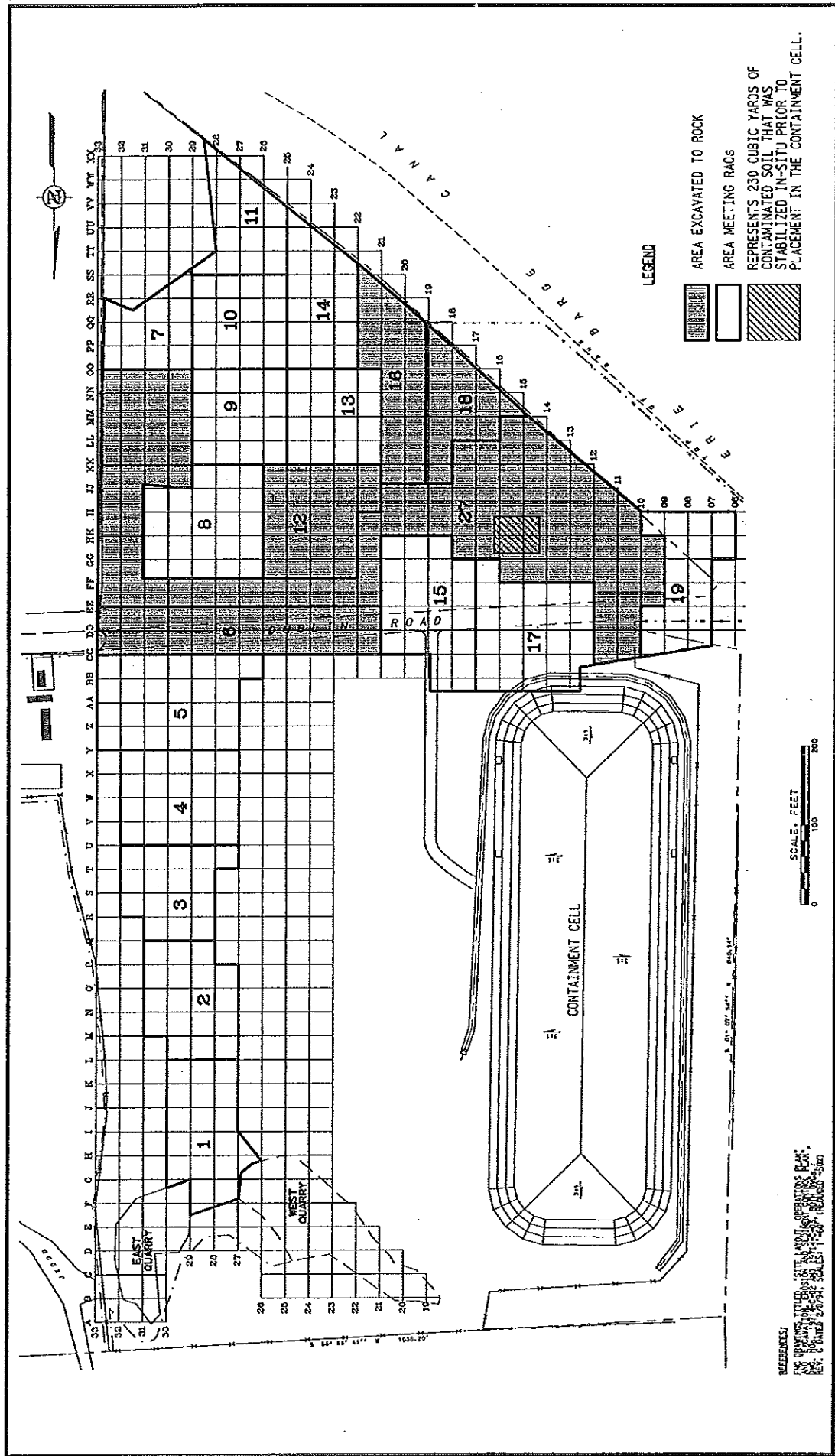


Figure 4-2
Confirmatory Soil RAO Sampling Results
(1/2/95)

4.4.2 Stabilization

1994 Season:

During 1994, additives used for stabilization were lime and lime/portland cement, Type 1. The type and quantity of additives, as a percentage of the weight of the contaminated material, had been established by Remcor in treatability tests as required by the approved specifications. This required amount of additive was computer-controlled within the pug mill. Volumes of contaminated material treated and volumes of additives are shown in pug mill throughput quantities (Appendix G).

Stabilized material was initially stockpiled (each stockpile representing one shift's production) and analyzed by TCLP by a Remcor subcontractor for contaminants of concern. If the stabilized material passed TCLP analysis, it was placed in the containment cell; if it failed TCLP analysis it was restabilized and sampled again.

Contaminated material on both sides of Dublin Road and the Quarries was tested for conformance with the RAO criteria in Table 4-7 prior to excavation (one test for every 250 yd³ of material). If the tested material exhibited contaminant concentrations less than the TCLP criteria but exceeded RAOs, that material was excavated, placed directly in the containment cell, and compacted without stabilization. Contaminated material that exceeded TCLP criteria was stabilized through the process facility and then deposited in the containment cell.

1995 Season:

Subgrid Block 27 as shown in Figure 4-2, was the only soil that required stabilization in 1995. Block 27 contained approximately 230 yd³ of soil contaminated with arsenic. This material was stabilized in situ, resampled, and analyzed for TCLP characteristics. The material passed TCLP requirements and after excavation was placed in the containment cell.

4.4.3 Disposal

A total of 71,254 yd³ of material was placed in the containment cell, and 2,354 tons of lime and portland cement were used to stabilize contaminated materials that did not pass TCLP analysis based on FMC and Remcor records. The compaction specification was determined at each lift using a pocket penetrometer.

1994 Season:

The final compacted volume in the containment cell at the end of the 1994 season was approximately 45,307 yd³, based on FMC and Remcor records, filling it to maximum capacity. The cell was closed for the season by placing a temporary liner over the top.

A minimum compressive strength of 20 psi was required for the in-place material. A minimum of three tests per acre per lift were performed by Remcor and witnessed by BACP, using a pocket penetrometer. The material placed in the cell was compacted using both sheepsfoot and smooth vibratory rollers. Compaction results for the 1994 construction season are included in Appendix D.

Table 4-7
Remedial Action Objectives for the Dublin Road Site

Contaminant	Groundwater ¹ (mg/L)	Surface Water ² Class C (mg/L)	Soils ³ (mg/kg)	Sediments ³ (mg/kg)
Arsenic	0.025	0.19	35	5
Copper	0.2	0.027	25	19
Lead	0.015	0.011	93	27
Mercury	NE ⁴	NE ⁴	0.1	0.11
Zinc	0.3	0.03	30	85
BHC (total)	ND ⁵	0.00005 ⁶	NR ⁸	NE ⁴
α-BHC	---	---	0.48	NE ⁴
β-BHC	---	---	1.6	NE ⁴
γ-BHC	---	---	2.3	NE ⁴
DDT	ND ⁵	0.0001 ⁷	8.8	NE ⁴
DDE	ND ⁵	0.0001 ⁷	8.8	NE ⁴
DDD	ND ⁵	0.0001 ⁷	12.4	NE ⁴

¹ ARAR : Title 6 NYCRR Part 703 for Class GA groundwater.

² ARAR: Title 6 NYCRR Part 701 for Class C water. Calculated based on a measured hardness of 268 ppm for Jeddo Creek Tributary 3.

³ ROD (NYSDEC/EPA 1993).

⁴ RAOs for these contaminants not established. Sediments excavated from the Rectangular Pond were cleaned up to RAOs for soils.

⁵ Not detected.

⁶ The approved RAO for BHC compounds was changed from 0.00001 mg/L, based on analytical constraints.

⁷ The approved RAO for DDT, DDE, and DDD was changed from 0.000001 mg/L based on analytical constraints.

⁸ Value not required. RAOs for individual BHC compounds will govern.

1995 Season:

The containment cell was extended to handle additional material, and 25,947 yd³ of new material was disposed of in this extension in 1995 according to FMC records. Approximately 5,000 yd³ of material from 1994 was regraded over the cell extension to a 3:1 slope. The extended cell was closed at the end of the season by placing a permanent cap over the top.

Material placed in the cell extension was also required to achieve a strength of 20 psi as measured with a pocket penetrometer. Again, at least three tests per acre per lift were taken by FMC and witnessed by BAPC. Material placed in the cell extension was compacted using a smooth vibratory roller. Compaction results for the 1995 construction season are provided in Appendix D.

1996 Season:

During 1996, 771 yd³ of additional sediment from the Quarries and soil from between the Quarries was removed and disposed of offsite at a secure landfill at Chemical Waste Management, Inc. in Model City, NY.

4.4.4 Debris and Other Material Handling

1994 Season:

Rocks and other debris too large to be processed through the pug mill (i.e., >3-in.) in 1994 were pressure-washed in the treatment area, placed in the containment cell, and covered with a layer of stabilized material.

1995 Season:

During 1995, the temporary liner used over the cell during the winter of 1994, liners used during construction of the treatment area and retention pond, and empty carbon canisters used in the temporary water treatment system were placed in the cell extension and compacted. Large pieces of liner disposed of in the extension were folded and crushed with the roller, and the canisters were emptied and crushed prior to placement in the cell extension. All debris was kept toward the middle of the lift being placed to ensure a sufficient burial depth.

4.5 VERIFICATION SAMPLING AND ANALYSES

Sampling and analysis activities included verification sampling of offsite backfill material and excavated areas and confirmation sampling of stabilized material. Samples were collected by the remediation contractor as specified in the project specifications. As outlined in the approved remedial design, the remediation area was divided into 19 blocks for verification sampling as shown in Figure 4-2; samples were collected from 5 areas in each block, and these 5 samples were composited and analyzed for all RAO parameters.

If the composite verification sample results exceeded RAOs, then excavation continued and the block was resampled for the same parameters. If an area failed a subsequent test, the block was excavated in 6-in.

increments and retested until the area met the RAO or bedrock was encountered. Table 4-8 summarizes the analytical results from the final round of verification sampling in 1995; Figure 4-2 outlines the blocks corresponding to the sample results provided in the table. Data results and field maps are included in Appendix H.

4.6 CAP COMPONENTS

The permanent cap was placed over the containment cell and cell extension by FMC at the end of the 1995 construction season. The components of the cap from bottom to top included: a geotextile layer; 60 mil very low-density polyethylene textured geomembrane layer; geotextile/geonet composite layer; completed with a 30-in. vegetation/topsoil/soil layer.

4.6.1 Nonstructural Fill

A final nominal 8-in. lift (approximately 5,100 yd³) of agricultural limestone was placed over the entire containment cell to act as a cushion prior to cap installation.

4.6.2 Upper Synthetic Membrane and Drainage Layer

A 10-oz geotextile fabric was placed over the last lift of soil to act as a cushion before the HDPE liner was installed. The geotextile was installed with 18-in. overlap at all seams. A 60-mil textured HDPE liner was installed over the geotextile with approximately 6-in. of overlap and was hot-wedge-welded together. The textured liner cap was subject to the same quality control procedures as outlined in Section 4.2.3 for the bottom liners. The final Solmax report contains QA information on this installation (Appendix E).

The textured liner was covered with a double-sided geonet composite (geotextile on both sides of the geonet). The geocomposite was installed with approximately 3-in. of overlap and joined with plastic cable ties 5 to 6 ft apart. At locations where two ends butted together, the cable ties were placed 1 ft apart.

4.6.3 Fill and Topsoil

A 2-ft lift (approximately 15,300 yd³) of screened 3-in. and smaller fill material (sand with some gravel) was placed over the geonet composite. Throughout placement of this material, some out-of-specification material was placed and had to be removed from the containment cell. Laborers watched for and removed pieces that looked unacceptable.

The topsoil originally stripped from the containment cell construction area and other locations north of Dublin Road was used as the final topsoil layer on the cell.

4.6.4 Toe Drain

The toe drain pipe was installed around the containment cell and consisted of a perforated 4-in. flexible pipe wrapped in geotextile which was buried in gravel in the anchor trench. Approximately every 100 ft, a lateral made of solid 4-in. flexible pipe was tied into the perforated pipe. The laterals were sloped away from the containment cell, and stone was used to cover the ends of the laterals. Lateral locations are marked on the as-built drawing.

Table 4-8
Confirmatory Sampling Analytical Results (mg/kg)

Sample ID	Date	As	Cu	Pb	Zn	Hg	ETU	α-BHC	β-BHC	γ-BHC	DDD	DDE	DDT	2,4,5-T	2,4,5-TP	2,4-D
RAO		35	25	93	30	0.1	Monitor	0.45	1.6	2.3	12.4	8.8	Monitor	Monitor	Monitor	Monitor
CONF-1																
CONF-2																
CONF-3	9/1	2.3	19	5.4	42	<	<	<	<	<	<	<	<	<	<	<
CONF-4																
CONF-5																
CONF-6																
CONF-7																
CONF-8																
CONF-9																
CONF-10																
CONF-11																
CONF-12																
CONF-13																
CONF-14																
CONF-15	9/6	2.8	8	1.2	24	<	<	<	<	<	<	<	<	<	<	<
CONF-16																
CONF-17																
CONF-18																
CONF-19	9/6	12	25	8.7	28	<	<	<	<	<	<	<	<	<	<	<

< - less than method detection limit
Note: Data based on FMC and/or FMC contractor records.

In the winter of 1995, water was found in the secondary leachate collection system after a heavy rain fell on top of snow. Runoff from this rainfall and snow melt caused the water in the anchor trench to build up and seep between the liners and into the secondary leachate collection system. As a result, additional laterals were added to the toe drain to decrease the lateral interval to one every 50 ft. Water was pumped from the secondary and primary leachate collection systems during the winter and spring.

The water was completely removed from the secondary system, and FMC continued to remove water from the primary system in the south section of the cell. It was anticipated that the leachate from the primary collection system will slowly cease to be generated and removal will no longer be required. All water collected from the secondary and primary leachate collection systems was transferred to the onsite groundwater treatment facility. After treatment, the water was discharged to the onsite wetlands, along with the remainder of the treatment plant effluent.

4.6.5 Vegetation

The containment cell was seeded and fertilized on December 6 and 7, 1995. Cold temperatures and limited sunlight during the winter months would delay germination of the seed until spring, so an erosion control blanket (Curlex, manufactured by American Excelsior) was installed over the containment cell after seeding. The blanket eventually decomposes after seed germinates and grass grows through it.

4.7 WATER MANAGEMENT AND TREATMENT

Runoff water in the containment cell was captured by the containment system; hay bales were placed around the outer edge of the cell to filter any overflow. Runoff from the clean soil surrounding the containment cell was controlled by a drainage ditch and silt fences were used to control sediment transport.

1994 Season:

A temporary drainage ditch excavated during construction of the containment cell ran from the south side of the cell, around the southeast corner and along the west side almost to the northwest corner, and from the south side around the southeast corner and along the east side approximately half of the length of the cell. Silt fences were installed to limit transport of sediment across the site.

Any water accumulated in open excavations, the Rectangular Pond, Quarries, and other depressions was collected, pumped to the retention pond, and treated. Water collected from the containment cell leachate collection system was also treated.

A temporary water treatment unit was constructed to treat contaminated construction and runoff water, retention pond water, and water from the containment cell leachate collection system. A 100,000-gal pool was used as the settling basin in 1994. Throughput quantities and effluent water test from the temporary water treatment unit are included in Appendix I.

1995 Season:

Andco Environmental Processes, Inc. installed the permanent groundwater treatment system early in the 1995 construction season. A schematic of the water treatment process is presented in Figure 4-3.

Dublin Road Water Treatment Process Summary

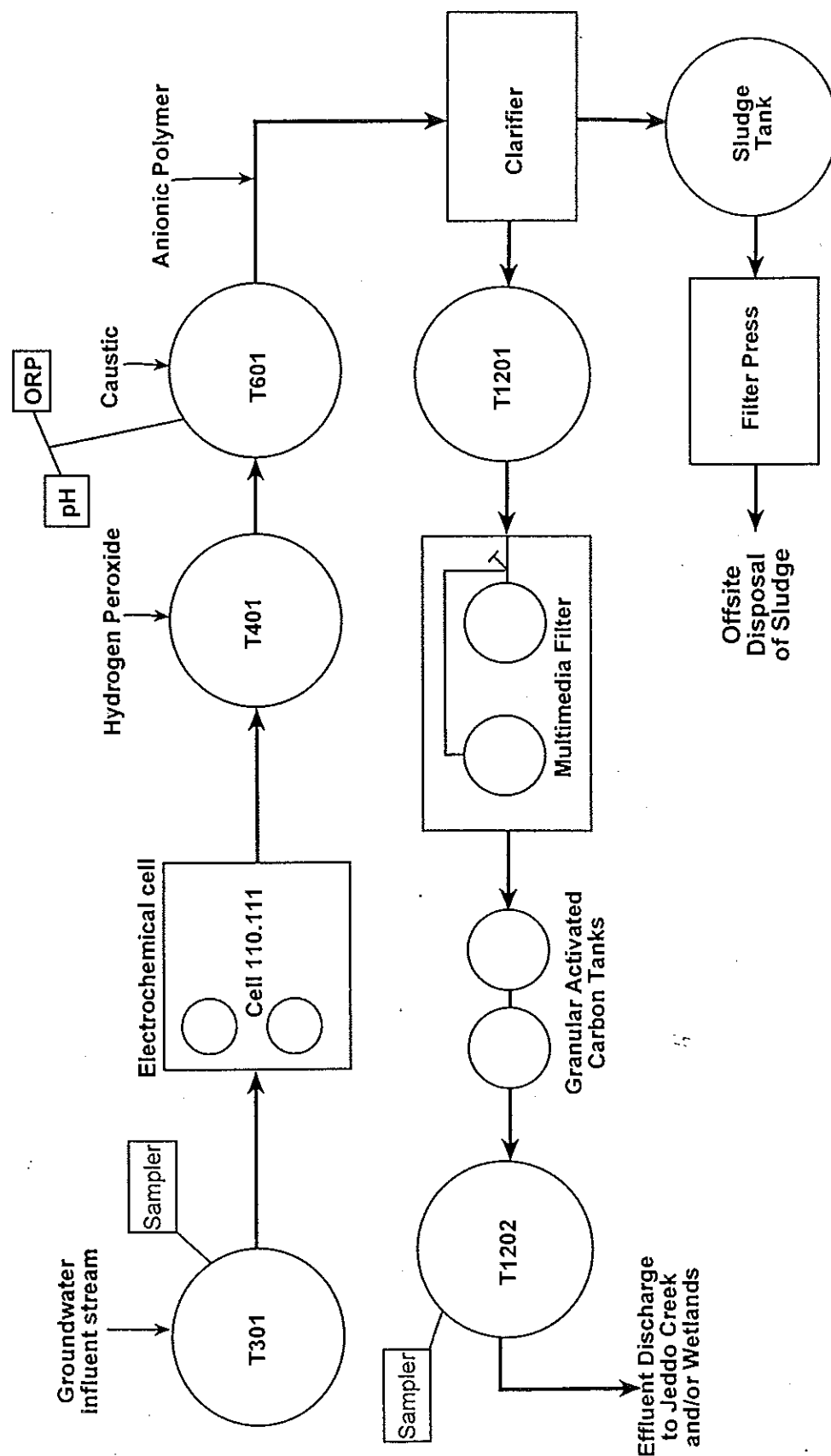


Figure 4-3
Schematic of Water Treatment Process

The groundwater treatment system uses an electrochemical precipitation system. Groundwater is extracted from wells and pumped to an influent tank. When enough water has collected in the influent tank, the water is pumped to the electrochemical cell, where ferrous hydroxide is generated. The water then flows to a reactor tank, where hydrogen peroxide is added to oxidize the ferrous hydroxide and to oxidize any arsenic from the arsenite state to the arsenate state. Then the water flows to another tank, where pH is adjusted to the optimum value to precipitate the heavy metals.

Following pH adjustments and before the water enters the clarifier, a small amount of polymer flocculent is introduced to improve the settling properties of the solids. The water then flows through a multimedia filter and through activated carbon for final polishing prior to discharge.

The 100,000-gal pool used as a settling basin in 1994 was used as a holding tank during 1995; stormwater collected from excavation areas and depressions south of Dublin Road and water from the leachate collection system was pumped into the tank until a sufficient volume had been collected to start the treatment plant. A total of 180,670 gal was treated during 1995 based on FMC and FMC contractor records. Results of effluent samples are included in Appendix I.

The temporary drainage ditch around the original cell was extended during construction of the containment cell extension. Part of the ditch ran the full length of the cell including the extension, and part started at the southeast corner of the extension and ran north approximately two-thirds the length of the cell. Before demobilization in the fall, the final drainage ditch was constructed in the same location as the temporary ditch and lined with Tensar 3000 erosion control mat. The ditch on the west side of the cell was not completed due to inclement weather. Ditch locations are shown in Appendix A, Drawing 19714-C-06.

Silt fences installed during 1994 were maintained by FMC to limit transport of sediment. Additional silt fences and hay bales were installed to control runoff. In areas that had been excavated down to bedrock, silt fencing was removed and not re-erected.

1996 Season:

The total amount of water treated and discharged to Jeddo Creek during 1996 was approximately 932,000 gal. The water was collected from the temporary holding pool, East and West Quarries, and the containment cell leachate collection system. Quantities of water pumped during 1994 and 1995 from the containment cell leachate collection system, based on FMC and FMC contractor records, are shown in Figures 4-4 and 4-5.

4.8 GROUNDWATER EXTRACTION SYSTEM

The groundwater component of the RA at the Dublin Road site involved installing a groundwater extraction/treatment system. The groundwater extraction system was installed onsite by FMC in 1995. System details and original trench design are shown in Appendix A, Drawing 19714-C-09. The following sections describe the system design, well installation, testing, and final system evaluation, summarized from *Installation, Testing, and Evaluation of Extraction Wells and Monitoring Wells at the FMC Dublin Road Site* (BAPC 1996) included as Appendix J.

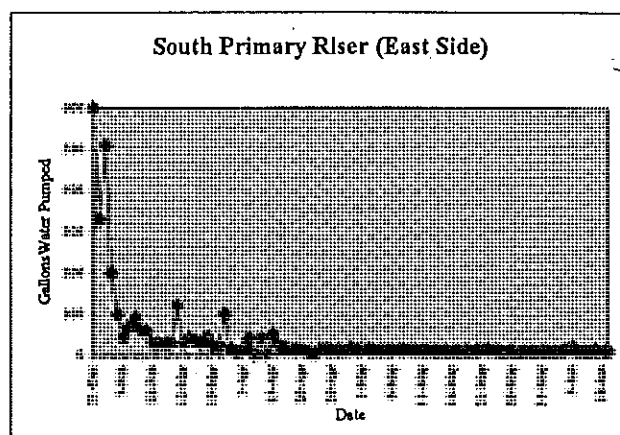
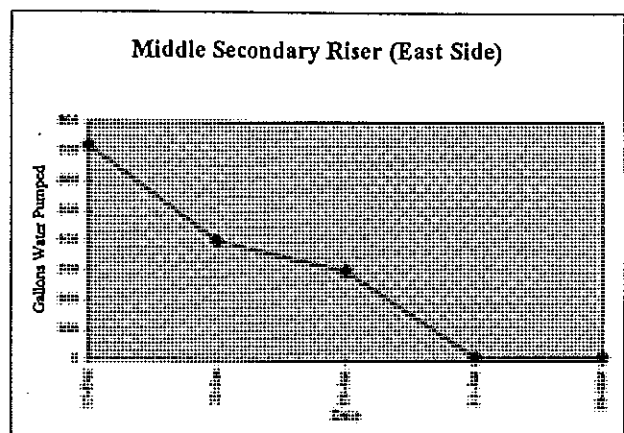
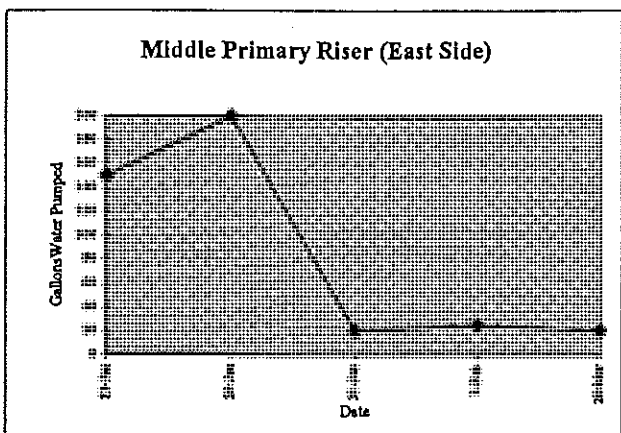
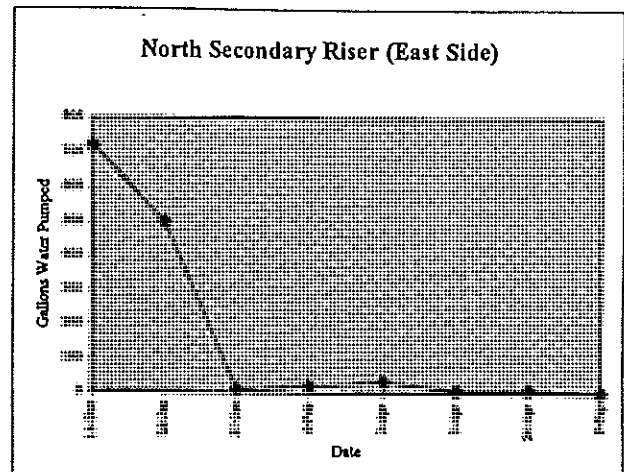
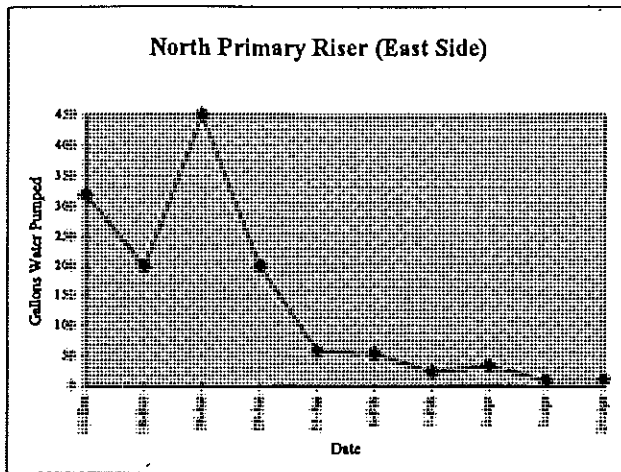


Figure 4-4
Quantity of East Side Leachate Collection System
Water Treated During 1996

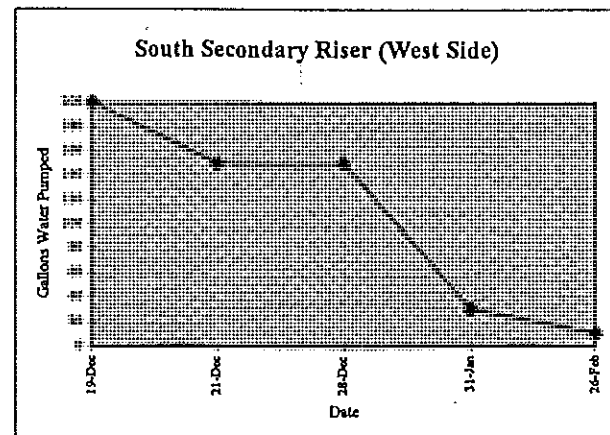
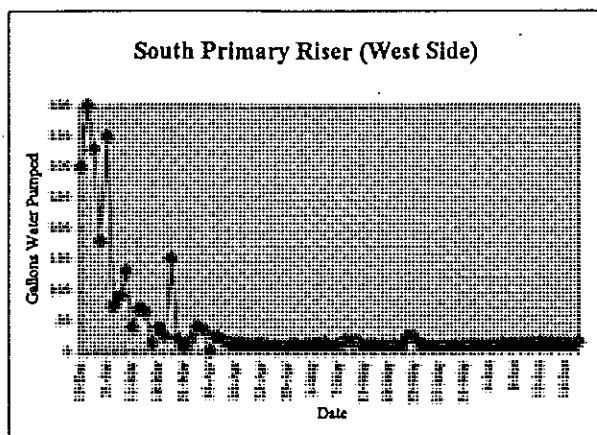
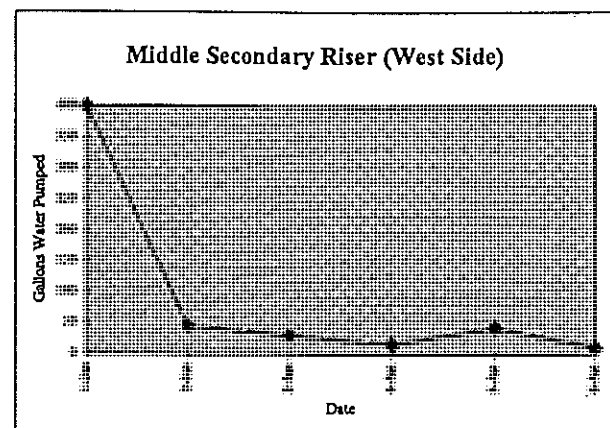
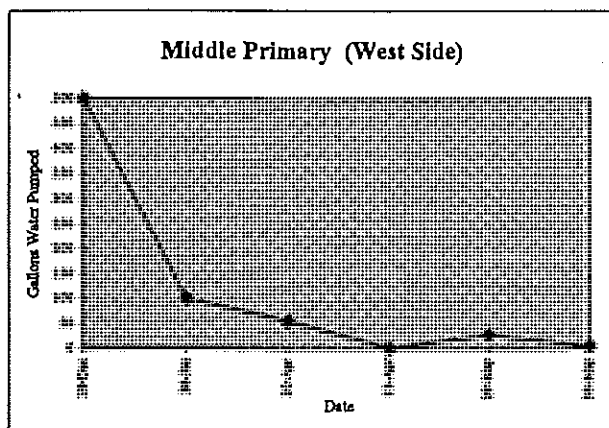
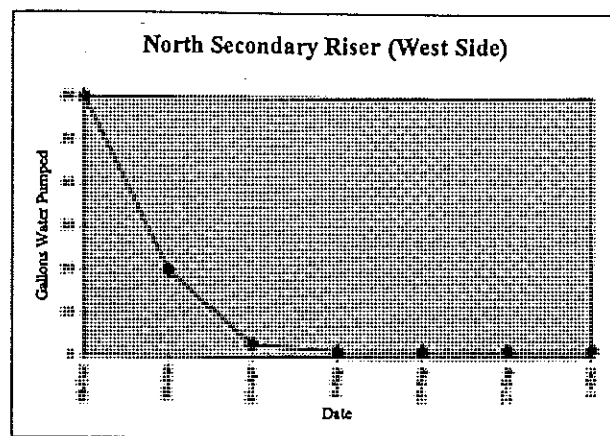
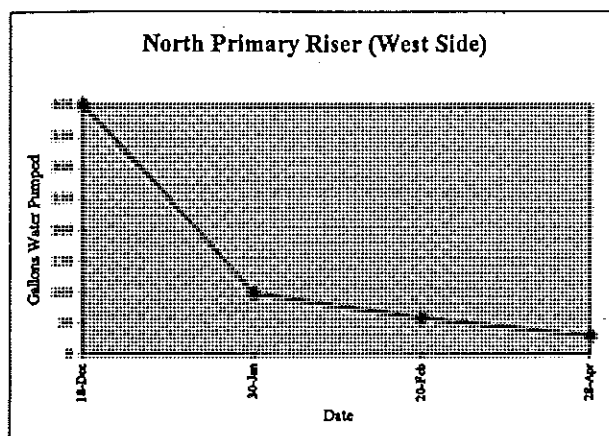


Figure 4-5
Quantity of West Side Leachate Collection System
Water Treated During 1996

4.8.1 System Design

Significant changes to the site configuration during RA necessitated modifications to the remedial design of the groundwater extraction system prior to installation. These modifications were made with NYSDEC (FCR 10) approval [Letter A.S. Nagi to J. W. Bodamer dated September 12, 1995] and included deleting the trench drain design element, revising the extraction well design, and relocating some extraction wells.

The groundwater extraction system is comprised of extraction wells and sumps. This system uses positive-pressure pneumatic pumps to extract well water, which then flows by gravity into collection sumps and is pumped into the treatment system by a network of above ground piping. A single air compressor operates the well pumps; the sump pumps are electrical.

The groundwater extraction and monitoring wells were installed by FMC between August and October 1995. Installation included pump or slug tests and final evaluation of the extraction system. The system was designed in accordance with the values shown in Table 4-9.

4.8.2 Well Installation

Extraction wells

Eleven extraction wells (W1 through W-6, W-8 through W-10, and W-12) were installed between August 28 and September 15, 1995, by Buffalo Drilling Company. A twelfth extraction well (W-11, originally a test well designated TW during the feasibility study) had been installed by Empire Soils Investigation, Inc. in July 1991 (BEI 1992).

Each extraction well consists of five primary components: PVC sump (5 ft long), PVC well screen (20 ft long), PVC riser, centralizers, and a PVC piezometer. As-built diagrams for each well are presented in Appendix J.

Monitoring wells

During remedial activities, a number of groundwater monitoring wells were abandoned as discussed in Section 4.2.1. Additional monitoring wells (89 through 93, and 36A) were installed by FMC in both the upper bedrock and overburden in September and October, 1995 (Figure 4-6). These additional wells provide observation points for extraction well pump testing, supplement remaining site monitoring wells, and provide monitoring points for the containment cell.

Monitoring well components include PVC sumps with bottom plug (1 ft long), PVC well screens, PVC riser pipes, and steel lockable surface casings. As-built diagrams are presented in Appendix J.

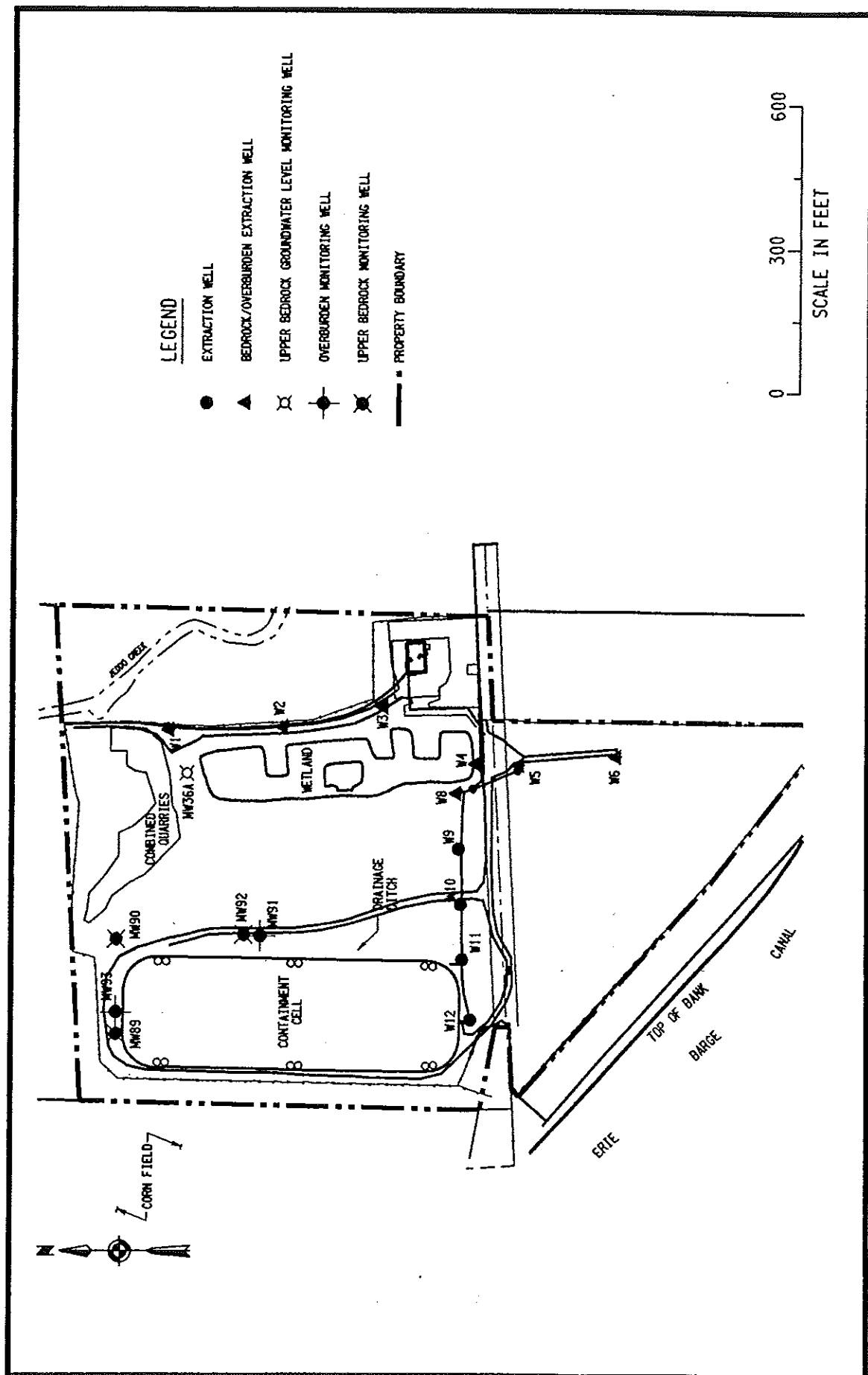
4.8.3 Well Testing

Extraction wells

Extraction wells underwent a 24-hour pump test and a 12-hour recovery test in October 1995. Each extraction well was pumped at a constant rate and frequent water level measurements were taken in the

Table 4-9
Summary of Extraction System Design Properties

Property	Value
Transmissivity	13 ft ² /day
Aquifer thickness	20 ft
Recharge	5 in./year
Leakage factor	0.0024 day ⁻¹
Pumping rate (per well)	0.5 gpm
Canal elevation	512 ft amsl
Jeddo Creek elevation (north)	480.9 ft amsl
Jeddo Creek elevation (south)	482.6 ft amsl
East Quarry water elevation	477.7 ft amsl
West Quarry water elevation	477.7 ft amsl
Wetlands/rock fill water elevation	487 ft amsl
Municipal landfill water elevation	500 ft amsl



13714 FIG04.DGN

Figure 4-6
New Monitoring Well Locations

extraction well and nearby monitoring wells. Observation and pumping wells used during this testing are shown in Figure 4-7. Extraction well testing results are included in Appendix J.

Monitoring wells

Monitor well response tests were performed in October 1995 by rapidly removing or adding water to the well and observing the return of the water level to pretest conditions. Upper bedrock zone monitoring wells (due to their long water column) were tested by water removal method, and overburden monitoring wells (due to their short water column) were tested by the addition of water method. Water level observation and pumping wells used during this testing are shown in Figure 4-7. Extraction well testing results are included in Appendix J.

4.8.4 System Evaluation

Extraction and monitoring well test results were evaluated to compare actual field conditions with the conceptual hydrogeologic model design. Extraction rates, transmissivity, and groundwater levels were the key elements in this evaluation.

Field extraction rates were significantly lower than design rates because specific capacity values were lower (see Appendix J). The hydrogeologic model had assumed the upper bedrock aquifer to be isotropic and homogeneous, whereas field transmissivity results suggest the aquifer is anisotropic and heterogeneous. The primary impact of anisotropy on system performance is thought to be an increase in cleanup time, due to shorter-than-predicted upgradient capture. Impacts of aquifer heterogeneity on the extraction system may necessitate pretreatment of influent water using a basic solution, especially for water withdrawn from the higher transmissivity zones.

At the conclusion of the extraction well testing program, groundwater levels were measured to determine the impact of pumping the extraction wells on the site groundwater system. The potentiometric surface map based on these data indicates that pumping of the extraction wells will significantly influence groundwater flow directions in the site vicinity and prevent offsite migration of contaminants.

4.9 WETLAND RESTORATION

As shown in Figure 4-8, wetland restoration was conducted in April and May 1996 in accordance with Appendix A, Drawing 19714-C-05.

The former drainage swale north of Dublin Road was restored as an open water impoundment between the original Swamp and the East Quarry. The gently sloped sides of the impoundment will produce a shallow water emergent zone. Isolated vegetation, peninsulas, and island habitat were incorporated in this wetland design.

Established wetland vegetation will be maintained in accordance with the requirements outlined in technical specifications (Appendix K) and the O&M plan (BAPC 1996) for the site.

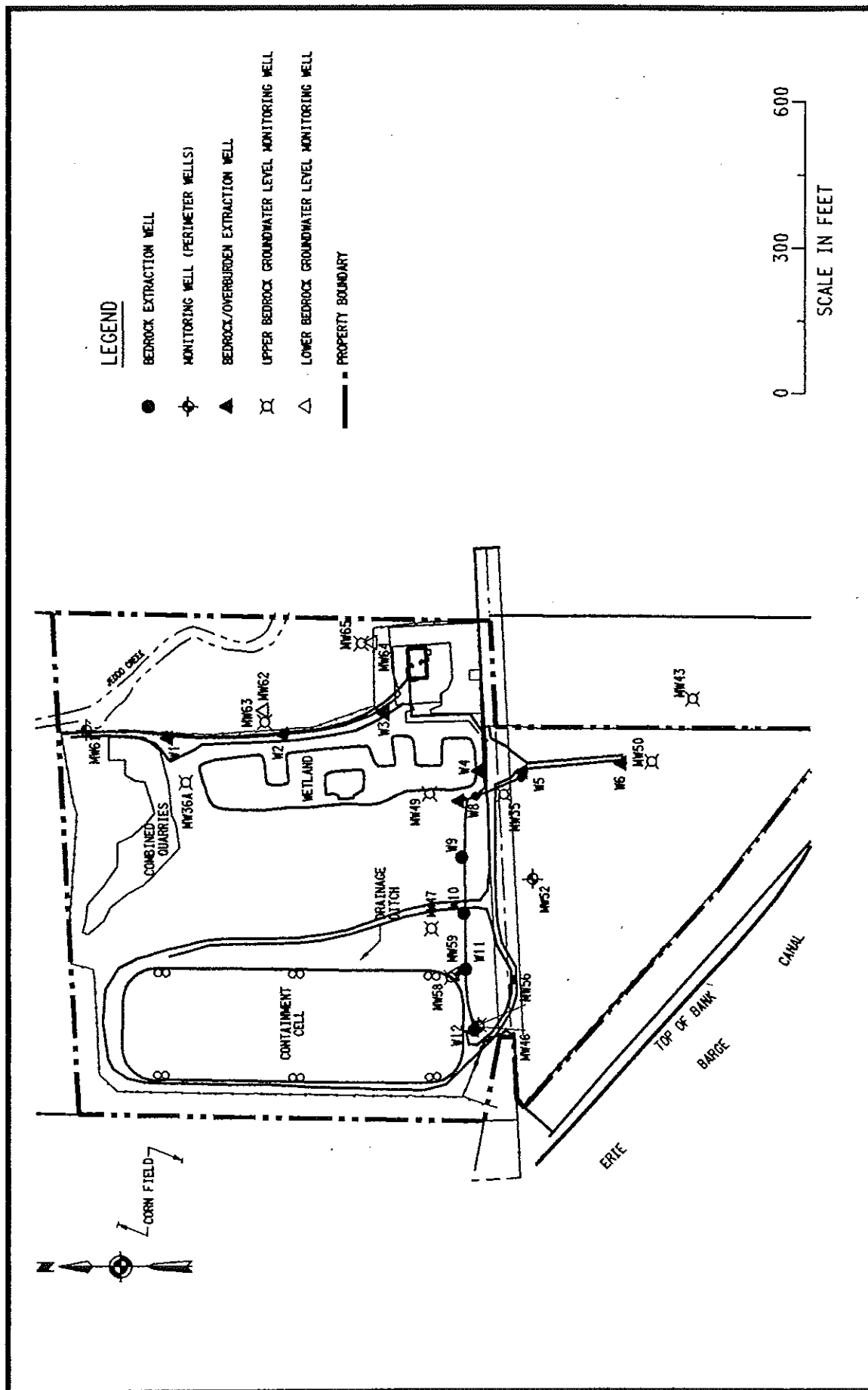
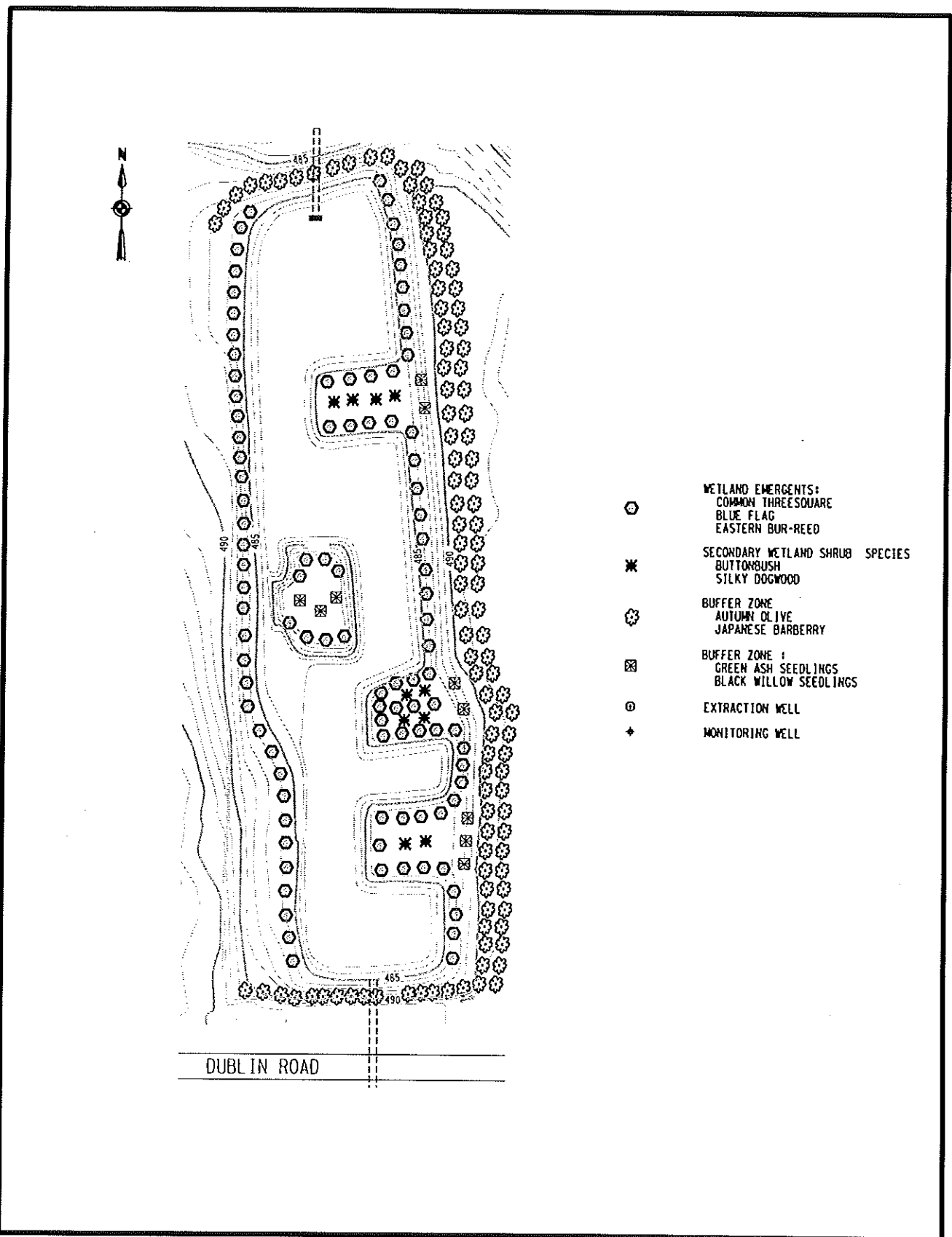


Figure 4-7
Pumping and Observation Well Locations

19714 FIG05.DGN



19714 FIG2.DGN
4/9/96

Figure 4-8
Wetland Vegetation Plan

4.10 REEXCAVATION OF QUARRIES

In late 1995, FMC sampling of the East and West Quarry sediments indicated the remaining sediments and the material between the two quarries did not meet the RAOs. In June of 1996, the Quarries were dewatered and the contaminated materials were excavated and transported offsite to a secure landfill at the Chemical Waste Management facility in Model City, NY. The soil separating the East and West Quarries was removed and taken to Chemical Waste Management facility in Model City, NY, resulting in the formation of a single quarry.

4.11 TOWN LANDFILL DRAINAGE

Runoff from the closed Middleport municipal landfill on the south side of Dublin Road and just east of the FMC property originally drained to the west onto FMC property. Due to the potential for surface water from the landfill to migrate onto the FMC property, FMC requested and obtained permission from Middleport and NYSDEC to redirect runoff from the landfill back onto the Middleport property.

Clearing approximately 3 acres of vegetation and placing a 5,050-yd³, according to FMC and FMC contractor records, soil cover on the landfill redirected runoff to sheet-flow southeast to a ditch that feeds into Jeddo Creek instead of draining west to the FMC property. Smith Environmental also regraded the ditch between the landfill and Dublin Road to redirect its flow east to Jeddo Creek.

4.12 HEALTH AND SAFETY SUMMARY

The information contained in Section 4.12 was obtained from FMC and FMC contractor records. BAPC had no health and safety responsibility and did not independently verify any data or information collected.

4.12.1 General

1994 Season:

Remcor conducted its work in accordance with written health and safety, emergency response, and air monitoring plans. Implementation of the plans and coverage of health and safety at the site was carried out by a full-time, dedicated Site Health and Safety Officer (SHSO) appointed by Remcor and approved by FMC. The SHSO reported to Remcor's Manager of Health and Safety, a Certified Industrial Hygienist who acted as the Project Health and Safety Officer (PHSO) and provided additional health and safety support.

Site security was provided by perimeter fencing; access was limited through a gate at Dublin Road. Daytime working hour security was provided by Remcor site personnel. Off-hour, nighttime/weekend security was provided by off-duty local police officers hired by Remcor. A visitors' log was used to track visitors to the site.

1995 Season:

FMC conducted its work in accordance with written health and safety, emergency response, and air monitoring plans. These plans were implemented by the Remcor SHSO, who remained as the SHSO for

FMC after Remcor left the site. The PHSO was the same individual who was Remcor's PHSO in 1994 and early 1995 and who was retained by FMC for this project for the remainder of 1995. Site security was provided as in 1994, with fencing, visitors' log, and off-duty local police officers hired by Remcor and FMC.

1996 Season:

Smith Environmental continued to work under the guidelines outlined in the Health and Safety, emergency response, and air monitoring plans. The Smith Environmental PHSO made a visit to the site and reviewed the health and safety plan at the start of the 1996 construction season. Implementation of these plans was carried out by the Smith Environmental SHSO, who was also the SHSO in 1994 and 1995. Site security was provided as in 1994 and 1995 with fencing, visitor's log, and off-duty local police officers hired by Smith Environmental.

4.12.2 Occupational Safety

1994 Season:

Accidents, injuries, and illnesses were tracked by Remcor for all personnel who worked at the site. Table 4-10 summarizes the accident experience for the site in 1994, including comparisons to the national averages for the construction industry.

1995 Season:

Accidents, injuries, and illnesses were tracked by FMC for all personnel who worked at the site. Table 4-10 summarizes the accident experience for the site in 1995, including comparisons to the national averages for construction work.

1996 Season:

Accidents, injuries and illnesses were tracked by Smith Environmental for all personnel who worked at the site. Table 4-10 summarizes the accident experience for the site in 1996, including comparisons to the national averages for construction work.

4.12.3 Safety Incentive Program

Copies of the 1994 and 1995 safety incentive programs are included in Appendix L.

1994 Season:

Remcor and FMC initiated a safety incentive program on July 1, 1994, to increase safety awareness and encourage site personnel to work safely and prevent accidents. The incentive program was based on months worked without an Occupational Safety and Health Administration (OSHA) recordable injury. Awards ranged from a pocket knife and coffee cup insulator for 1 month injury-free to a \$100 gift certificate for 6 months without an injury. The incentive program applied only to Remcor site personnel and long-term subcontractors working at the site. Awards were presented monthly at lunchtime meetings when all employees were present. A safety appreciation award dinner was hosted by FMC at the end of the construction season to recognize the safety contributions of all site personnel.

Table 4-10
Reportable Accidents (1994 –1996)

	Number LWD ¹	of Injuries Total	Hours Worked	Site LWD ¹ Rate	Site Total Rate (SIR ²)	National for LWD ¹	Rates for Total (SIR ²)
1994							
Total	1	1	22,145	9.03	9.03	5.0	10.2
1995							
Total	1	1	25,997	7.69	7.69	5.0	10.2
1996							
Total	0	0	13,172	0	0	5.0	10.2

¹ LWD - lost workday cases.

² SIR - serious injury cases (total OSHA recordable cases, including lost workday cases).

³ United States Labor Department, Bureau of Labor Statistics has not published rates for the 1995 and 1996 construction industry.

Note: Data based on FMC and FMC contractor records.

1995 Season:

A safety incentive program for 1995 was modeled after the 1994 program. Awards ranged from a baseball cap and golf towel for 1 month injury-free to \$100 in gift certificates for 6 months injury-free. A safety appreciation award dinner was hosted by FMC at the end of the construction season.

1996 Season:

The safety incentive program for 1996 was modeled after the 1994 and 1995 programs for the site. Awards ranged from a pocket reference book to an FMC jacket at the end of the project. A safety appreciation award dinner was hosted by FMC at the end of the project.

4.12.4 Personnel Monitoring

1994 Season:

Remcor determined airborne concentrations of potential site constituents by collecting air samples from the breathing zone of representative workers performing tasks with the highest potential for exposure. Selection of workers to be monitored was made by the SHSO in conjunction with the Remcor PHSO. Most samples were taken and analyzed for the expected potential site constituents of arsenic, lead, DDT, and lindane. Additional samples were taken for a wider range of organochlorine pesticides, sulfuric acid, and mercaptans, and volatile organic compounds (VOCs).

Personnel samples were taken during the clearing and grubbing of the Waste Pile area during June 1994; at the start and during excavation, transfer, and treatment of potentially contaminated materials; and when workers complained of odor breakthrough in their respirators.

Samples were taken using portable belt-worn sampling pumps. Arsenic and lead were sampled at a rate of approximately 2 L/min onto a 0.8- μ m mixed cellulose filter and analyzed by inductively coupled plasma. Pesticides were sampled at a rate of approximately 1 L/min on glass fiber filters and/or on mini polyurethane foam (PUF) cartridges and analyzed by gas chromatography using an electron capture detector. VOCs were sampled at a rate of approximately 100 to 150 mL/min through a charcoal tube and analyzed by gas chromatography. Mercaptans were sampled at a rate of approximately 50 mL/min on a caustic impregnated glass fiber filter and analyzed by gas chromatography using a Hall electroconductivity detector in the sulfur mode.

Forty personnel samples were taken during 1994. All results were below OSHA permissible exposure limits (PELs).

- 40 samples total
- 18 samples for arsenic and lead
- 15 samples for DDT and lindane (9 of these samples also underwent an extended organochlorine pesticide scan)
- 5 samples for mercaptans
- 1 sample for VOCs
- 1 sample for carbamate pesticides
- 15 samples for arsenic and lead and 15 samples for DDT and lindane taken simultaneously on the same workers

Personnel sampled included excavator operator, bulldozer operator, loader operator, dump truck driver, pug mill operator, and technician (holding grade stake). Areas where these tasks were sampled included the Waste Pile area, soil stabilization/stockpile area, pug mill operations, and transfers between these areas.

Summary tables for 1994 personnel monitoring are included in Appendix L.

1995 Season:

FMC determined airborne concentrations of the potential site constituents arsenic, lead, DDT, and lindane (and other organochlorine pesticides) by collecting air samples from the breathing zone of representative workers performing tasks with the highest potential for exposure. Samples were analyzed as indicated above. Selection of workers to be monitored was made by the SHSO in conjunction with the PHSO. Personnel samples were taken during the construction of the extension cell, excavation and regrading of the original cell, excavation of potentially contaminated areas, and placement of material in the extension cell.

Thirty-nine personnel samples were taken during 1995. Because of the replacement of Remcor, 12 samples were not analyzed. Twenty-seven samples were analyzed for potential site constituents, and all results were below OSHA PELs.

- 39 samples total
- 12 samples not analyzed
- 18 samples for arsenic and lead
- 9 samples for DDT and lindane (2 of these samples also underwent an extended organochlorine pesticide scan)
- 9 samples for arsenic and lead and 9 samples for DDT and lindane taken simultaneously on the same workers

Personnel sampled included excavator operator, bulldozer operator, loader operator, and dump truck driver. Areas where these tasks were sampled included the original cell, extension cell, rectangular pond and swamp areas, and transfers between these areas.

Summary tables for 1995 personnel monitoring are included in Appendix L.

1996 Season:

Smith Environmental determined airborne concentrations of the potential site constituents: arsenic, lead, DDT and lindane by collecting air samples from the breathing zone of representative workers performing tasks with the highest potential for exposure. Samples were analyzed as indicated above. Selection of workers to be monitored was made by the SHSO in conjunction with the PHSO. Personnel samples were taken in the quarry excavation, which was the only contaminated material handled in 1996.

A total of eight personnel samples were taken in 1996. All samples were analyzed for their respective constituents, and none exceeded the detection limit.

Below is a summary of the samples taken:

- 8 samples total
- 4 arsenic and lead
- 4 DDT and lindane
- 0 exceeded the detection limit

4.12.5 Environmental Compliance Monitoring

Environmental compliance monitoring consisted of perimeter sampling and analysis for arsenic, lead, DDT, and lindane as well as real-time fugitive dust monitoring. In addition, some area sampling was performed to test for constituents that may have been present or generated during soil treatment activities. All environmental monitoring was performed by FMC or FMC contractors.

Perimeter monitoring

Perimeter monitoring was conducted by Remcor and FMC during both the 1994 and 1995 construction seasons. No perimeter monitoring was conducted during the 1996 season because the potential for offsite exposure during removal of moist quarry sediments and stockpiled soils was remote.

1994 Season:

Perimeter air samplers were used to provide data on potential offsite releases of contaminants. Four samplers each for pesticides and particulates (for arsenic and lead) were co-located at the site perimeter. One set of samplers was placed on the normally upwind (west) site perimeter, and the other sets were placed along the downwind (east) site perimeter (see Figure 4-9). The units were biased along the east site border because the prevailing winds originate from the west and southwest.

Sampling was performed continuously during operations that could generate airborne contaminants. Filter media were normally changed out approximately every 24 hours. Some filters were changed after approximately 8 to 10 hours of operation on Saturdays when there was no activity the following day. Pesticide samples were collected in accordance with EPA Ambient Air Method TO-4. Pesticide samplers were General Motor Works Model GPS-1 PUF samplers equipped with a dual sampling module containing a 4-in.-diameter glass fiber filter for particulates and a 3-in.-diameter PUF filter for vapors. These samplers operated at a flow rate of approximately 0.2 to 0.28 m³/min (7 to 10 cfm). Samples were analyzed by gas chromatography using an electron capture detector for DDT and lindane. Several samples also were analyzed for additional organochlorine pesticides that could have been present during site operations.

Arsenic and lead samples were collected using particulate samplers following the procedures given in *40 CFR 50, Appendix B*. Samples were analyzed in accordance with *40 CFR 50, Appendix G*, a flame atomic absorption method. Particulate samplers were General Motor Works Model GL 2000H, using an 8-in. by 10-in. glass fiber filter. Samplers were operated at a flow rate of approximately 1.1 to 1.7 m³/min (39 to 60 cfm).

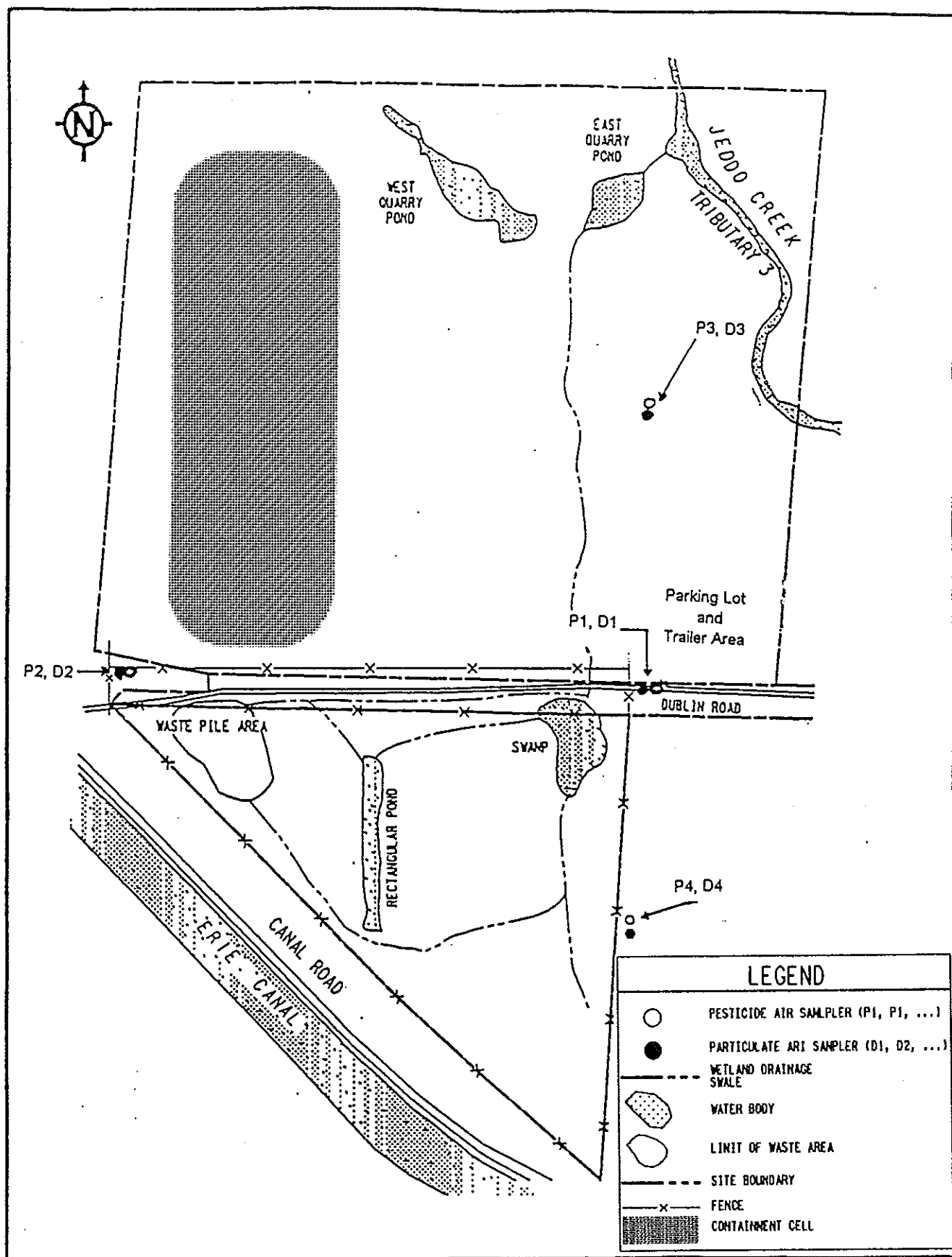


Figure 4-9
Site Map with Perimeter Air Sampling Locations

A total of 597 perimeter samples (299 pesticide and 298 arsenic/lead) were taken over approximately 75 days during the 1994 construction season. Of the 299 pesticide samples, 142 were analyzed for DDT and lindane, and 157 were analyzed for 18 organochlorine pesticides, including DDT and lindane.

- 597 total perimeter samples
- 299 pesticide samples
- 298 arsenic/lead samples
- 99.5 percent of the total perimeter sample concentrations were less than perimeter limits
- 99 percent of arsenic/lead sample concentrations were less than perimeter limits
- 3 out of 597 samples (0.5 percent) exceeded perimeter limits for arsenic

Tables summarizing 1994 perimeter monitoring results and comparisons to perimeter limits are included in Appendix L.

1995 Season:

Perimeter air samplers were deployed in the same locations as in 1994, the same air samplers were used, and samples were obtained and analyzed in the same manner. A total of 709 perimeter samples were taken over approximately 90 days during the 1995 construction season. Five hundred thirty of these were analyzed for potential site constituents—265 for pesticides (DDT and lindane) and 265 for lead and arsenic.

- 530 total perimeter samples representing 69 days of sampling
- 265 pesticide (DDT and lindane) samples
- 265 arsenic/lead samples
- All of the perimeter sample concentrations were less than perimeter limits

Tables summarizing 1995 perimeter monitoring results and comparisons to perimeter limits are included in Appendix L.

Fugitive dust monitoring

Fugitive dust monitoring was conducted during the 1994, 1995, and 1996 construction seasons.

1994 Season:

Fugitive dust monitoring was conducted by Remcor in accordance with NYSDEC guidance for particulate monitoring at inactive hazardous waste sites. A direct-reading digital instrument was used to monitor airborne dust levels over periods of 15 minutes or less throughout the work day. Onsite downwind monitoring was performed daily during operations that would disturb soil or sediments. Most monitoring was performed immediately downwind of site operations, and additional monitoring was performed at downwind site fencelines and at upwind locations.

Monitoring results were compared to the NYSDEC action level of $100 \mu\text{g}/\text{m}^3$ to determine if dust suppression measures were necessary.

- 238 observations made over 70 days
- 99.6 percent (237) of the observations were below the NYSDEC action level
- Only 1 observation (0.4 percent) was above the action level, and application of water was immediately initiated to reduce dust

Tables summarizing the 1994 results are included in Appendix L.

1995 Season:

Fugitive dust monitoring was performed by FMC with the same instrumentation and using the same method as in 1994.

- 142 observations made over 60 days
- 97.9 percent (139) of the observations were below the NYSDEC action level
- Only 3 observations (2.1 percent) were above the action level, and application of water was immediately initiated to reduce dust

Tables summarizing the 1995 results are found in Appendix L.

1996 Season:

Fugitive dust monitoring was performed by Smith Environmental with the same instrumentation and using the same method as in 1994 and 1995. Observations were made daily during operations which generated dust. All observations were below the 100 $\mu\text{g}/\text{m}^3$ NYSDEC action level.

Additional area sampling

Additional area sampling was conducted during the 1994 and 1995 construction seasons by Remcor and FMC. No additional area sampling was required during the 1996 season because excavation was limited to moist quarry sediments.

1994 Season:

Site personnel noticed a disagreeable odor during soil stabilization activities associated with the stabilization process. In an attempt to identify and quantify the potential constituents responsible for the odors, samples were taken for mercaptans, sulfides, and chlorinated compounds that could have been present or generated during the stabilization process. Stabilization activities were stopped during evaluation of the sampling results.

Several area samples were taken during Waste Pile excavation, pug mill operation, and stockpiling of treated materials. Twenty-five detector tube (Dräger type) samples were taken over a period of 10 days in September and October for chlorine, hydrochloric acid, hydrogen sulfide, mercaptans, and phosgene. No chlorine, hydrochloric acid, hydrogen sulfide, and phosgene were detected in any samples. Mercaptans were detected in one ambient air sample in the Waste Pile Area, and also in three headspace samples of treated soil. These instantaneous samples indicated that mercaptans could be present but did not provide a quantitative measurement of potential air concentrations.

Four samples for mercaptans and other related sulfur compounds were collected on September 28 and 29 using 1-L Tedlar bags and a low-flow pump. Mercaptans were not found in any samples; however, a related compound, dimethyl disulfide, was found at a level of 0.4 ppm. The OSHA PEL for mercaptans is a ceiling concentration of 10 ppm for 15 min. There is no published exposure limit for dimethyl disulfide.

Additional pesticide samples were taken over three days in September 1994 to determine potential exposures outside the exclusion zone near the pug mill area. A high-volume sampler was used to collect samples approximately 50 ft directly downwind of the pug mill. Samples were analyzed for organochlorine pesticides including DDT and lindane, and all results were below OSHA PELs.

Area samples for VOCs were taken on October 11 and 19 at upwind and downwind fenceline locations. Samples were collected on charcoal tubes using low-volume air sampling pumps at 100 to 150 mL/min and were analyzed by gas chromatography for 30 VOCs. All results were below OSHA PELs.

After review of the sampling results with the NYSDEC and NYSDOH, remediation activities were restarted.

Tables summarizing the area monitoring are included in Appendix L.

1995 Season:

FMC determined that additional area sampling was not required or necessary during 1995. However, one area sample was taken for arsenic, lead, DDT, and lindane at the same time as personnel samples were taken in August 1995. Analytical results were below OSHA PELs.

4.12.6 Training

All site personnel, including subcontractors, who may have had a potential for exposure to site contaminants were required to be trained according to the OSHA hazardous waste operations and emergency response standard 29 CFR 1910.120(e) prior to working on the site for the 1994, 1995, and 1996 construction seasons. General site workers completed at least 40 hours of offsite hazardous waste operations training and 8 hours of annual refresher training as applicable, and the site supervisor had an additional 8 hours of supervisory training. In addition, all site workers received initial training on the site-specific health and safety plan and emergency procedures and the hazard communication standard and program for the site. Scheduled weekly "toolbox" safety meetings were held as well as daily safety briefings to discuss safety topics specific to the site. Subcontractors also received initial health and safety plan and hazard communication training and participated in the daily and weekly safety meetings. Visitors were informed of potential site hazards, restricted areas, and emergency procedures when they visited the site. Training and information was provided for visitors according to their potential for contact with site hazards. Visitors who entered the exclusion or decontamination zones also were required to have 40-hour training in accordance with 29 CFR 1910.120. The SHSO was responsible for ensuring that all site personnel, subcontractors, and visitors had the proper training. The SHSO also maintained training records at the site.

4.12.7 Weekly Jobsite Inspections

As part of the ongoing effort to maintain a clean and orderly work site, the SHSO conducted weekly jobsite inspections during the 1994, 1995, and 1996 construction seasons. The checklist used as guidance for these inspections covered housekeeping items, recordkeeping, site conditions, use of personal protective equipment, decontamination, and other safety and compliance items. The checklist was reviewed by the remediation contractor's site supervisor and the PSHO to verify that items were properly addressed. A copy of the checklist is included in Appendix L.

4.12.8 Medical Surveillance

Site personnel, subcontractors, and visitors who were identified as having had a reasonable potential for exposure to site constituents were required to undergo a baseline health assessment before participating in site operations during the 1994, 1995, and 1996 construction seasons. The purpose of this medical surveillance was to assess each individual's health prior to handling hazardous materials, to determine an individual's fitness to work at a hazardous waste site and wear respiratory and other personal protective equipment, and to monitor any medical indicators that could be related to site work. The assessment consisted of a physical exam, medical and occupational history, lab studies, and audio and visual screening. Tests for blood lead, zinc protoporphyrin, DDT, and lindane, and urinary arsenic were performed as part of the medical exams. Medical exams were performed annually and upon termination of employment. Medical exams and consultations were available for employees who reported symptoms of overexposure to site constituents.

The SHSO was responsible to coordinate medical exams for site personnel, ensure that subcontractors and visitors had the proper medical surveillance, and maintain medical surveillance records. All individuals were within acceptable biological exposure indices for arsenic, lead, DDT, and lindane.

4.13 FIELD CHANGE REQUESTS AND FIELD CHANGE/DESIGN CHANGE NOTICES

Table 4-11 briefly describes the field change requests (FCRs) issued during the Dublin Road RA. Copies of the actual FCRs are included in Appendix M. Table 4-12 provides a brief description of field change notices (FCNs), design change notices (DCNs) completed during the Dublin Road RA, and dates of NYSDEC approvals. Copies of the actual FCNs/DCNs are included in Appendix M.

5.0 CONCLUSIONS

Characteristically hazardous Waste Pile materials were excavated and treated until TCLP levels were met and placed in an onsite containment cell constructed consistent with 6 NYCRR Part 360. Onsite surface water was treated. The site was graded to provide drainage and prevent accumulation of standing water. A new wetland was constructed onsite to replace the wetlands removed during remediation. Extraction and treatment of contaminated groundwater began in the fall of 1996 and the treated water was discharged to the onsite wetland. The Quarry will be allowed to refill with clean surface water and continue its existing hydraulic function. Fencing has been installed around the entire site.

Table 4-11
Field Change Request Summary*

FCR No.	Description	Approval Date
FCR-01	Changes to Specification No. CSP-01 and CSP-02 due to field conditions.	8/3/94 8/17/94
FCR-02	Changes to Specification No. CSP-07 to allow for disposal of unanticipated glass debris scattered throughout the Waste Pile into the Waste Disposal Cell.	8/11/94
FCR-03	Changes to Specification No. CSP-02 to facilitate the deposition and treatment of contaminated soil material by allowing an alternative approach to stabilization while maintaining the TCLP criteria for materials being deposited in the containment cell.	9/15/94
FCR-04	Changes to Specification No. CSP-06 and Appendix A, Drawing No. C-07 (Rev. 0) to support a revised cap. This changes the cap cross sections because the volume of the engineered cell and existing cap configuration are insufficient to contain all of the contaminated material requiring excavation.	10/24/94
FCR-05	Changes to Specification No. CSP-02 to direct hauling of contaminated material from the former Rectangular Pond Area. This facilitates the deposition and treatment of contaminated soil material by allowing an alternative approach to stabilization while maintaining the TCLP criteria for materials being deposited in the containment cell.	11/3/94
FCR-08	Changes to Appendix A, Drawing No. C-02 (Rev. 0) to extend the size of the original containment cell to accommodate additional material.	4/13/95
FCR-09	Changes to Appendix A, Drawing No. C-04 (Rev. 0), C-05 (Rev. 0), and C-07 (Rev. 0) to increase the size for the wetland restoration on the north side of Dublin Road, and not use the land south of Dublin Road for wetland restoration at all. This was due to the excavation of additional contaminated soils south of Dublin Road down to bedrock, which would require a large volume of backfill material prior to wetland restoration activities.	9/12/95
FCR-10	Changes to Specifications CSP-04 and X-01, and Appendix A, Drawings C-02 (Rev. 0) and C-04 (Rev. 0) to revise the groundwater extraction system design due to actual soil remediation activities.	9/12/95
FCR-11	Changes to Specifications CSP-01 and CSP-07 to regrade material in the containment cell from a 2.5:1 slope to a 3:1 slope.	Not approved

*FCR-06 and FCR-07 were deleted.

Table 4-12
Field Change/Design Change Notice Summary

FCN No.	Description	Approval Date
FCN-01	Changes to Appendix A, Drawing C-02 (Rev. 0) due to unnecessary excavation of existing fill at the treatment building area. The finished grade of the treatment building area will be 6 to 12 in. higher in elevation and will be documented on as-built drawings.	6/23/94
FCN-02	Changes to Appendix A, Drawing C-03 (Rev. 0) due to inappropriate location of silt fence. This change will result in elimination of the silt fence along the south property line between the Rectangular Pond and southeast corner of the property line.	6/23/94
FCN-03	Changes to Appendix A, Drawing C-03 (Rev. 0) to specify dewatering control to prevent ponding of surface water during rains.	7/18/94
FCN-04	Changes to Appendix A, Drawing C-12 (Rev. 0) due to constructability problems.	7/29/94
FCN-05	Changes to the air monitoring plan to relocate the perimeter pesticide samples from location P3 on the downwind north side of the pug mill area for one day of sampling.	9/14/94
FCN-06	Changes to Appendix A, Drawing C-03 (Rev. 0) to facilitate the simultaneous excavation of both the Waste Pile and the North Exclusion Zone using erosion control measures to limit the potential migration of contaminated material along the drainage path to the North Exclusion Zone while excavation of the Waste Pile Area is in progress.	10/12/94
FCN-07	Changes to Appendix A, Drawing C-03 (Rev. 0) to add temporary demarcation and soil erosion control along the east fenceline adjacent to the Village of Middleport.	10/24/94
FCN-08	Changes to Appendix A, Drawings C-04 (Rev. 1), C-09 (Rev. 0), and M-04 (Rev. 0) to utilize the existing treatability study test well (TW) for an extraction well in lieu of installing well W-11.	9/6/95
FCN-09	Changes to Drawing C-09 (Rev. 0) to modify the overburden well installation of well 92 due to existence of shallower bedrock.	11/27/95
FCN-10	Changes to Specification No. CSP-03 to utilize 8.5-hour test 1991 pumping results from well W-11 (formerly TW) to replace a 24-hour drawdown test for each extraction well.	11/27/95

Table 4-12 (cont.)

FCR No.	Description	Approval Date
FCN-11	Install additional discharge pipes on 50-ft centers in anchor trench and backfill with 3/4-in. clean gravel to prevent water from backing up anchor trench during heavy runoff periods (caused by rain/snow melt).	2/29/96
FCN-12	Replace use of Smartweed (unavailable) with Japanese millet during wetland mitigation.	6/5/96
FCN-13	Reduce freeboard in sump tanks to reduce sump pump cycling and hence increase pump life	6/26/96
DCN-01	Upgrade of Drawing S-05 (Rev. A) to Rev. 0	6/16/95
DCN-02	Modification of pipe support design to Drawing S-05 (Rev. 0)	9/11/95

FMC conducted an inspection with representatives of NYSDEC, NYSDOH, and EPA, and confirmed that the soil remediation work was complete and that the groundwater extraction and treatment system was operational and functional, subject to collection and submittal of operational and monitoring data under the O&M Plan. Minor deficiencies discovered during this inspection were corrected. EPA documented completion of construction activities in the Preliminary Close Out Report (EPA 1997).

Future O&M activities will focus on ensuring the long-term integrity of the containment cell, the reliability and effectiveness of the groundwater remediation and treatment system for the duration of its operation, and the security of the site. O&M activities will be conducted on the containment cell, groundwater extraction and treatment system, wetland, drainage culverts, and fencing. Groundwater remediation will continue in accordance with the O&M plan.

REFERENCES

- Bechtel National, Inc. (BNI), 1984. *Dublin Road Waste Site Field Investigation Report*.
- Bechtel Environmental, Inc. (BEI), 1988. *Remedial Investigation Report for FMC Dublin Road Site*.
- BEI, 1989. *Remedial Investigation Supplement Report for the FMC Dublin Road Site*.
- BEI, 1992. *Feasibility Study Report for the FMC Dublin Road Site (Proposed)*.
- Bechtel Associates Professional Corporation (New York) (BAPC (NY)), 1994. *Final Design Report for the Remedial Design at the Dublin Road Site*.
- BAPC (NY), 1996. *Operation and Maintenance Manuals for Dublin Road*, 3 Volumes, Prepared for FMC Corporation, October.
- EPA (Environmental Protection Agency), 1993. *FMC Dublin Road Site Record of Decision*. Site Number 8-37-001. U.S. Environmental Protection Agency, Region 2, and New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation.
- EPA, 1995. *Close Out Procedures for National Priorities List Sites (Interim Final)*. EPA/540/R-95/062, OSWER Directive 9320.2-09, Office of Emergency and Remedial Response, Washington D.C.
- EPA, 1997. *Superfund Preliminary Site Close Out Report; FMC Dublin Road Site; Towns of Shelby and Ridgeway, Orleans County, New York*. U.S. Environmental Protection Agency, Region 2.
- Geraghty & Miller, 1979. *Preliminary Investigation of Ground Water Contamination in Bedrock Underlying the Dublin Road Dump Site at Middleport, New York*.
- NYCRR (New York Codes, Rules, and Regulations), 1993. *6 NYCRR, Part 360, Solid Waste Management Facilities, Title 6 of the Official Compilation of Codes, Rules, and Regulations*. New York State Department of Environmental Conservation, Division of Solid Waste, Albany, New York.

APPENDIX F HISTORICAL PRR DATA

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-20 MW-20_030113 02/27/2013 WATER		MW-20 MW-20_060513 06/05/2013 WATER		MW-20 MW-20_082113 08/21/2013 WATER		MW-20 MW-200_111913 11/19/2013 WATER		MW-20 MW-20_111913 11/19/2013 WATER		MW-20 MW-20_051614 05/16/2014 WATER		MW-20 MW-20_080414 08/04/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.00	J
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.00	J	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00552		0.00500	U	0.00778		0.00523		0.00500	U	0.00500	U	0.00841	
7440-50-8	Copper	0.2	-	mg/L	0.0199		0.0054		0.0052		0.0050	U	0.0050	U	0.0125		0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0217		0.0050	U	0.0050		0.0050	U	0.0050	U	0.0050	U	0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-20 MW-20_2014-11-11 11/11/2014 WATER		MW-20 MW-20_2015-05-14 05/14/2015 WATER		MW-20 MW-20_2015-12-09 12/09/2015 WATER		MW-20 MW-20_2016-05-30 05/30/2016 WATER		MW-20 MW-20_2016-11-27 11/27/2016 WATER		MW-20 MW-20-2017-04-26 04/26/2017 WATER		MW-20 MW-20-2017-10-30 10/30/2017 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.02	U	0.01	U	0.02	U	0.05	U	0.01	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	J	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.02	U	0.01	U	0.02	U	0.05	U	0.01	J	0.05	U	0.02	J
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.02	U	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00527		0.00320	J	0.00630	J	0.01000	U	0.00600	J	0.01500	U	0.01100	J
7440-50-8	Copper	0.2	-	mg/L	0.0041	J	0.0068	J	0.0023	J	0.0200	U	0.0027	J	0.0083	J	0.0024	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0067	J	0.0062	J	0.0200	U	0.0200	U	0.0034	J	0.0033	J	0.0023	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-20 MW-200-2017-10-30 10/30/2017 WATER		MW-20 MW-20_04272018 04/27/2018 WATER		MW-20 MW-20_10192018 10/19/2018 WATER		MW-20 MW-20_04302019 04/30/2019 WATER		MW-20 MW-20-11292019 11/29/2019 WATER		MW-20 MW-20_05062020 05/06/2020 WATER		MW-20 MW-20-11132020 11/13/2020 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.25	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.25	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	J	0.05	U	0.05	U	0.05	U	0.25	U	0.01	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.25	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00810	J	0.01500	U	0.00920	J	0.01500	U	0.00570	J	0.00610	J	0.00820	J
7440-50-8	Copper	0.2	-	mg/L	0.0024	J	0.0072	J	0.0016	J	0.0046	J	0.0028	J	0.0130		0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.003	J	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0017	U	0.0023	J	0.0049	J	0.0055	U	0.0027	J	0.0092	J	0.0030	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-20 MW-20-05062021 05/06/2021 WATER		MW-20 MW-20-11172021 11/17/2021 WATER		MW-20 MW-20-05052022 05/05/2022 WATER		MW-20 MW-20-12012022 12/01/2022 WATER		MW-20 MW-20-05022023 05/02/2023 WATER		MW-24 MW-24-05052022 05/05/2022 WATER		MW-27 MW-27_060513 06/05/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	J	0.05	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	J	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	J	0.05	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	J	0.00780	J	0.00560	U	0.00980	J	0.00710	J	0.00950	J	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0059	J	0.0029	J	0.0036	J	0.0016	U	0.0018	J	0.1300		0.0055	
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.012		0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0029	J	0.0035	J	0.0023	J	0.0020	J	0.0024	J	0.1100		0.0078	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-27 MW-27_082013 08/20/2013 WATER		MW-27 MW-27_111913 11/19/2013 WATER		MW-27 MW-27_030714 03/06/2014 WATER		MW-27 MW-27_051614 05/16/2014 WATER		MW-27 MW-27_080114 08/01/2014 WATER		MW-27 MW-27_2014-11-10 11/10/2014 WATER		MW-27 MW-27_2015-05-14 05/14/2015 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.01000	U
7440-50-8	Copper	0.2	-	mg/L	0.0050		0.0050	U	0.0050	U	0.0125		0.0050	U	0.0024	J	0.0041	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.018	
7440-66-6	Zinc	0.3	-	mg/L	0.0146		0.0050	U	0.0050	U	0.0254		0.0050	U	0.0034	J	0.0129	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-27 MW-27_2015-12-09 12/09/2015 WATER		MW-27 MW-27_2016-06-02 06/02/2016 WATER		MW-27 MW-27_2016-11-27 11/27/2016 WATER		MW-27 MW-27-2017-04-26 04/26/2017 WATER		MW-27 MW-270-2017-04-26 04/26/2017 WATER		MW-27 MW-27-2017-10-30 10/30/2017 WATER		MW-27 MW-270_04272018 04/27/2018 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.02	U	0.05	U	0.01	J	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01000	U	0.01000	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0250	U	0.0200	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.004	J	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0274		0.0200	U	0.0150		0.0027	J	0.0020	J	0.0100	U	0.0019	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-27 MW-27_04272018 04/27/2018 WATER		MW-27 MW-27_10192018 10/19/2018 WATER		MW-27 MW-27_04302019 04/30/2019 WATER		MW-27 MW-27-11302019 11/30/2019 WATER		MW-27 MW-27_05062020 05/06/2020 WATER		MW-27 MW-27-11132020 11/13/2020 WATER		MW-27 MW-27-05062021 05/06/2021 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.02	U	0.05	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.00670	J	0.01500	U	0.01500	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0210		0.0100	U	0.0170		0.0019	U	0.0043	J	0.0027	J
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.007	J	0.010	U	0.006	J	0.003	J	0.004	J	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0022	J	0.0700		0.0051	U	0.0620		0.0021	J	0.0230		0.0015	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-27 MW-27-11152021 11/15/2021 WATER		MW-27 MW-27-05042022 05/04/2022 WATER		MW-27 MW-27-12012022 12/01/2022 WATER		MW-27 MW-27-05022023 05/02/2023 WATER		MW-40 FD-030113 02/27/2013 WATER		MW-40 MW-40_030113 02/27/2013 WATER		MW-40 MW-400_060413 06/04/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	J	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.02	J	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.05	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00500	U	0.21900		0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0016	U	0.0120		0.0110		0.0034	J	0.0174		0.0385		0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U	0.008	J	0.004	J	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	U	0.0740		0.0460		0.0060	J	0.0169		0.1000		0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-40 MW-40_060413 06/04/2013 WATER		MW-40 MW-40_082013 08/20/2013 WATER		MW-40 MW-40_111913 11/19/2013 WATER		MW-40 MW-40_030614 03/06/2014 WATER		MW-40 MW-40_051614 05/16/2014 WATER		MW-40 MW-40_080114 08/01/2014 WATER		MW-40 MW-40_2014-11-10 11/10/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.00	J
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00669		0.00783		0.00610		0.00500	U	0.00500	U	0.00554		0.00925	
7440-50-8	Copper	0.2	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0024	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0067	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-40 MW-40_2015-05-14 05/14/2015 WATER		MW-40 MW-400_2015-12-08 12/08/2015 WATER		MW-40 MW-40_2015-12-08 12/08/2015 WATER		MW-40 MW-40_2016-06-02 06/02/2016 WATER		MW-40 MW-400_2016-11-27 11/27/2016 WATER		MW-40 MW-40_2016-11-27 11/27/2016 WATER		MW-40 MW-40-2017-04-26 04/26/2017 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.02	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.02	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.02	U	0.02	U	0.05	U	0.01	J	0.01	J	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.02	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00270	J	0.00480	J	0.00570	J	0.01000	U	0.00800	J	0.00670	J	0.00720	J
7440-50-8	Copper	0.2	-	mg/L	0.0097	J	0.0025	J	0.0021	J	0.0200	U	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.009		0.005	U	0.002	J	0.005	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0177	J	0.0168	J	0.0154	J	0.0200	U	0.0052	J	0.0060	J	0.0028	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-40 MW-40-2017-10-30 10/30/2017 WATER		MW-40 MW-40_04272018 04/27/2018 WATER		MW-40 MW-400_10192018 10/19/2018 WATER		MW-40 MW-40_10192018 10/19/2018 WATER		MW-40 MW-40_04302019 04/30/2019 WATER		MW-40 MW-40-11292019 11/29/2019 WATER		MW-40 MW-40_05062020 05/06/2020 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01600		0.00670	J	0.00990	J	0.00990	J	0.00790	J	0.00650	J	0.00850	J
7440-50-8	Copper	0.2	-	mg/L	0.0029	J	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.004	J	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0320		0.0038	J	0.0032	J	0.0025	J	0.0020	U	0.0100	U	0.0017	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-40 MW-40-11132020 11/13/2020 WATER		MW-40 MW-400-11132020 11/13/2020 WATER		MW-40 MW-40-05062021 05/06/2021 WATER		MW-40 MW-40-11152021 11/15/2021 WATER		MW-40 MW-40-05042022 05/04/2022 WATER		MW-40 MW-40D-05042022 05/04/2022 WATER		MW-40 MW-40-11302022 11/30/2022 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01200	J	0.01200	J	0.00940	J	0.00680	J	0.00560	U	0.00560	U	0.00810	J
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0100	U	0.0041	J	0.0016	U	0.0016	U	0.0016	U	0.0016	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.003	U	0.003	U	0.003	U	0.004	J	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0035	J	0.0019	J	0.0180		0.0015	U	0.0190		0.0160		0.0061	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-40 BD-05022023 05/02/2023 WATER		MW-40 MW-40-05022023 05/02/2023 WATER		MW-40 MW-4-10302023 10/30/2023 WATER		MW-40 MW-40-10302023 10/30/2023 WATER		MW-42 MW-42_030113 03/01/2013 WATER		MW-42 MW-42_061013 06/10/2013 WATER		MW-42 MW-42_082213 08/22/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	J	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	J	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01100	J	0.01200	J	0.00820	J	0.00660	J	0.00500	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0032	J	0.0053	J	0.0100	U	0.0100	U	0.1030		0.0050	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.004	J	0.007	J	0.003	U	0.003	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0250	J	0.0450	J	0.0030	J	0.0044	J	0.0808		0.0050	U	0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-42 MW-42_112013 11/20/2013 WATER		MW-42 MW-42_052314 05/23/2014 WATER		MW-42 MW-42_080514 08/05/2014 WATER		MW-42 MW-42_2014-11-12 11/12/2014 WATER		MW-42 MW-42_2015-05-14 05/14/2015 WATER		MW-42 MW-42_2015-12-08 12/08/2015 WATER		MW-42 MW-42_2016-05-30 05/30/2016 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00500	U	0.00500	U	0.00495	J	0.00190	J	0.01000	U	0.01000	U
7440-50-8	Copper	0.2	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0015	J	0.0036	J	0.0250	U	0.0200	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	J	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0062		0.0055	J	0.0200	U	0.0200	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-42 MW-42_2016-11-28 11/28/2016 WATER		MW-42 MW-42-2017-04-26 04/26/2017 WATER		MW-42 MW-42-2017-10-30 10/30/2017 WATER		MW-42 MW-42_04272018 04/27/2018 WATER		MW-42 MW-42_10192018 10/19/2018 WATER		MW-42 MW-42_04302019 04/30/2019 WATER		MW-42 MW-42-11302019 11/30/2019 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0021	J	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.020	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0100	U	0.0017	J	0.0100	U	0.0016	J	0.0027	J	0.0028	U	0.0100	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-42 MW-42_05072020 05/07/2020 WATER		MW-42 MW-42-11132020 11/13/2020 WATER		MW-42 MW-42-05062021 05/06/2021 WATER		MW-42 MW-42-11172021 11/17/2021 WATER		MW-42 MW-42-05052022 05/05/2022 WATER		MW-42 MW-42-12012022 12/01/2022 WATER		MW-42 MW-42-05022023 05/02/2023 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	J
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.05	U	0.01	U	0.01	U	0.01	U	0.05	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	J
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0023	U	0.0100	U	0.0019	J	0.0016	U	0.0016	U	0.0016	U	0.0016	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0018	J	0.0100	U	0.0023	J	0.0026	J	0.0040	J	0.0022	J	0.0022	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-42 MW-42-10312023 10/31/2023 WATER		MW-60 MW-60_030113 03/01/2013 WATER		MW-60 MW-600_060513 06/05/2013 WATER		MW-60 MW-60_060513 06/05/2013 WATER		MW-60 MW-600_082113 08/21/2013 WATER		MW-60 MW-60_082113 08/21/2013 WATER		MW-60 MW-60_111913 11/19/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00500	U	0.05000	U	0.05000	U	0.05000	U	0.05000	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0050	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.005	U	0.050	U	0.050	U	0.050	U	0.050	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0028	J	0.0127		0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-60 MW-60_051614 05/16/2014 WATER		MW-60 MW-600_080514 08/05/2014 WATER		MW-60 MW-60_080514 08/05/2014 WATER		MW-60 MW-60_2014-11-11 11/11/2014 WATER		MW-60 MW-60_2015-05-14 05/14/2015 WATER		MW-60 MW-60_2015-12-09 12/09/2015 WATER		MW-60 MW-60_2016-05-30 05/30/2016 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.02	U	0.01	U	0.02	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00655		0.00612		0.00597		0.00480	J	0.00300	J	0.01000	U
7440-50-8	Copper	0.2	-	mg/L	0.0076		0.0050	U	0.0050	U	0.0026	J	0.0062	J	0.0250	U	0.0200	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.006		0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0098	J	0.0314		0.0200	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-60 MW-60_2016-11-27 11/27/2016 WATER		MW-60 MW-60-2017-04-26 04/26/2017 WATER		MW-60 MW-60-2017-10-30 10/30/2017 WATER		MW-60 MW-60_04272018 04/27/2018 WATER		MW-60 MW-60_10192018 10/19/2018 WATER		MW-60 MW-60_04302019 04/30/2019 WATER		MW-60 MW-60-11302019 11/30/2019 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00720	J	0.01500	U	0.01000	J	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0023	J	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.004	J	0.005	J	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0100	U	0.0100	U	0.0100	U	0.0020	J	0.0031	J	0.0018	U	0.0100	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-60 MW-60_05072020 05/07/2020 WATER		MW-60 MW-60-11132020 11/13/2020 WATER		MW-60 MW-60-05062021 05/06/2021 WATER		MW-60 MW-60-11152021 11/15/2021 WATER		MW-60 MW-60-05052022 05/05/2022 WATER		MW-60 MW-60-12012022 12/01/2022 WATER		MW-60 MW-60-05022023 05/02/2023 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	J	0.05	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.05	U	0.01	U	0.01	U	0.01	U	0.02	J	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	J	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0100	U	0.0023	J	0.0016	U	0.0023	J	0.0016	U	0.0016	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.003	U	0.003	U	0.004	J	0.003	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0100	U	0.0100	U	0.0044	J	0.0015	U	0.0120		0.0015	U	0.0041	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-60 MW-60-10312023 10/31/2023 WATER		MW-61 MW-61_030113 03/01/2013 WATER		MW-61 MW-61_060613 06/06/2013 WATER		MW-61 MW-61_082113 08/21/2013 WATER		MW-61 MW-61_111913 11/19/2013 WATER		MW-61 MW-61_051614 05/16/2014 WATER		MW-61 MW-61_080514 08/05/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0061		0.0050	U	0.0050		0.0050	U	0.0050	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.005	J	0.006		0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0170		0.0255		0.0050	U	0.0095		0.0050	U	0.0050	U	0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-61 MW-61_2014-11-11 11/11/2014 WATER		MW-61 MW-61_2015-05-14 05/14/2015 WATER		MW-61 MW-61_2015-12-09 12/09/2015 WATER		MW-61 MW-61_2016-05-30 05/30/2016 WATER		MW-61 MW-61_2016-11-27 11/27/2016 WATER		MW-61 MW-61-2017-04-26 04/26/2017 WATER		MW-61 MW-61-2017-10-30 10/30/2017 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.24	U	0.05	U	0.05	U	0.08	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.24	U	0.05	U	0.05	U	0.08	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.24	U	0.01	J	0.05	U	0.08	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.24	U	0.05	U	0.05	U	0.08	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00150	J	0.01000	U	0.01000	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0030	J	0.0250	U	0.0250	U	0.0200	U	0.0100	U	0.0100	U	0.0070	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.008		0.005	U	0.005	U	0.010	U	0.010	U	0.009	J
7440-66-6	Zinc	0.3	-	mg/L	0.0020	J	0.0033	J	0.0200	U	0.0200	U	0.0034	J	0.0043	J	0.0410	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-61 MW-61_04272018 04/27/2018 WATER		MW-61 MW-61_10192018 10/19/2018 WATER		MW-61 MW-61_04302019 04/30/2019 WATER		MW-61 MW-61-11302019 11/30/2019 WATER		MW-61 MW-61_05072020 05/07/2020 WATER		MW-61 MW-61-11132020 11/13/2020 WATER		MW-61 MW-61-05062021 05/06/2021 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.04	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.05	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0029	J	0.0100	U	0.0100	U	0.0100	U	0.0016	U	0.0100	U	0.0017	J
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0140		0.0140		0.0025	U	0.0100	U	0.0100	U	0.0100	U	0.0023	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-61 MW-61-11152021 11/15/2021 WATER		MW-61 MW-61-05052022 05/05/2022 WATER		MW-61 FD-12012022 12/01/2022 WATER		MW-61 MW-61-12012022 12/01/2022 WATER		MW-61 MW-61-05022023 05/02/2023 WATER		MW-61 MW-61-10312023 10/31/2023 WATER		MW-89 MW-89_022713 03/01/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	J	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	J	0.05	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0016	U	0.0016	U	0.0016	U	0.0016	U	0.0016	U	0.0100	U	0.0218	
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	J	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0021	J	0.0015	U	0.0033	J	0.0015	U	0.0015	U	0.0120		0.0156	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-89 MW-89_060413 06/04/2013 WATER		MW-89 MW-89_082013 08/20/2013 WATER		MW-89 MW-89_112013 11/20/2013 WATER		MW-89 MW-89_030614 03/06/2014 WATER		MW-89 MW-890_051414 05/14/2014 WATER		MW-89 MW-89_051414 05/14/2014 WATER		MW-89 MW-89_080414 08/04/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0057		0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0087		0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-89 MW-890_2014-11-11 11/11/2014 WATER		MW-89 MW-89_2014-11-11 11/11/2014 WATER		MW-89 MW-89_2015-05-14 05/14/2015 WATER		MW-89 MW-89_2015-12-07 12/07/2015 WATER		MW-89 MW-89_2016-05-30 05/30/2016 WATER		MW-89 MW-89_2016-11-27 11/27/2016 WATER		MW-89 MW-89-2017-04-26 04/26/2017 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.03	U	0.02	U	0.01	U	0.10	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.02	U	0.01	U	0.10	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.03	U	0.02	U	0.01	U	0.10	U	0.05	U	0.01	J	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.03	U	0.02	U	0.01	U	0.10	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00575		0.00706		0.01000	U	0.01000	U	0.01000	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0038	J	0.0048	J	0.0053	J	0.0038	J	0.0200	U	0.0022	J	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.012	U	0.005	U	0.005	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0024	J	0.0071	J	0.0200	U	0.0200	U	0.0100	U	0.0100	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-89 MW-89-2017-10-30 10/30/2017 WATER		MW-89 MW-89_04272018 04/27/2018 WATER		MW-89 MW-89_10192018 10/19/2018 WATER		MW-89 MW-89_05012019 05/01/2019 WATER		MW-89 MW-89-11292019 11/29/2019 WATER		MW-89 MW-890-11292019 11/29/2019 WATER		MW-89 MW-89_05062020 05/06/2020 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.01	J	0.02	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0026	J	0.0100	U	0.0031	J	0.0100	U	0.0035	J	0.0035	J	0.0033	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0018	U	0.0029	J	0.0026	J	0.0029	U	0.0100	U	0.0100	U	0.0100	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-89 MW-89_11162020 11/16/2020 WATER		MW-89 MW-89-05062021 05/06/2021 WATER		MW-89 MW-89-11152021 11/15/2021 WATER		MW-89 MW-89-05042022 05/04/2022 WATER		MW-89 MW-89-11302022 11/30/2022 WATER		MW-89 MW-89-05022023 05/02/2023 WATER		MW-89 MW-89-10312023 10/31/2023 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.01	U	0.01	U	0.01	U	0.01	J	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00960	J
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0046	J	0.0030	J	0.0016	J	0.0016	U	0.0020	J	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0016	J	0.0015	U	0.0015	U	0.0026	J	0.0015	U	0.0015	U	0.0030	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-90 MW-90_022713 03/01/2013 WATER		MW-90 MW-90_060513 06/05/2013 WATER		MW-90 MW-90_081913 08/19/2013 WATER		MW-90 MW-90_111913 11/19/2013 WATER		MW-90 MW-90_030514 03/05/2014 WATER		MW-90 MW-90_051314 05/13/2014 WATER		MW-90 MW-90_080114 08/01/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	UJ	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0192		0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0086		0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0087	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-90 MW-90_2014-11-10 11/10/2014 WATER		MW-90 MW-90_2015-05-14 05/14/2015 WATER		MW-90 MW-90_2015-12-07 12/07/2015 WATER		MW-90 MW-90_2016-05-30 05/30/2016 WATER		MW-90 MW-90_2016-11-27 11/27/2016 WATER		MW-90 MW-90-2017-04-26 04/26/2017 WATER		MW-90 MW-90-2017-10-30 10/30/2017 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.03	U	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.01000	U	0.01000	U	0.01000	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0026	J	0.0020	J	0.0250	U	0.0200	U	0.0030	J	0.0028	J	0.0042	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.011		0.005	U	0.005	U	0.010	U	0.003	J	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0037	J	0.0200	U	0.0200	U	0.0015	J	0.0100	U	0.0100	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-90 MW-90_04272018 04/27/2018 WATER		MW-90 MW-90_10192018 10/19/2018 WATER		MW-90 MW-900_04302019 04/30/2019 WATER		MW-90 MW-90_04302019 04/30/2019 WATER		MW-90 MW-90-11292019 11/29/2019 WATER		MW-90 MW-90_05062020 05/06/2020 WATER		MW-90 MW-90_11162020 11/16/2020 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.02	J	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0035	J	0.0016	J	0.0100	U	0.0100	U	0.0019	J	0.0026	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	J	0.0023	J	0.0020	U	0.0016	U	0.0100	U	0.0100	U	0.0100	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-90 MW-90-05062021 05/06/2021 WATER		MW-90 MW-90-11152021 11/15/2021 WATER		MW-90 MW-90-05042022 05/04/2022 WATER		MW-90 MW-90-11302022 11/30/2022 WATER		MW-90 MW-90-05022023 05/02/2023 WATER		MW-90 MW-90-10312023 10/31/2023 WATER		MW-91 MW-91_022713 03/01/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.02	J	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	J	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	J	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0038	J	0.0016	U	0.0038	J	0.0020	J	0.0086	J	0.0100	U	0.0227	
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	J	0.0015	U	0.0015	U	0.0015	U	0.0037	J	0.0024	J	0.0314	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-91 MW-91_060513 06/05/2013 WATER		MW-91 MW-91_082013 08/20/2013 WATER		MW-91 MW-91_112013 11/20/2013 WATER		MW-91 MW-91_030614 03/06/2014 WATER		MW-91 MW-91_051414 05/14/2014 WATER		MW-91 MW-91_080414 08/04/2014 WATER		MW-91 MW-91_2014-11-10 11/10/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.03	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0023	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0018	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-91 MW-91_2015-05-13 05/13/2015 WATER		MW-91 MW-91_2015-12-07 12/07/2015 WATER		MW-91 MW-91_2016-05-30 05/30/2016 WATER		MW-91 MW-91_2016-11-27 11/27/2016 WATER		MW-91 MW-91-2017-04-26 04/26/2017 WATER		MW-91 MW-91-2017-10-30 10/30/2017 WATER		MW-91 MW-91_04272018 04/27/2018 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.01	J	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00220	J	0.01000	U	0.01000	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0032	J	0.0015	J	0.0200	U	0.0100	U	0.0044	J	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.003	J	0.005	U	0.005	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0006	U	0.0200	U	0.0200	U	0.0100	U	0.0100	U	0.0100	U	0.0015	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-91 MW-91_10192018 10/19/2018 WATER		MW-91 MW-91_05012019 05/01/2019 WATER		MW-91 MW-91-11292019 11/29/2019 WATER		MW-91 MW-910_05062020 05/06/2020 WATER		MW-91 MW-91_05062020 05/06/2020 WATER		MW-91 MW-91_11162020 11/16/2020 WATER		MW-91 MW-91-05062021 05/06/2021 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.03	J	0.05	U	0.05	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.01	J	0.05	U	0.05	U	0.05	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.01	J	0.05	U	0.05	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0100	U	0.0100	U	0.0100	U	0.0017	U	0.0022	U	0.0100	U	0.0930	
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.004	J
7440-66-6	Zinc	0.3	-	mg/L	0.0025	J	0.0017	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0520	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-91 MW-91-11152021 11/15/2021 WATER		MW-91 MW-91-05042022 05/04/2022 WATER		MW-91 MW-91-11302022 11/30/2022 WATER		MW-91 MW-91-05022023 05/02/2023 WATER		MW-91 MW-91-10312023 10/31/2023 WATER		MW-92 MW-92_060513 06/05/2013 WATER		MW-92 MW-92_082113 08/21/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.05	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.02	J	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.05	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0017	J	0.0016	U	0.0016	U	0.0016	U	0.0016	U	0.0050	U	0.0052	
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U	0.003	U	0.003	U	0.003	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0066		0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-92 MW-92_112013 11/20/2013 WATER		MW-92 MW-920_030614 03/06/2014 WATER		MW-92 MW-92_030614 03/06/2014 WATER		MW-92 MW-92_051414 05/14/2014 WATER		MW-92 MW-92_080414 08/04/2014 WATER		MW-92 MW-92_2015-05-13 05/13/2015 WATER		MW-92 MW-92_2015-12-08 12/08/2015 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00200	J	0.01000	U
7440-50-8	Copper	0.2	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0049	J	0.0023	J
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.003	J	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0006	U	0.0200	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-92 MW-92_2016-05-30 05/30/2016 WATER		MW-92 MW-92_2016-11-27 11/27/2016 WATER		MW-92 MW-92-2017-04-26 04/26/2017 WATER		MW-92 MW-92-2017-10-30 10/30/2017 WATER		MW-92 MW-92_04272018 04/27/2018 WATER		MW-92 MW-92_10312018 10/31/2018 WATER		MW-92 MW-92_05012019 05/01/2019 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.01	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01000	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0200	U	0.0100	U	0.0100	U	0.0023	J	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.010	U	0.010	U	0.003	J	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0200	U	0.0028	J	0.0100	U	0.0100	U	0.0017	J	0.0035	U	0.0020	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-92 MW-92-11292019 11/29/2019 WATER		MW-92 MW-92_05062020 05/06/2020 WATER		MW-92 MW-92_11162020 11/16/2020 WATER		MW-92 MW-92-05062021 05/06/2021 WATER		MW-92 MW-92-11152021 11/15/2021 WATER		MW-92 MW-92-05042022 05/04/2022 WATER		MW-92 MW-92-11302022 11/30/2022 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	J
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.03	U	0.03	U	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.01	J	0.05	U	0.01	U	0.01	U	0.01	U	0.01	J
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0035	J	0.0032	U	0.0100	U	0.0033	J	0.0044	J	0.0016	U	0.0017	J
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.003	U	0.003	U	0.003	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0100	U	0.0100	U	0.0025	J	0.0015	U	0.0029	J	0.0015	U	0.0015	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-92 MW-92-05022023 05/02/2023 WATER		MW-93 MW-93_060513 06/05/2013 WATER		MW-93 MW-93_082113 08/21/2013 WATER		MW-93 MW-93_112013 11/20/2013 WATER		MW-93 MW-93_030714 03/07/2014 WATER		MW-93 MW-93_051514 05/15/2014 WATER		MW-93 MW-93_080414 08/04/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0025	J	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-93 MW-93_2015-05-14 05/14/2015 WATER		MW-93 MW-93_2015-12-07 12/07/2015 WATER		MW-93 MW-93_2016-05-30 05/30/2016 WATER		MW-93 MW-93-2017-04-26 04/26/2017 WATER		MW-93 MW-93-2017-10-30 10/30/2017 WATER		MW-93 MW-93_04272018 04/27/2018 WATER		MW-93 MW-93_05012019 05/01/2019 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.02	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01000	U	0.01000	U	0.01000	U	0.01500	U	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0038	J	0.0250	U	0.0200	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.009		0.005	U	0.005	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0067	J	0.0091	J	0.0200	U	0.0018	J	0.0100	U	0.0019	J	0.0024	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-93 MW-93-11292019 11/29/2019 WATER		MW-93 MW-93_05062020 05/06/2020 WATER		MW-93 MW-93_11162020 11/16/2020 WATER		MW-93 MW-93-05062021 05/06/2021 WATER		MW-93 MW-93-11152021 11/15/2021 WATER		MW-93 MW-930-11152021 11/15/2021 WATER		MW-93 MW-93-05042022 05/04/2022 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.01	J	0.01	U	0.01	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.03	U	0.03	U	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.01	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01500	U	0.01500	U	0.01500	U	0.00560	U	0.00560	U	0.00560	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0025	J	0.0019	U	0.0100	U	0.0025	J	0.0016	U	0.0019	J	0.0016	U
7439-92-1	Lead	0.015	-	mg/L	0.010	U	0.010	U	0.010	U	0.003	U	0.003	U	0.003	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0100	U	0.0100	U	0.0100	U	0.0028	J	0.0019	J	0.0015	U	0.0015	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			MW-93 MW-93-05022023 05/02/2023 WATER		QUARRY-EAST EAST_060613 06/06/2013 WATER		QUARRY-EAST EAST_111913 11/19/2013 WATER		QUARRY-WEST WEST_060613 06/06/2013 WATER		QUARRY-WEST WEST_112013 11/20/2013 WATER		SW-1 SW-1_051614 05/16/2014 WATER		SW-1 SW-1_2014-11-12 11/12/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.02	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.01490		0.00551		0.00500	U	0.00500	U	0.00500	U	0.01030	
7440-50-8	Copper	0.2	-	mg/L	0.0016	U	0.0050	U	0.0050	U	0.0050	U	0.0063		0.0050	U	0.0023	J
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0019	J	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0050	U	0.0067	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			SW-1 SW-1_2015-05-13 05/13/2015 WATER		SW-1 SW-10_2016-06-02 06/02/2016 WATER		SW-1 SW-1_2016-06-02 06/02/2016 WATER		SW-1 SW-1-2017-04-26 04/26/2017 WATER		SW-1 SW-1_10192018 10/19/2018 WATER		SW-1 SW-1_05012019 05/01/2019 WATER		SW-1 SW-1_05072020 05/07/2020 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.02	J
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00480	J	0.01000	U	0.01000	U	0.00610	J	0.01500	U	0.01500	U	0.01500	U
7440-50-8	Copper	0.2	-	mg/L	0.0250	U	0.0200	U	0.0200	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
7439-92-1	Lead	0.015	-	mg/L	0.002	J	0.005	U	0.005	U	0.010	U	0.010	U	0.010	U	0.010	U
7440-66-6	Zinc	0.3	-	mg/L	0.0006	U	0.0200	U	0.0200	U	0.0019	J	0.0032	J	0.0086	U	0.0015	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			SW-1 SW-1-05062021 05/06/2021 WATER		SW-1 SW1-05052022 05/05/2022 WATER		SW-1 SW-1-05032023 05/03/2023 WATER		SW-2 4/13/2013_ARC 04/13/2013 WATER		SW-2 4/13/2013_ARC 04/13/2013 WATER		SW-2 SW-2_051614 05/16/2014 WATER		SW-2 SW-2_2014-11-12 11/12/2014 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	U	0.01	J	0.06		0.09		0.01	U	0.02	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.03	U	0.56		0.70		0.01	U	0.02	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.05	U	0.02		0.01	U	0.02	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U	0.05	U	0.03		0.01	U	0.02	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00560	U	0.00560	U	0.03970		0.04020		0.01120		0.00852	
7440-50-8	Copper	0.2	-	mg/L	0.0017	J	0.0016	U	0.0016	U					0.0096		0.0023	J
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U	0.003	U	0.002		0.005	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	U	0.0015	U	0.0015	U					0.0050	U	0.0068	

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			SW-2 SW-2_2015-05-13 05/13/2015 WATER		SW-2 SW-2_2016-06-02 06/02/2016 WATER		SW-2 SW-2-2017-04-26 04/26/2017 WATER		SW-2 SW-2_10192018 10/19/2018 WATER		SW-2 SW-2_05012019 05/01/2019 WATER		SW-2 SW-2_05072020 05/07/2020 WATER		SW-2 SW-2-05062021 05/06/2021 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01630		0.02500		0.01500	U	0.01400	J	0.01500	U	0.01500	U	0.00900	J
7440-50-8	Copper	0.2	-	mg/L	0.0023	J	0.0200	U	0.0100	U	0.0100	U	0.0100	U	0.0021	U	0.0067	J
7439-92-1	Lead	0.015	-	mg/L	0.002	J	0.005	U	0.010	U	0.010	U	0.010	U	0.010	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0006	U	0.0200	U	0.0035	J	0.0029	J	0.0019	U	0.0016	J	0.0040	J

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			SW-2 SW2-05052022 05/05/2022 WATER		SW-2 SW-2-05032023 05/03/2023 WATER		SW-3 6/13/2013_ARC 06/13/2013 WATER		SW-3 SW-3_052314 05/23/2014 WATER		SW-3 SW-3_2014-11-12 11/12/2014 WATER		SW-3 SW-30_2015-05-13 05/13/2015 WATER		SW-3 SW-3_2015-05-13 05/13/2015 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	U	0.01	J	0.05	U	0.01	U	0.02	U	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.03	U	0.05	U	0.01	U	0.02	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.05	U	0.01	U	0.02	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	J	0.05	U	0.01	U	0.01	J	0.01	U	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00560	U			0.00830		0.00437	J	0.01920		0.02040	
7440-50-8	Copper	0.2	-	mg/L	0.0016	U	0.0016	U			0.0050	U	0.0050	U	0.0022	J	0.0023	J
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.003	U			0.005	U	0.005	U	0.003	J	0.002	J
7440-66-6	Zinc	0.3	-	mg/L	0.0015	U	0.0015	U			0.0050	U	0.0059	J	0.0144	J	0.0006	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			SW-3 SW-3_2016-06-02 06/02/2016 WATER		SW-3 SW-3-2017-04-26 04/26/2017 WATER		SW-3 SW-3_10192018 10/19/2018 WATER		SW-3 SW-3_05012019 05/01/2019 WATER		SW-3 SW-3_05072020 05/07/2020 WATER		SW-3 SW-3-05062021 05/06/2021 WATER		SW-3 SW3-05052022 05/05/2022 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units														
	Pesticides																	
319-84-6	alpha-BHC	ND	0.05	ug/L	0.05	U	0.01	J	0.05	U	0.05	U	0.01	J	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.03	J	0.03	U	0.03	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.01	U
	Metals																	
7440-38-2	Arsenic	0.025	-	mg/L	0.01400		0.00790	J	0.02100		0.01500		0.01500	U	0.00560	U	0.00560	U
7440-50-8	Copper	0.2	-	mg/L	0.0200	U	0.0052	J	0.0100	U	0.0021	J	0.0039	U	0.0040	J	0.0016	U
7439-92-1	Lead	0.015	-	mg/L	0.005	U	0.010	U	0.010	U	0.010	U	0.010	U	0.003	U	0.003	U
7440-66-6	Zinc	0.3	-	mg/L	0.0200	U	0.0240		0.0043	J	0.0032	U	0.0028	J	0.0030	J	0.0015	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

FMC Dublin Road Site Historical Data Record 2013 Through 2023		Location ID Field Sample ID Sample Date Sample Matrix			SW-3 SW-3-05032023 05/03/2023 WATER		WETLAND WETLAND_060613 06/06/2013 WATER		WETLAND WETLAND_112013 11/20/2013 WATER	
CAS No.	Parameter Name	RAO	RAD	Report Units						
	Pesticides									
319-84-6	alpha-BHC	ND	0.05	ug/L	0.01	J	0.01	U	0.01	U
319-85-7	beta-BHC	ND	0.05	ug/L	0.03	U	0.01	U	0.01	U
319-86-8	delta BHC (delta Hexachlorocyclohexane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U
58-89-9	gamma BHC (Lindane)	ND	0.05	ug/L	0.01	U	0.01	U	0.01	U
	Metals									
7440-38-2	Arsenic	0.025	-	mg/L	0.00560	U	0.00500	U	0.00500	U
7440-50-8	Copper	0.2	-	mg/L	0.0016	U	0.0050	U	0.0050	U
7439-92-1	Lead	0.015	-	mg/L	0.003	U	0.005	U	0.005	U
7440-66-6	Zinc	0.3	-	mg/L	0.0015	U	0.0097		0.0050	U

U - not detected
J - estimated value
- not applicable
RAD Remedial Action Detection Limit
RAO Remedial Action Objective for groundwater
ND - not defined

APPENDIX G EXCAVATION WORK PLAN (EWP)

APPENDIX G – EXCAVATION WORK PLAN

G-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table G-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table G-1: Notifications*

<u>Name</u>	<u>Contact Information</u>	<u>Required Notification**</u>
Mackenzie Rees – NYSDEC Project Manager	(585) 226-5409 mackenzie.rees@dec.ny.gov	All Notifications
David Pratt – NYSDEC, Hazardous Waste Remediation Supervisor, Region 8	(585) 226-5449 david.pratt@dec.ny.gov	All Notifications
Elizabeth McConnell – USEPA Project Manager, Region 2	(212) 637-4253 mcconnell.elizabeth@epa.gov	All Notifications
Kelly Lewandowski – NYSDEC Site Control	(585) 226-5459 kelly.lewandowski@dec.ny.gov	Notifications 1 and 8
Justin Deming – NYSDOH Chief, Regions 4, 5 & 8 Bureau of Environmental Exposure Investigation, NYSDOH	(518) 402-7860 justin.deming@health.ny.gov	Notifications 4, 6, and 7
Kristen Kulow – NYSDOH Project Manager	(607) 353-4335 kristin.kulow@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;
- A summary of the applicable components of this EWP;

- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix H of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

G-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section G-6 of this Appendix.

G-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

G-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Trucks transporting contaminated soil must have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

G-5 MATERIALS TRANSPORT OFF-SITE

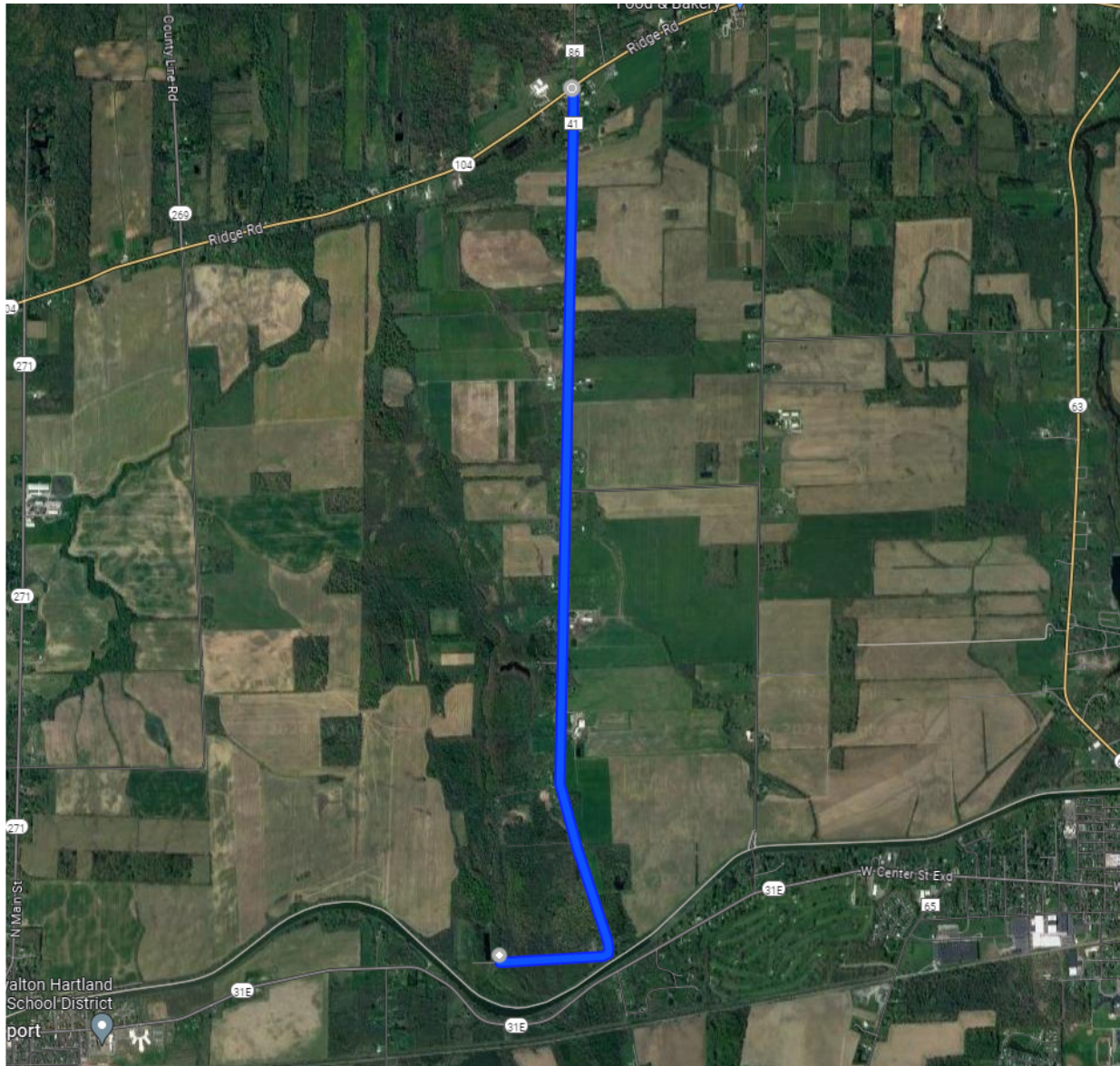
All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are as follows: East on Dublin Road approximately 2,000 feet to Fruit Avenue (Orleans County Route 41) and 3.25 miles north to New York State Route 104 (Ridge Road). All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate

route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Figure G-1: Truck Route



Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

G-6**MATERIALS DISPOSAL OFF-SITE**

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excitation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 361-5 registered or permitted facility).

G-7**MATERIALS REUSE ON-SITE**

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances April 2023 guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections G-2 and G-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site may only be reused on-site with written approval from the NYSDEC project manager.

G-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

G-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the ROD. The existing containment cell cover system is comprised of a minimum of 6 inches of vegetated topsoil layer, 24 inches of clean soil, geotextile/geonet composite layer, 60-mil HDPE liner, and a geotextile fabric covering a nominal 8-inch layer of limestone placed over the compacted materials within the containment cell. If excavation penetrates the liner system and limestone layer, a demarcation layer, consisting of orange snow fencing material, white geotextile, or equivalent material, will be installed to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

G-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at <http://www.dec.ny.gov/regulations/67386.html>, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix M.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for commercial or industrial use and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (April 2023) guidance values for PFAS and 1,4-dioxane. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting

soil quality standards are the lower of the commercial, protection of groundwater, and protection of ecological resources SCOs listed in 6 NYCRR Part 375-6.8(b). Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

G-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

G-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

G-13 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan is provided in Appendix I

G-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include reducing the exposed impacted area through sequenced excavation, plastic sheeting, and/or use of odor/vapor suppressant sprays if airborne VOCs are found to be above acceptable levels. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

G-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Appendix I. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.

Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.

Gravel will be used on roadways to provide a clean and dust-free road surface.

On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

G-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX H HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

FMC DUBLIN ROAD SITE (SITE 837001)
ORLEANS COUNTY, NEW YORK

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ACRONYMS

Acronym	Definition / Description
ACGIH	American Conference of Government Industrial Hygienists
ANSI	American National Standards Institute
BHC	Benzene hexachloride
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
COC	Chemicals of concern
dBA	A-weighted decibels
ERP	Emergency Response Plan
°F	Degrees Fahrenheit
FMC	FMC Corporation
HASP	Health and Safety Plan
HAZMAT	Hazardous materials
HAZWOPER	Hazardous Waste Operations and Emergency Response Standards
IDLH	Immediately dangerous to life and health
JHA	Job Hazard Analysis
mg/m ³	Milligram(s) per cubic meter
NIOSH	National Institute for Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PEL	Permissible exposure limit
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Part(s) per million
RCRA	Resource Conservation and Recovery Act
Site	Dublin Road site
SDS	Safety Data Sheet
SOP	Standard operating procedure
STEL	Short-term exposure limit
TLV	Threshold limit value
TWA	Time-weighted average
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

The Health and Safety Plan (HASP) presented herein describes minimum health and safety requirements to be followed during work conducted as part of Resource Conservation and Recovery Act (RCRA) corrective action activities or associated with existing Interim Corrective Measures at the FMC Corporation (FMC) Dublin Road site located in Orleans County, New York (Site).

Any work activities that may potentially result in contact with contaminated environmental media (soil, sediment, or water) at the Site are subject to the health and safety requirements specified in this HASP as well as the Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response Standards (OSHA HAZWOPER) rules and regulations. Such work may include but is not limited to the following:

- Ground-invasive activities within the Site.
- Repair or installation of buried utilities and power poles.
- Construction and demolition of Site buildings and appurtenance when such activities can potentially involve contact with contaminated environmental media.
- Sampling and handling of contaminated environmental media.
- Management of contaminated environmental media.

The applicability of this HASP extends to FMC employees and its contractors. FMC contractors will be required to establish and follow their own project-specific HASPs that meet the requirements specified in this HASP, other FMC health and safety requirements, and applicable rules and regulations.

This HASP also contains requirements for community air monitoring during any ground-invasive activity within the northern part of the Site.

1.1 Site Description

The Site consists of approximately 30 acres located in a rural, agricultural section of Orleans County that is divided by Dublin Road as shown on Figure 1. Figure 2 presents a Site Plan. Approximately 9 acres are located south of Dublin Road and approximately 21 acres are located north of Dublin Road.

The property is bounded by the New York State Erie Barge Canal to the south and west, the Village of Middleport municipal landfill to the east (south of Dublin Road) and wooded areas and/or farmland to the north, northeast and northwest. Jeddo Creek runs northerly through the northeast corner of the Site.

The boundary of the Site is enclosed with a chain-link fence. The northern portion of the Site is partially wooded and contains two inactive rock quarries (East and West quarries) and systems constructed as part of the remedial actions implemented at the Site including a containment cell, a wetland, a drainage swale, the Site groundwater extraction and treatment systems and building. The East and West quarries were combined into a single pond after removal of soil/sediments and left to refill naturally.

1.2 Site Investigation and Remediation

The Site is a former waste disposal site owned by FMC and located partly in the towns of Shelby and Ridgeway, Orleans County, New York. As shown on Figure 1, the Site is divided by Dublin Road.

The southern portion of the Site was historically used by FMC and predecessor entities for the disposal of coal ash/cinders and debris and other materials primarily from the Middleport, New York, pesticide chemical manufacturing and formulating plant from 1933 to 1968. The primary Site contaminants consist of metals (arsenic, copper, zinc, lead) and pesticides (benzene hexachloride [BHC] isomers and DDT and its metabolites).

As part of the 1994 through 1996 remedial actions, a groundwater extraction system and water treatment system were constructed to address residual groundwater contamination at the Site. The groundwater extraction system consists of 11 groundwater extraction wells equipped with pneumatic pumps and three collection sumps. When the wells are operating, extracted groundwater is pumped from the extraction wells into the collection sumps and then to the groundwater treatment system through a network of aboveground piping. The groundwater treatment system encompasses an automated groundwater treatment plant for removal of solids, metals, and organic chemicals. Unit operations include multimedia filtration, ANDCO Environmental Processes, Inc. electrochemical precipitation process for removal of metals, and carbon filtration.

Pumping of the groundwater extraction system ceased on May 29, 2012. The groundwater extraction and treatment system was maintained for operation at the Site; a Site Management Plan was issued in February 2014. The Site Management Plan provides a detailed description of all procedures required to manage remaining contamination at the Site after completion of the Remedial Action, including the following five procedures:

1. Implementation and management of all Engineering and Institutional Controls
2. Media monitoring
3. Operation and maintenance of all treatment, collection, containment, or recovery systems
4. Performance of periodic inspections, certification of results, and submittal of Periodic Review Reports
5. Defining criteria for termination of treatment system operations.

2.0 ORGANIZATIONAL STRUCTURE

The following sections describe the roles and responsibilities for key staff members and contractors working at the Site. The names and contact information for each of the roles listed are included in Attachment 1 (Project Incident Reporting Contact List). Attachment 1 will be updated on a regular basis as individual assignments change.

2.1 FMC Remediation Manager

FMC has designated the Remediation Manager who will be responsible for decisions regarding operations and work stoppage due to health and safety considerations. The daily and routine operations will be managed by a Contractor Site Supervisor.

2.2 Contractor Site Supervisor

It will be the responsibility of each contractor to designate a Site Supervisor for the work to be performed on the Site. The Site Supervisor is responsible for field operations and reports to the Remediation Manager. The Site Supervisor ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor are:

- Implementing this HASP.
- Conducting applicable health and safety training, including review of applicable Site health and safety requirements.
- Preparing and coordinating the Site Work Plan.
- Verifying that the contractors are meeting the requirements of this HASP, applicable regulatory standards, and FMC standards and guidelines.
- Managing the safety and health functions on this Site.
- Serving as the point of contact for safety and health matters.
- Ensuring site monitoring, worker training, medical surveillance, and effective selection and use of personal protective equipment (PPE).
- Assessing site conditions for unsafe acts and conditions and providing corrective action.
- Maintaining detailed safety and health records as described in this HASP.
- Coordinating with others as necessary for safety and health efforts.

2.3 Site Workers

Site workers are responsible for complying with this HASP, using the proper PPE, reporting unsafe acts and conditions, and following the lines of authority established for this Site.

3.0 SITE CHARACTERIZATION AND JOB HAZARD ANALYSIS

3.1 Job Hazard Analysis (JHA)

Table 3-1 summarizes the key physical hazards for general site activities and the planned hazard controls. Each contractor will be required to submit a project-specific hazard assessment and control plan. Biological and chemical hazards and their known or anticipated airborne concentrations are identified and specific concentrations may vary by location. Since the potential for exposure will vary based on the location and task, the Remediation Manager and contractor Site Supervisor must assess the location-specific and task-specific potential for exposure and develop a JHA or equivalent.

The information provided here is designed to satisfy the JHA requirements of Code of Federal Regulations 29 CFR 1910.120(b)(4)(ii)(A) and the workplace hazard assessment requirements of 29 CFR 1910.132(d). Contractors are required to complete their own hazard assessment and include it in their HASP.

Table 3-2 summarizes health hazard information for known site chemicals of concern (COCs).

These tables summarize the information used to select and implement the specific exposure controls identified in the remainder of the HASP, including personal protective equipment, exposure monitoring, site controls, decontamination, and others.

When the tables are modified, related provisions elsewhere in the HASP are also modified. Tables 3-1 and 3-2 are modified by the SSHO when:

- The Scope of Work is changed by adding, eliminating, or modifying tasks.
- New methods of performing site tasks are selected.
- Observation of the performance of site tasks results in a revised characterization of the hazards.
- New chemical, biological, or physical hazards are identified.
- Exposure data indicate changes in the concentration and/or likelihood of exposure.
- New/different control measures are selected.

Table 3-1
Summary of Key Physical Hazards and Controls

Activity	Hazard	Control Measures
Driving to and on-site	Vehicle accident Struck-by / line of fire	Only licensed drivers will operate registered vehicles. Inspect vehicle and follow posted signs and speed limits. Do not use telephone or mobile device while driving. Maintain adequate space around vehicle. Use spotter when backing or moving in tight spaces. Trucks and mobile equipment must have a back-up alarm.
Walking and general site activities	Slips, trips, and falls Contact with site contaminants Struck-by, contact with equipment or other hazards	USEPA Level D PPE required for all environmental-related work activities: hard hat, safety glasses with side shields, safety shoes, long sleeve shirt, high visibility vest when working near equipment or traffic, gloves appropriate for task. All PPE must be ANSI or NIOSH approved. Attend site orientation and be aware of site alarm requirements and designated rally points. Be aware of surroundings and obey all signs and barriers. Focus on task; do not walk and talk on telephone or view documents. Only trained and authorized staff members are allowed to enter regulated areas. Check in with the Site Supervisor prior to entry.
Material handling	Ergonomic strains and sprains Damage to equipment	Assess lift before starting task. Use two-person lift for over 50 pounds. Use good lifting techniques. Avoid lifting with back, get a firm grip on the load, avoid awkward postures. Use mechanical lifting equipment where feasible.
Environmental sampling and operations Surface and groundwater sampling	Slips, trips, and falls working in rough terrain	Be aware of surroundings and plan your route. Wear Level D PPE and focus on task while walking. Clear ice and debris, as necessary. Maintain good housekeeping. Post hazard areas and respect all signs and barriers.

Activity	Hazard	Control Measures
Inspection and monitoring activities Landscaping and routine maintenance	Exposure to site chemicals of concern	Establish work zones as described in Section 4.0 (Site Control). Only allow trained and authorized staff into the Contamination Reduction Zone and Exclusion Zone. Use good work practices and avoid contact. Monitor exposure with a photoionization detector (PID) or appropriate instrument based on your task. Review Table 3-2 and be aware of chemical hazards and symptoms of exposure. Use appropriate PPE for the task. Additional dermal and respiratory protection may be required based on the potential for exposure. Each work group must conduct a task-specific hazard assessment and determine the appropriate level of PPE.
Equipment operation	Struck-by / line of fire noise	Heavy equipment will only be used by trained authorized operators in accordance with manufacturer's specifications. Work areas will be clearly delineated and controlled. No one will be allowed within the operating radius of the equipment. A daily pre-use inspection is required, as well as access to a spill kit. Refer to 29 CFR 1926.600 for additional requirements. When operating equipment, appropriate hearing PPE will be used.
Excavation and handling of contaminated soil	Struck-by /line of fire Collapse of excavation	See control measures for equipment operation, above. Assess the soil and install excavations in accordance with 29 CFR 1926.651. Have a designated Competent Person on-site. Complete daily inspections of the excavation or when conditions change.

Activity	Hazard	Control Measures
Excavation and handling of contaminated soil (continued)	Exposure to chemicals of concern	Use good work practices and avoid contact. Monitor exposure with a photoionization detector (PID) or appropriate instrument based on your task. Review Table 3-2 and be aware of chemical hazards and symptoms of exposure. Use appropriate PPE for the task. Additional dermal and respiratory protection may be required based on the potential for exposure. Each work group must conduct a task-specific hazard assessment and determine the appropriate level of PPE.
Drilling/geoprobe and subsurface investigation activities	Contact with overhead or underground utilities	Complete a thorough site survey and site one-call clearance. Review all available site drawings and figures. Document clearance of the proposed drilling locations and consult with site owner prior to starting work. Maintain adequate clearance from all utilities; shield or guard if required distance cannot be maintained. Do not move drill rigs or equipment with elevated derricks or rigs. Plan your route and use spotters when backing or moving in tight areas. Follow all traffic signs and posted speed limits. Inspect equipment prior to use and have a spill kit available.

Notes:

This table provides a general summary of key hazards and site-specific requirements. Each contractor is required to conduct a task-specific hazard assessment and document on a Job Safety Analysis, Job Hazard Analysis (JHA), Activity Hazard Analysis, or equivalent. The hazard assessment must provide a summary of tasks, list of key hazards and required controls.

Acronyms:

ANSI – American National Standards Institute

CFR – Code of Federal Regulations

NIOSH – National Institute for Occupational Safety and Health

USEPA – U.S. Environmental Protection Agency

Table 3-2
Health Hazards of Known Site Chemicals of Concern

Chemical of Concern	Location	Site Action Levels	Routes of Exposure	Primary Hazards
Arsenic	Groundwater Soil GW/SW conveyance system	OSHA: PEL = 0.010 mg As/m ³ ACGIH: TLV/TWA = 0.01 mg As/m ³ NIOSH: IDLH = 100 mg As/m ³ TLV-STEL = 0.002 mg As/m ³	Inhalation skin absorption skin and/or eye contact ingestion	Systemic toxin, cancer-causing agent
Lead	Groundwater Soil GW/SW conveyance system	OSHA: PEL = 0.030 mg/m ³	Inhalation skin absorption skin and/or eye contact ingestion	Nervous system and systemic toxin.
Ethylene thiourea	Groundwater Soil GW/SW conveyance system	NA – as low as reasonably feasible	Inhalation ingestion skin and/or eye contact	Toxic and irritant
BHC Isomers	Groundwater Soil GW/SW conveyance system	NA – as low as reasonably feasible	Inhalation skin absorption ingestion skin and/or eye contact	Toxic and irritant
DDT/DDD/DDE Pesticide compounds	Groundwater Soil GW/SW conveyance system	NA – as low as reasonably feasible	Inhalation skin absorption ingestion skin and/or eye contact	Toxic and irritant Marine toxin

Notes:

Routes of exposure and action levels will allow for determination of PPE required above Level D PPE. Level D PPE is minimum PPE that is required for work on this Site. If any action level is exceeded further evaluation will be required to determine engineering controls or PPE required.

Table 3-2
Health Hazards of Known Site Chemicals of Concern
(continued)

Acronyms:

ACGIH	= American Conference of Government Industrial Hygienists.
IDLH	= Immediately dangerous to life and health.
mg/m ³	= milligrams of contaminant per cubic meter of air.
NA	= not available
NIOSH	= National Institute for Occupational Safety and Health.
OSHA	= Occupational Safety and Health Administration.
PEL	= permissible exposure limit.
ppm	= parts of contaminant per million parts of air.
TLV	= Threshold limit value.
TLV-TWA	= Threshold limit value - Time-Weighted Average.
TLV-STEL	= Threshold limit value – Short-Term Exposure Limit.
GW/SW	= Groundwater/Surface Water

Source: NIOSH Pocket Guide to Chemical Hazards

3.2 Employee Notification of Hazards and Overall Site Information Program

The information in Table 3.1 and Table 3.2 is made available to all employees who could be affected by site hazards prior to the time they begin their work activities. Modifications to these tables are communicated during routine briefings.

Consistent with paragraph (i) of HAZWOPER, contractors and subcontractors are informed about the nature and level of hazardous substances at this Site, and likely degree of exposure to workers who participate in site operations. The SSHO or Site Supervisor is responsible for providing site characterization information, this HASP, and modifications to this HASP to other contractors and subcontractors working on this Site. Employees and contractors working on this project must receive a HASP orientation and sign-off the acknowledgement page.

All contractors must attend the site-specific orientation, review the FMC contractor handbook, and comply with all site-specific rules and guidelines. FMC reserves the right to refuse entry or dismiss anyone that does not comply with site rules.

4.0 SITE CONTROL

This site control program is designed to reduce the spread of hazardous substances from contaminated areas to clean areas; to identify and isolate contaminated areas of the Site; to facilitate emergency evacuation and medical care; to prevent unauthorized entry to the Site; and to deter vandalism and theft.

The site control program includes the elements specified in 29 CFR 1910.120(d) and provides the following site-specific information:

- A site map, indicating site perimeter and work zones.
- Site access procedures.
- Site security.
- Site work zones, including standard operating procedures.
- Use of the buddy system.
- Both internal (on-site) and external communications.

The Site Superintendent is responsible for evaluating site conditions and for verifying that the site control program functions effectively. The site control program is updated regularly to reflect current site conditions, work operations, and procedures.

4.1 Site Access

Access to the Site is restricted to reduce the potential for exposure to safety and health hazards.

Visitors must check in with the Site Supervisor or their designee and are required to comply with the requirements of this HASP. Visitors who want to enter contaminated areas of the Site:

- Must provide documentation that they have the required training and medical evaluation.
- Must receive a site-specific briefing about protecting themselves from site hazards, recognizing site zones demarcations, and following emergency evacuation procedures prior to entry.
- Visitors are expected to provide their own PPE.

4.2 Work Zones

HAZWOPER-covered work zones will be categorized into three major zones and controlled by the responsible work crew. These zones are characterized by presence or absence of biological and chemical hazards and the activities performed within them.

Zone boundaries must be clearly marked at all times and the flow of personnel and equipment among the zones is controlled.

The Site is monitored for changing conditions that may warrant adjustment of zone boundaries. Zone boundaries are adjusted as necessary to protect personnel and clean areas. Whenever boundaries are adjusted, zone markings are also changed, and workers are immediately notified of the change.

The following criteria were considered in establishing the site work zones:

- Required clean-up activities.
- Sampling results for air and surface contaminants.
- Inside traffic patterns.
- Ventilation system and air circulation patterns.
- Air dispersion calculations.
- Potential for fire.
- Physical, biological, other characteristics and decontamination substances.

4.2.1 Exclusion Zone and Standard Operating Procedures

The Exclusion Zone is the area where hazardous substances are known or suspected to be present and where the greatest potential for exposure occurs. Remediation operations (site clean-up) are performed in the Exclusion Zone.

Personnel and equipment will enter and exit the Exclusion Zone from the designated access point(s) in the Contamination Reduction Zone (Section 4.2.2).

Personnel in the Exclusion Zone will adhere to these standard operating procedures (SOPs):

- Check in and out of the Exclusion Zone at the designated access point(s).
- Use the buddy system at all times.
- Wear the PPE required for this zone (see Section 7.0 [PPE] of this HASP).
- Perform air and surface sampling as required for this zone (see Section 8.0 [Exposure Monitoring] of this HASP).
- Do not smoke, eat, or drink.
- Monitor self and buddy for signs of heat stress and other difficulties.
- Alert supervisor to signs of unanticipated hazards.
- Do not engage in horseplay.
- Monitor self and buddy for PPE improper fittings, rips, tears, and/or damage.
- Use monitoring equipment and tools that are safe for the working environment.

4.2.2 Contamination Reduction Zone and Standard Operating Procedures

The Contamination Reduction Zone is located between the Exclusion Zone and the Support Zone (clean zone). Its primary purpose is for decontamination of workers and

equipment. The Contamination Reduction Zone also serves as a buffer between the Exclusion Zone and Support Zone, to limit the potential for contamination to spread to the Support Zone and outlying areas. Work crews are responsible for establishing the Contamination Reduction Zone boundaries. They must be marked with caution tape, barriers, construction fencing, or other suitable means based on the scope and duration of the work.

Based on monitoring results, the Contamination Reduction Zone boundaries may be adjusted to ensure that the Support Zone remains uncontaminated.

Workers and equipment exit the Exclusion Zone through the designated access point(s) into the Contamination Reduction Zone. Workers and equipment are then decontaminated in the Contamination Reduction Zone, according to the procedures specified in Section 11.0 of this HASP. Workers and equipment then exit the Contamination Reduction Zone into the Support Zone through the designated access points.

If necessary, emergency decontamination procedures are implemented. Emergency decontamination procedures are described in Section 11 of this HASP.

Personnel in the Contamination Reduction Zone will adhere to these SOPs:

- Check in and out of this zone at the designated access point(s).
- Wear the PPE required for this zone (see Section 7.0 [PPE] of this HASP).
- Perform air and surface sampling as required for this zone (see Section 8.0 [Exposure Monitoring] of this HASP).
- Do not smoke, eat, or drink.
- Monitor self and buddy for signs of heat stress and other difficulties.
- Alert supervisor to signs of unanticipated hazards.
- Do not engage in horseplay.
- Monitor self and buddy for PPE improper fittings, rips, tears, and/or damage.

4.2.3 Support Zone

The Support Zone is the clean area of the Site, beyond the outer boundary of the Contamination Reduction Zone. There should be no contamination in this zone. Administrative, clerical, and other support functions are based in the Support Zone.

The Support Zone and its boundaries must be maintained and marked by each work crew.

Air and surface monitoring are conducted in the Support Zone as needed to ensure that it remains uncontaminated. If contamination is detected, zone boundaries are adjusted until corrective action is taken and monitoring results indicate that this zone is again uncontaminated.

Within the Support Zone, personnel adhere to these SOPs:

- Check in and out of this zone from the Contamination Reduction Zone at the designated site access point(s).
- Alert supervisor to signs of unanticipated hazards.
- Do not engage in horseplay.
- Perform air and surface sampling as required for this zone (see Section 8.0 [Exposure Monitoring] of this HASP).

4.3 Buddy System

While working in the Exclusion Zone, site workers use the buddy system. The buddy system means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of an emergency. The responsibilities of workers using the buddy system include:

- Remaining in close visual contact with partner.
- Providing partner with assistance as needed or requested.
- Observing partner for signs of heat stress or other difficulties.
- Periodically checking the integrity of partner's PPE.
- Notifying the supervisor or other site personnel if emergency assistance is needed.

4.4 Site Communications

The following communication equipment is used to support on-site communications:

A current list of emergency contact numbers is posted in the following locations:
See Section 1 (Introduction) of this HASP. Contractors must prepare their own HASPs, including emergency contacts. The Incident Reporting Contact List is included as Attachment 1.

Other forms of communication on this Site include:
Voice and cell phone communication. Site radios may be used, as necessary.

Each contractor is required to check in with the Site Supervisor and maintain communication via cell phone or radio, if issued one.

5.0 TRAINING PROGRAM

The site training program is designed and established to ensure that workers receive, or have already received, the training they need to work safely and meet regulatory requirements. Site safety and health training requirements are based on the JHA contained in Section 3.0 of this HASP and relevant OSHA requirements.

For this Site, the Site Supervisor oversees the implementation of this training program and is responsible for ensuring that employees and contractors are adequately and currently trained for all tasks they are asked to perform. Each contractor is required to maintain documentation of training and have readily available for inspection or auditing purposes. Employees who have not been trained to a level required by their job function and responsibility are not permitted to participate in or supervise field activities.

This training program is consistent with the requirements of 29 CFR 1910.120(e) and (q)(11) and addresses the following site-specific information:

- Initial training for site workers and supervisors.
- Management and supervisor additional training requirements.
- Site-specific briefings for visitors and workers.
- Refresher training.
- Qualification of trainers.
- Training certification.
- Emergency response training.

5.1 Initial Training for Site Workers and Supervisors

Initial training requirements are based on the designation of the Site as either post-emergency response operations or as a government-identified uncontrolled hazardous-waste site. These requirements are also based on a worker's potential for exposure, and compliance with the applicable regulatory requirements of 29 CFR 1910.120 (q)(11) and/or (e)(3).

In order to work in contaminated areas, personnel at this Site working within the Contamination Reduction Zone or Exclusion Zone have successfully completed 40-hour initial HAZWOPER training consistent with the requirements of 29 CFR 1910.120(e)(3)(i) or have received equivalent training consistent with the provisions of 29 CFR 1910.120(e)(9). In addition, such personnel have received three days of supervised field experience applicable to this Site.

The initial training provided to these workers addresses:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health, and other hazards present on the Site.
- Use of PPE.

- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the Site.
- The site control plan (detailed in Section 4.0 of this HASP).
- Medical surveillance requirements (detailed in Section 6.0 of this HASP).
- The spill containment program (detailed in Section 10.0 of this HASP).
- Decontamination procedures (detailed in Section 11.0 of this HASP).
- The Emergency Response Plan (detailed in Section 12.0 of this HASP).

Additional training provided for site workers is listed in Table 5-1.

Table 5-1
Other Training for Site Workers

Daily pre-job “toolbox” safety meeting is required by each work crew
Review of this HASP with signature on Acknowledgement Form (see Attachment 2 for form)

5.2 Management and Supervisor Training

In addition to the appropriate level of worker HAZWOPER training described above, on-site managers and supervisors who are directly responsible for, or who supervise, workers engaged in hazardous waste operations receive eight additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

5.3 Site-Specific Briefings for Visitors and Workers

A site-specific briefing is provided to all individuals, including site visitors, who enter the Site beyond the initial point of access at the main security gate. Site orientation training is typically provided at the security office/reception area.

For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

5.4 Refresher Training

All workers on this Site, including managers and supervisors who could be exposed to potentially contaminated areas, receive annual HAZWOPER refresher training consistent with the requirements of 29 CFR 1910.120. Table 5-2 details the refresher training.

Table 5-2
Refresher Training Topics

Annual 8-Hour HAZWOPER refresher, as per 29 CFR 1910.120 requirements

5.5 Qualification of Trainers

Only instructors qualified in accordance with 29 CFR 1910.120 are used to train workers for this Site. Qualified instructors have either completed a training program for the subjects they are expected to teach or have the academic credentials and instructional experience necessary for teaching these subjects.

5.6 Training Certification

This Site maintains written certification of the successful completion of applicable training requirements for all personnel. Contractors are required to maintain documentation of training and qualifications for their employees and subcontractors. Employees and supervisors receive a written certificate when they complete necessary training and field experience. Any person who has not been so certified or who does not meet the requirements of equivalent training is prohibited from engaging in the clean-up operations on this Site. A signed HASP acknowledgement form must be completed prior to starting work (Attachment 2).

5.7 Emergency Response Training

Emergency response training is addressed in the Emergency Response Plan, or ERP (Attachment 3 of this HASP).

6.0 MEDICAL SURVEILLANCE

The medical surveillance section of the HASP describes how worker health status is monitored for work done at the Site under this plan. Medical surveillance is used when there is the potential for worker exposure to harmful levels of hazardous substances.

The purpose of a medical surveillance program is to medically monitor worker health to ensure that personnel are not adversely affected by site hazards. The provisions for medical surveillance at this Site are based on the site characterization and JHA found in Section 3.0 of this HASP. They are consistent with OSHA requirements in 29 CFR 1910.120(f) and substance-specific requirements in 29 as applicable.

Contractors working at the Site are required to assess their work scope for applicability of medical monitoring requirements, if applicable employees will be enrolled and compliant with applicable requirements.

The medical surveillance program addresses the following information:

- Provisions of the site medical surveillance program.
- Communication between the site personnel, physicians, and workers.
- Medical recordkeeping procedures.

The person with responsibility for ensuring this program is implemented and maintained is the Site Supervisor.

6.1 Site Medical Surveillance Requirements

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and JHA documented in Section 3.0 of this HASP and as required by 29 CFR 1910.120(f)(2) and the substance-specific standards.

Based on limited worker exposure to hazardous substances at or above the PELs or other published exposure limits (less than 30 days per year); limited use of respirators (less than 30 days per year); and the absence of an employee-staffed hazardous materials (HAZMAT) team, the medical surveillance program required at this Site is also limited. The Site medical surveillance program provides that:

1. Workers assigned to tasks requiring the use of respirators receive medical examinations in accordance with 29 CFR 1910.134(e) to ensure they are physically capable to perform the work and use the equipment.
2. Workers who could potentially be exposed to covered substances are covered by a medical protocol addressing this exposure.
3. If a worker is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substances or health hazards, medical examinations are provided to that worker as soon as possible after the occurrence and as required by the attending physician.

Medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to employees free of cost, without loss of pay, and at a reasonable time and place. The need to implement a more comprehensive medical surveillance program will be re-evaluated in the event of an over-exposure incident.

6.2 Site Medical Surveillance Program

A medical surveillance program is implemented for corrective action work at this Site based on the potential for employee exposure to levels of hazardous substances or health hazards in excess of the PEL or other published exposure limits, the use of respiratory protection, and/or the assignment of workers to a HAZMAT team.

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and JHA documented in Section 3.0 of this HASP and as required by 29 CFR 1910.120(f)(2) and any substance-specific standards that apply to an employee's scope of work. Based on that evaluation:

1. Some personnel who enter contaminated areas of this Site do not need to be included in the medical surveillance program. Table 6-1 below lists the types of workers who are not covered by the medical surveillance program.

Table 6-1
Types of Workers Excluded from the Medical Surveillance Program

Workers who are NOT exposed above the PEL for 30 or more days per year.
Workers who do NOT wear respiratory protection.
Workers that are NOT part of a HAZMAT team.
Workers that have NOT experienced any signs or symptoms, or illness associated with chemical exposure.

2. Personnel within the medical surveillance program receive medical examinations on the following schedule:
 - a. **Prior to assignment:** Personnel covered by the medical surveillance program are medically examined prior to commencing work in contaminated areas of the Site. The purpose of this examination is to assess baseline health status and the worker's ability to perform anticipated duties wearing required PPE without any adverse health effects. The pre-assignment medical examination must have been performed within the past 12 months. The content of the exam must be based on the hazards present at this Site and anticipated work duties. A copy of the results of that examination, in the form of a physician's written opinion as described, must be presented on-site prior to entry into contaminated areas.

- b. **On an annual basis:** Personnel within the medical surveillance program receive medical exams at least every 12 months to provide for ongoing assessment of a worker's health status.
- c. **At termination or reassignment:** Personnel are offered the opportunity for a medical examination upon their termination of employment or reassignment to work where the worker is not exposed to hazardous materials or required to wear a respirator.
- d. **Post-injury/illness:** Any worker who is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substances or health hazards, receives a medical examination as soon as possible after the occurrence, with follow-up examinations provided as required by the attending physician.

All medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to workers free of cost, without loss of pay, and within a reasonable time frame.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The Site PPE program for HAZWOPER-covered activities is described below. This section of the HASP describes how PPE is selected and used to protect workers from exposure to hazardous substances and hazardous conditions on this Site. Updated Safety Data Sheets (SDS) for known substances are maintained at the Site and are available electronically. Exposure hazards from Site COCs, as well as those from the decontamination process, are considered. The following topics are addressed in this section:

- PPE selection criteria.
- Site-specific PPE ensembles.
- Criteria for PPE upgrades and downgrades.
- Work mission duration.
- Training in use of PPE.
- Respiratory protection.
- Hearing conservation.
- PPE maintenance and storage.
- Evaluation of this program.

The person with overall responsibility for implementing the PPE program at the Site is the contractor-designated Site Supervisor.

7.1 PPE Selection Criteria

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices, and PPE are used to protect employees.

An initial level of PPE is assigned to each task to provide an adequate barrier to exposure hazards. Initial PPE ensembles are selected based on the anticipated route(s) of entry of biological and chemical hazards and their concentration. Ensemble materials are selected using permeation data supplied by individual manufacturers. Materials providing the greatest duration of protection have been chosen. Tear and seam strength of the PPE are also considered to ensure ensemble durability while work is performed. When necessary, multiple layers of protection are used to accommodate the range of hazards that may be encountered. Where possible, employees are provided with a range of component sizes to ensure properly fitted PPE.

The following general criteria are used in selecting PPE levels at this Site. Contractors will be required to make their own PPE determination that meet or exceed the requirements listed below and are in accordance with 29 CFR 1910.134.

7.1.1 Use of Level A Protection

Employees use Level A protection during tasks that have or potentially have the following characteristics:

- Measured or potentially high concentration(s) of atmospheric vapors, gases, or particulate.
- High potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin.
- Operations in confined or poorly ventilated areas where the absence of conditions requiring Level A have not yet been determined.

Level A work is not anticipated for this Site.

7.1.2 Use of Level B Protection

Employees use Level B protection during tasks that have or potentially have the following characteristics:

- Exposures are known and the highest degree of respiratory protection is needed.
- The atmosphere is oxygen deficient (concentrations less than 19.5 percent).
- There are no warning properties for the identified gases, vapors, or particulates.
- The atmosphere contains incompletely identified vapors or gases, as indicated by a direct-reading instrument, not suspected of containing high levels of hazardous substances harmful to skin or capable of being absorbed through the skin.
- Atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards but do not represent a skin absorption hazard.

7.1.3 Use of Level C Protection

Employees use Level C protection during tasks that have or potentially have an increased potential for dermal and/or respiratory exposure.

In accordance with 29 CFR 1910.134(d)(3)(iii)(B)(2), a cartridge/canister change schedule has been determined. Cartridges and canisters used with air-purifying respirators on this Site are replaced when any of the following occurs:

- A NIOSH-approved End of Service Life Indicator is activated
- The service time identified in the contractor-specific HASP has passed. Service time is the total period of time canisters/cartridges are exposed to the environment.
- Inhalation is restricted.

If warning properties (chemical odors, tastes, or physical irritation) are noted, employees will immediately leave the work area and notify their Site Supervisor.

7.1.4 Use of Level D Protection

Note that Level D Protection is the minimum required PPE for HAZWOPER-covered facilities. PPE must be provided by the contractor, agency or supporting organization, inspected before use and in good condition.

Employees will use Level D protection during HAZWOPER-covered tasks. Level D PPE consists of:

- ANSI-approved hard hat.
- ANSI-approved safety glasses with side shields.
- ANSI-approved safety shoes/boots.
- Cut resistant ANSI-approved gloves.
- Class 2 or 3 high-visibility clothes or vest when in proximity to heavy equipment, traffic, or multiple work crews.
- Modified Level D - chemical-resistant coveralls may be required for various tasks based on potential for skin contact and toxicity of the material.

7.2 Site-Specific PPE Ensembles

Site-specific PPE ensembles and materials are identified in Section 7.1. These ensembles are consistent with Appendix B of 29 CFR 1910.120. All PPE is used in accordance with manufacturers' recommendations, and in conjunction with Section 11.0 (Decontamination).

7.3 Criteria for PPE Upgrades and Downgrades

Since PPE is primarily used as a barrier to biological and chemical exposure, airborne concentrations of site contaminants and decontamination chemicals are monitored routinely, in accordance with Section 8.0 (Exposure Monitoring). The level of PPE is assessed based on the criteria in Table 7-1.

The contractor Site Supervisor has the authority to upgrade or downgrade PPE in a timely manner to respond to changing site conditions and to protect worker health and safety. Routine evaluation of the PPE program is conducted as identified in Section 7.9 of this HASP.

All employees and contractors working on this project are to use the PPE as specified in this section or their employer-specific HASP. Failure to comply with PPE requirements will result in disciplinary action up to and including removal from the Site.

7.4 Work Mission Duration

Each work team identifies and monitors task-specific work duration based on the following factors:

- Physiological requirements of the task.
- PPE level for the task.

- Ambient temperature and humidity.
- Respiratory protection capacity (air supply or cartridge change requirements).
- Chemical protective clothing capacity (permeation rate of on-site materials).
- Acclimatization of the work force to site and task conditions.

Table 7-1
Airborne Contaminant Action Levels

Parameter	Reading ⁽¹⁾	Action
Air Sampling (8-hour samples, laboratory analysis)		
Lead Arsenic (conducted as needed based on work scope)	<0.030 mg/m ³ <0.010 mg/m ³	Normal operations. If any of the air sampling action levels are exceeded, investigate source and increase dust suppression. If levels cannot be reduced utilize respiratory protection with appropriate protection factor.
Air Monitoring (real-time)		
Total Particulates ⁽²⁾ VOCs ⁽³⁾	0-0.150 mg/m ³	Normal operations (refer to CAMP requirements).
	<1 ppm	
	>0.150 mg/m ³	Investigate source of particulate or VOCs, reduce generation rate, Review chemical-specific hazards, and utilize respiratory protection with appropriate protection factor.
	>1 ppm	Stop work, contact SSHO and PM. Review chemical specific hazards and use respiratory protection with appropriate protection factor.
Additional Analytes		
Metals Acid / irritant gas Specific organic compounds	>50% of the PEL/TLV	Investigate source, reduce generation rate. Upgrade PPE if levels cannot be reduced below 50% of the PEL/TLV.
Visual Observation		
Sustained visible dust generation above normal background		Increase dust suppression measures.
Notes: 1) All readings must be recorded and be available for site personnel to review. 2) Readings for particulates are for 15 consecutive minutes, at breathing-zone height, measured with a calibrated pDR or equivalent. Real-time particulate sampling instruments provide total dust levels. Action levels are in excess of background levels, as measured prior to activities on-site or off-site. 3) Readings for VOCs sustained for greater than 30 seconds, at worker breathing-zone height, measured with a calibrated photo-ionization detector miniRAE or equivalent. Real-time VOC sampling instruments provide total organics levels; compound-specific monitoring may be required if action levels are exceeded. Action levels exceed background levels, as measured prior to activities on-site or off-site. VOCs will only be monitored if soil excavation results in excavation of soils where VOCs are suspect.		

7.5 Training

Employees receive general training regarding proper selection, use and inspection of PPE during initial HAZWOPER training (or equivalent) and subsequent refresher training. Information about the site-specific PPE requirements (Section 7.2), are communicated as identified in Section 5.0 (Training Program).

7.6 Respiratory Protection

Respiratory protection is selected, fitted, used, stored, and maintained in accordance with the FMC Respiratory Protection Program available from the Site Supervisor. Contractors that use respiratory protection must have their own Respiratory Protection Plan that meets the requirements of 29 CFR 1910.134.

7.7 Hearing Conservation

Consistent with 29 CFR 1910.95, hearing protection is made available when noise exposures equal or exceed an 8-hour, time-weighted-average sound level of 85 A-weighted decibels (dBA). Hearing protection is required when the 8-hour, time-weighted-average sound level greater than or equal to 90 dBA. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the JHA for the tasks/operation, and hearing protection is included as one of the PPE control measures.

Hearing protection is also required for any employees who have not yet had a baseline audiogram or who have experienced a standard threshold shift and are exposed to an 8-hour, time-weighted-average sound level greater than or equal to 85 dBA.

Employees exposed to an 8-hour, time-weighted average sound level greater than or equal to 90 dBA participate in a Hearing Conservation Program

7.8 PPE Maintenance and Storage

In order to ensure that PPE continues to provide the anticipated protection, this Site uses specific procedures for PPE inspection, cleaning, maintenance, and storage. Adherence to these procedures is tracked with written inspection records.

The Site Supervisor or contractor designee is responsible for overseeing PPE maintenance and storage procedures and maintaining compliance with manufacturer's guidelines and their employer specific plans.

7.9 Evaluation of PPE Program

Assessment of PPE performance occurs throughout site activities in response to air-monitoring data collected (Section 8.0 [Exposure Monitoring] of this HASP) and the action levels identified in Table 7-1. Surface samples may be collected from the inside surfaces of used PPE to ensure that the equipment provides an adequate barrier throughout the work shift.

Modifications to initially selected PPE are determined by Site Supervisor. Affected employees are informed immediately. Section 3.0 of this HASP (JHA) is updated with information about job hazards and selected controls.

8.0 EXPOSURE MONITORING PROGRAM

This section of the HASP describes minimum requirements and general information on action levels of key hazardous substances and worker exposures to them and how they are monitored at this Site. This exposure monitoring program provides project-specific information about:

- Monitoring procedures to detect the presence of hazardous substances.
- Monitoring procedures to determine worker exposures to hazardous substances and physical hazards.
- Action levels and required responses for known and expected hazardous substances and physical hazards.
- Calibration and maintenance procedures for monitoring equipment.

The SSHO or contractor designee is responsible for implementing this exposure monitoring program.

8.1 Monitoring Procedures

All staff conducting air monitoring will have the training, experience, and skills to calibrate and operate the instruments and interpret the results to make informed decisions on the potential for exposure.

Procedures for collecting, handling, and shipping laboratory samples will be in accordance with the selected method and laboratory guidance (Middleport QAPP).

8.1.1 Initial Monitoring

When the JHAs are prepared by each contractor, the task-specific requirements for monitoring will be noted. Initial and periodic monitoring is conducted to quantify employee exposure during activities and the JHAs and PPE requirements are updated accordingly.

8.1.2 Periodic Monitoring

Periodic monitoring is conducted to evaluate potential worker exposure to airborne hazardous substances and surface contamination. Resulting data are then used to determine baseline and on-going airborne and surface concentrations of contaminants, particularly when employee exposures may change significantly or rapidly. Situations in which conditions and employee exposures may change significantly or rapidly include:

- Commencement of work on another portion of the Site.
- Exposure to or handling of contaminants/hazards not previously identified.
- Commencement of a new task/operation.
- Change in indoor environmental conditions.
- Commencement of task/operation that is likely to increase airborne concentrations of hazardous substances.

Periodic air monitoring is conducted using direct-reading instruments, and by collecting and analyzing personal samples. Periodic monitoring associated with spill response and confined space entry is identified in Section 12.0 (Emergency Response Procedures).

8.1.3 Community Air Monitoring

Each contractor or agency working on-site must prepare and implement a Community Air Monitoring Plan (CAMP) that is consistent with the CAMP included in this HASP as Attachment 4.

8.2 Action Levels and Responses

Direct-reading instruments generally provide less precise data regarding the presence and concentrations of materials with a specific chemical characteristic. Consequently, the general site action limits will be applied (Table 7-1) and can be used by qualified employees to make quick decisions regarding the adequacy of the PPE worn and other implemented controls.

Table 7-1 summarizes the direct-reading monitoring equipment and monitoring frequency along with suggested sampling for typical tasks. Table 7-1 also identifies the applicable action limit to allow appropriate actions when airborne concentrations exceed these values. Qualified employees, identified in Section 8.1, conduct direct-reading monitoring and interpret data according to the information listed in Table 7-1.

Contractors are required to develop and implement their own task-specific air monitoring and exposure assessment criteria that are at least as stringent as this plan and meet applicable OSHA requirements.

Air sample collection and analysis are used to determine the identity and quantity of materials to which workers are exposed throughout the work shift. Consistent with HAZWOPER, personal air samples are collected in the breathing zones of employees expected to have the highest exposure during the task or in the Site location being evaluated. If exposures for these employees exceed the exposure limits identified in Table 7-1, additional samples are collected in the breathing zones of all employees associated with the task or the Site location evaluated. Full-shift and short-term samples are collected, providing quantitative results that can be compared to OSHA PELs and other published exposure limits. Frequency and duration of sample collection are also consistent with the requirements in OSHA's substance-specific standards,

Laboratory-analyzed sample results are used to evaluate the accuracy of direct-reading monitoring data as well as to quantify worker exposures and to determine the effectiveness of the exposure controls used at this Site. Laboratory results are compared with the direct-reading data to ensure that direct-reading instruments can be used to predict instances when exposures exceed defined exposure limits and the margin by which these values were exceeded. If a direct-reading instrument is not compatible with the contaminants identified in the air sample results, or the direct-reading data appear to be inadequate, the contractor designee is responsible for determining an alternative monitoring strategy. If the monitoring strategy must be modified, the HASP will be

revised accordingly and affected employees will be briefed about this change on the following day.

8.3 Equipment Calibration and Maintenance Procedures

All real-time monitoring instruments and sampling equipment must be calibrated and maintained according to the manufacturers' recommendations. Copies of the manufacturers' recommendations and instrument calibration and maintenance records will be maintained by the contractor designee.

9.0 HEAT AND COLD STRESS PREVENTION PROGRAM

This section of the HASP describes how the site-specific environmental conditions (temperature, humidity, air movement), employee work loads, and PPE may expose employees to hazards resulting in injury or illness related to heat and cold stress. This Heat and Cold Stress Prevention Program outlines exposure controls to protect employees working in hot and cold environments. The elements of this program are outlined in this section and include the following:

- Program implementation criteria.
- Heat and cold stress management.

The SSHO is responsible for implementing the Heat and Cold Stress Prevention Program, monitoring work-area heat/cold conditions and worker physiological parameters, and for ensuring that employees are trained to recognize the signs and symptoms of heat- and cold-stress illnesses or injury and what to do if these occur.

9.1 Program Implementation Criteria

The Heat and Cold Stress Prevention Program is implemented when work area temperatures rise above 72 degrees Fahrenheit (°F). The Cold Stress Prevention Program will be implemented when temperatures are below 40°F or wind and weather conditions dictate.

9.2 Heat and Cold Stress Management

Work practices and exposure controls are used to reduce the risk of elevating an employee's core body temperature, cooling temperature or cold extremities. These work practices and exposure controls include the following:

- Defining and adjusting employee work/rest intervals.
- Monitoring for physiological signs of heat and cold stress.
- Providing access to liquids and electrolytes.
- Establishing and implementing acclimatization schedules.
- Using warm weather cooling garments and heated break areas.
- Using adequate clothing and PPE.

Work/rest intervals are based on PPE, employee work loads, environmental conditions (temperature, humidity, air movement), and the results of physiological monitoring. Work/rest intervals are determined by the Site Supervisor and communicated to employees by the work supervisor or contractor Site Supervisor. Work/rest intervals are adjusted throughout the work shift as needed and communicated to each employee at the conclusion of an applicable rest period, prior to reentry into the work zone. Guidelines for work/rest schedules for this Site must meet or exceed the ACGIH guidelines and FMC standards.

10.0 SPILL CONTAINMENT PROGRAM

This section of the HASP describes the potential for hazardous substance spills at this Site and procedures for controlling and containing such spills. The purpose of this section of the HASP is to ensure that spill containment planning is conducted, and appropriate control measures are established, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii).

The spill containment program addresses the following site-specific information:

- Potential hazardous substance spills and available controls.
- Initial spill notification and response.
- Spill evaluation and response.

10.1 Potential Hazardous Substance Spills and Available Controls

There is a potential that a hazardous substance spill could occur, depending on the contractor or work crew activity. Therefore, the following site-specific spill containment program has been implemented to address spill containment planning, equipment, and procedures. Site personnel are trained in the contents of this spill containment program and their roles and responsibilities during spill response operations.

Each contractor or work crew is responsible for identifying regulated or toxic materials that could spill or leak during site activities. Each contractor is required to have a readily available SDS and suitable spill response materials available.

10.2 Initial Spill Notification and Response

Any worker who discovers a hazardous substance spill will notify the Site Supervisor.

The worker reports, to their best ability, the hazardous substance involved, the location of the spill, the estimated quantity of substance spilled, the direction/flow of the spill material, related fire/explosion incidents, and any associated injuries.

10.3 Spill Evaluation and Response

Spill evaluation and response will be managed in accordance with the Emergency Response Plan (ERP) (Attachment 3 of this HASP).

11.0 DECONTAMINATION

The decontamination section of the HASP describes how personnel and equipment are decontaminated when they leave the Exclusion Zone. This section also describes how residual waste from decontamination processes is disposed.

Decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants and protect against the transfer of contaminants outside designated work zones. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and permeate PPE surfaces. The decontamination procedures described below are designed to meet the requirements of 29 CFR 1910.120(k) and include project-specific information about:

- The location and type of project decontamination facilities.
- General and specific decontamination procedures for personnel and PPE.
- General and specific decontamination procedures for equipment.
- Disposal of residual waste from decontamination.
- Decontamination equipment and solutions.
- The monitoring procedures used to evaluate the effectiveness of decontamination.

Emergency decontamination procedures are detailed in the ERP of this HASP (Attachment 3).

The Remediation Manager and contractor Site Supervisor oversee implementation of project decontamination procedures and are responsible for ensuring their effectiveness.

11.1 Decontamination Facilities

Decontamination is conducted in the Contamination Reduction Zone, which acts as a buffer between the Exclusion Zone and the Support Zone. The location and design of decontamination stations minimize the spread of contamination beyond these stations. Separate facilities are used for personnel and for equipment. The location of these designated facilities will be established and clearly demarcated by each work crew. Only trained and authorized personnel are allowed in the Contamination Reduction Zone.

11.2 Decontamination Procedures for Personnel and PPE

Decontamination procedures are designed for the level of PPE used. Project-specific procedures for personnel and PPE decontamination minimize the potential for hazardous skin or inhalation exposure, cross-contamination, and chemical incompatibilities.

General site decontamination requirements are described in the following sections.

11.2.1 Personnel

Decontamination is required for all workers exiting a contaminated area. Personnel may re-enter the Support Zone only after undergoing the decontamination procedures described in this section and the ERP.

Workers are required and trained to immediately exit the work zone, perform applicable decontamination procedures, shower, and change into uncontaminated clothing if their permeable clothing is splashed or becomes wetted with a hazardous substance.

11.2.2 PPE

Used protective clothing is decontaminated, cleaned, laundered, maintained and/or replaced as needed to ensure its effectiveness.

PPE that requires maintenance or parts replacement is decontaminated prior to repairs or service.

PPE is decontaminated or prepared for appropriate disposal. Each contractor is responsible for their own waste disposal; contractors must not use FMC waste containers without written approval. Personnel who handle contaminated equipment have been trained in the proper means to do so to avoid hazardous exposure.

Procedures for decontamination waste disposal meet all applicable local, state, and federal regulations.

Respirators and non-disposable PPE are decontaminated with a method/procedure that has proven to be effective for the material in use.

11.3 Decontamination Procedures for Equipment

All tools, equipment, and machinery from the Exclusion Zone or Contamination Reduction Zone are decontaminated in the Contamination Reduction Zone prior to removal to the Support Zone. Equipment decontamination procedures are designed to minimize the potential for hazardous skin or inhalation exposure, cross-contamination, and chemical incompatibilities.

The following are general equipment decontamination procedures established and implemented during this project. Specific procedures for equipment decontamination must be developed by each work crew/contractor.

- Equipment in the Exclusion Zone that can be used again, is still operable, and will not pose an increased exposure hazard during re-use is left in Exclusion Zone until it is no longer needed. This eliminates unnecessary decontamination and reduces the potential for physical transfer of contaminants outside the Exclusion Zone.
- Decontamination is required for all equipment exiting a contaminated area. Equipment may re-enter the Support Zone only after undergoing the equipment decontamination procedures developed by each work crew/contractor.

- Equipment that is transported regularly between the contaminated and clean areas of the Site (e.g., monitoring equipment) is carefully decontaminated each time it is removed from the Exclusion Zone and the effectiveness of decontamination is monitored to reduce the likelihood that contamination will be spread outside designated work zones.
- Equipment that cannot be successfully decontaminated is disposed of as hazardous waste.

11.4 Monitoring the Effectiveness of Decontamination Procedures

Visual examination with confirmation sampling as necessary is used to evaluate the effectiveness of decontamination procedures, in compliance with 29 CFR 1910.120(k)(2)(iv). Visual examination is used to ensure that procedures are implemented as described and that they appear to control the spread of contaminants under changing conditions. Where feasible, visual examination is also used to inspect for signs of residual contamination and contaminant permeation of PPE.

Both air sampling and surface sampling are used to verify the effectiveness of decontamination. Air samples are taken in the clean zone to ensure that airborne contaminants have not spread to clean areas of the facility. Surface samples are taken from the inside surfaces of PPE, from decontaminated equipment, and from surfaces within clean areas of the facility to ensure that decontamination and control procedures are performing as anticipated. The type and frequency of air and surface sampling used to ensure the effectiveness of decontamination procedures are detailed in the Exposure Monitoring Section of this HASP.

Results of the inspections of decontamination procedures and documentation of any action taken to correct deficiencies will be maintained by each contractor or agency working at the site.

Personnel who work in contaminated areas, either the Contamination Reduction Zone (CRZ) or the Exclusion Zone, are trained in the principles and practices of decontamination described in this section of the HASP and in related SOPs. If procedures are changed as a result of inspection and monitoring, all affected employees are notified of these changes.

12.0 EMERGENCY RESPONSE PLAN

12.1 Purpose and Scope of Plan

The Dublin Road Site Emergency Response Plan (ERP) provide critical information to be used in the event of an emergency. The ERP is updated regularly and is included in the HASP as Attachment 3. Up-to-date versions are available from the Remediation Manager. The ERP includes the following information:

- Incident Reporting
- Emergency Route to Hospital
- Emergency Contacts
- Evacuation Procedures
- Adverse Weather Conditions
- Plan Maintenance
- Training
- Reporting Guidelines

Copies of the ERP will be posted in the Support Zone at the work site, and a copy should be with all on-site personnel during field activities. In the event of any situation or unplanned occurrence requiring assistance, (e.g., fire, major injury, crime, major release), **CALL 911 FIRST** and then notify the SSHO.

12.2 Non-Regulatory Reporting Guidelines

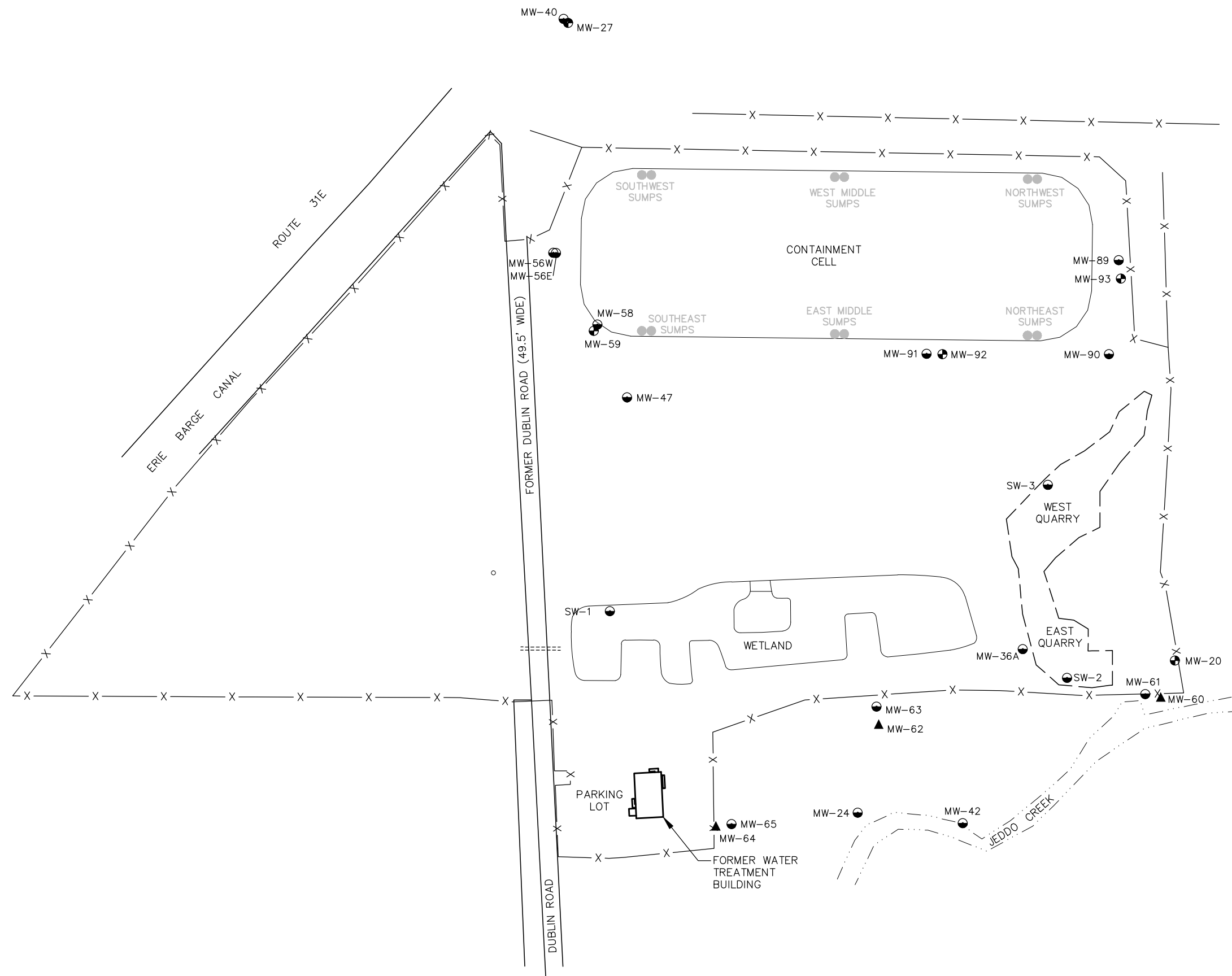
Employees involved in or witnessing an injury, worker exposure, environmental incident, or near miss must immediately report it to the Site Supervisor or Remediation Manager. No supervisor may decline to accept or relay a report of Safety, Health, and Environment incident or significant near-miss from a subordinate.

13.0 REFERENCES

- Arcadis, 2014. Site Management Plan. FMC Dublin Road Site No. 8-37-001, February
- 29 CFR 1910.120. "Occupational Safety and Health Standards - Subpart H Hazardous Materials - Hazardous waste operations and emergency response." *Code of Federal Regulations*.
- 29 CFR 1910.132. "Occupational Safety and Health Standards - Subpart I: Personal Protective Equipment - General requirements." *Code of Federal Regulations*.
- 29 CFR 1910.134. "Occupational Safety and Health Standards - Subpart I: Personal Protective Equipment - Respiratory protection." *Code of Federal Regulations*.
- 29 CFR 1910.95. "Occupational Safety and Health Standards - Subpart G: Occupational Health and Environmental Control - Occupational noise exposure." *Code of Federal Regulations*.
- 29 CFR 1926.600. "Safety and Health Regulations for Construction - Subpart O: Motor Vehicles, Mechanized Equipment, and Marine Operations - Equipment." *Code of Federal Regulations*.
- 29 CFR 1926.651. "Safety and Health Regulations for Construction - Subpart P: Excavations - Specific excavation requirements." *Code of Federal Regulations*,

FIGURES

FILE NAME: P:\FMC PROGRAM\MIDDLEPORT\MID-DUBLIN RD FIGS\SITE PLAN\FIGURE 1_SITE PLAN_080513.DWG
PLOT DATE: 1/22/2024 3:40 PM PLOTTED BY: RUSSO, JILL [US-US]



LEGEND:

- MW-90 ● UPPER BEDROCK MONITORING WELL LOCATION
- MW-93 ● OVERBURDEN MONITORING WELL LOCATION
- MW-62 ▲ LOWER BEDROCK MONITORING WELL LOCATION
- LEACHATE COLLECTION SUMP LOCATION
- ⊕ POWER POLE
- ===== CULVERT

NOTES:

1. BASE MAP PREPARED FROM ELECTRONIC CAD FILE FROM CLIENT MADE BY "CONESTOGA-ROVERS & ASSOCIATES", DRAWING I.D. 07452-10(027)GN-NF002, DATED APRIL 10, 2003, AT A SCALE OF 1"= 150'.
2. ALL LOCATIONS ARE APPROXIMATE.



FIGURE 1

FMC DUBLIN ROAD SITE NIAGARA COUNTY, NEW YORK

SITE PLAN

PARSONS
40 LA RIVIERE DRIVE, SUITE 350, BUFFALO, NEW YORK 14202 PHONE: 716-541-0730

ATTACHMENT 1 INCIDENT CONTACT LIST

Attachment 1
Dublin Road Reporting Contact List
Revised April 2024

All incidents occurring on the project site shall be reported. All injuries, spills, and property damage should be reported immediately. Additionally, Notices of Violation and any incident that could be reported in the media should be reported immediately. Reporting must be done to a person and not via voice message, email or fax. One must ensure contact is made. If you are unable to contact the first contact on the list, then you should attempt to call the next person on the list.

Company	Position	Name	Office Phone	Cell Phone	Email
FMC	Remediation Project Manager	Chris Moretti	215.299.6252		christina.moretti@fmc.com
	Remediation Manager	Jonathan Bucca	215.299.6358	856.237.6231	jonathan.bucca@fmc.com
Parsons	Program Manager	Heather Philip		315.418.0048	heather.philip@parsons.com
	Project Manager	Jeffrey Poulsen		716.432.7685	jeffrey.poulsen@parsons.com
	Health and Safety Lead	Diana Ceaser		908.619.0220	diana.ceaser@parsons.com
NYSDEC	Spill Line		800.457.7362		
	Site Manager	McKenzie Rees	585.226.2459		Mckenzie.rees@dec.ny.gov
Other Emergency Contacts					
Emergency Services		911			

ATTACHMENT 2
TRAINING ACKNOWLEDGMENT FORM

I, _____, acknowledge receiving, reviewing, and understanding the safety, security, health, and environmental orientation information for working on this project. I understand that I shall not perform work on this project unless I am knowledgeable and have received the necessary training to safely and effectively carry out the work I am assigned. I understand that I have the authority and responsibility to stop work and ask my supervisor about any safety, security, health, and environmental matters for which I am unsure or for which I am untrained.

Subject matter reviewed included the following:

FMC Dublin Road HASP and Emergency Response Plan (ERP)

Signature of Project Employee

Signature of Site Sunpervisor

[Click here to enter text.](#)

Date Signed by Project Employee

[Click here to enter text.](#)

Date Signed by Site Project Manager

Signed acknowledgments shall be maintained in the project file on SharePoint.

ATTACHMENT 3 EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN (ERP) FMC DUBLIN ROAD SITE

MIDDLEPORT NY

Prepared For:



Prepared By:



40 La Riviere Dr., Suite 350
Buffalo, New York 14202

APRIL 2024

Project Manager:

Date: April 18, 2024

DOCUMENT REVISION HISTORY

Revision Number	Date	Description
0	April 2022	Original Document
1	August 2023	Updated route to hospital and contact list
2	April 2024	Updated contact list

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LIST OF ATTACHMENTS

Attachment 1: Incident Reporting List

1.0 PURPOSE & SCOPE OF PLAN

The Middleport “Site” Emergency Response Plan (ERP) provides all on-site employees with critical information to be used in the event of an emergency. A copy of the ERP must be posted in the support zones at the work site, and a copy should be with all on-site personnel during field activities. Additionally, contractors receive a copy of the ERP with their permit. In the event of any situation or unplanned occurrence requiring assistance, (e.g., fire, major injury, crime, major release), **CALL 911 FIRST** and then notify the FMC Remediation Manager.

2.0 INCIDENT REPORTING

In the event of an emergency incident, **CALL 911 FIRST**, and then notify the FMC Remediation Manager. The FMC Remediation Manager will then call others on the emergency contacts list, so as to speak with someone live, which is included as **Attachment 1**. In the event field personnel are injured and/or are chemically contaminated, medical personnel will be notified ahead of time so hospital personnel can prepare for the situation. The incident reporting contact list, included as **Attachment 1**, must be in an easily accessible location at the site, including common areas as well as included in work permit packets.

3.0 EMERGENCY ROUTE/MAPS

MEDINA MEMORIAL HOSPITAL

200 Ohio Street

Medina, NY 14103

The hospital location, directions from the Site and a driving map are shown below.

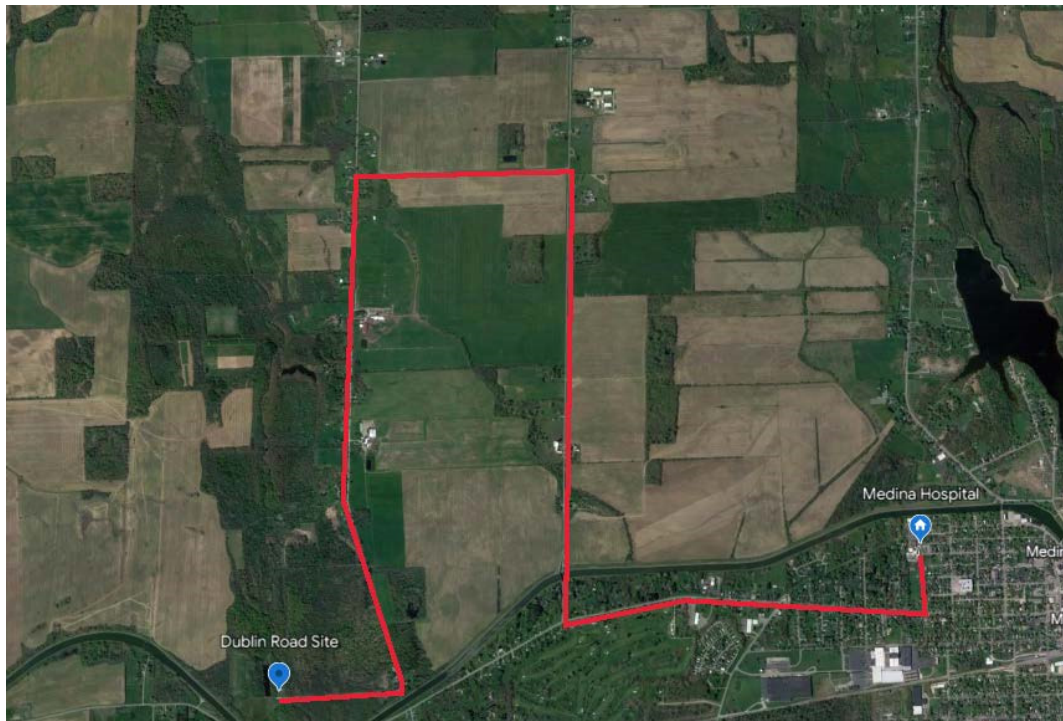
- From the Main Plant Gate start out going EAST (LEFT OUT OF SITE) on Dublin
- Turn Left (north) on Fruit Road
- Turn Right (east) on school House 10 Road
- Turn RIGHT (south) onto Marshal Road across the canal
- Turn Left onto Telegraph Road (NY-31E)
- Turn LEFT onto Ohio Street- to the hospital
- ARRIVE at the Hospital Emergency.

Approximate Travel Time: 8 minutes

Approximate Travel Distance: 5 miles

Main Phone Number: 585-798-2000

HOSPITAL ROUTE MAP:



OCCUPATIONAL CLINIC LOCATION

The nearest occupational clinic is Founders Health Center. Additional information on reporting for occupational injuries is included in the PSHEP.

Founders Health Center
5875 S. Transit Road
Lockport, NY 14094
716.433.2025

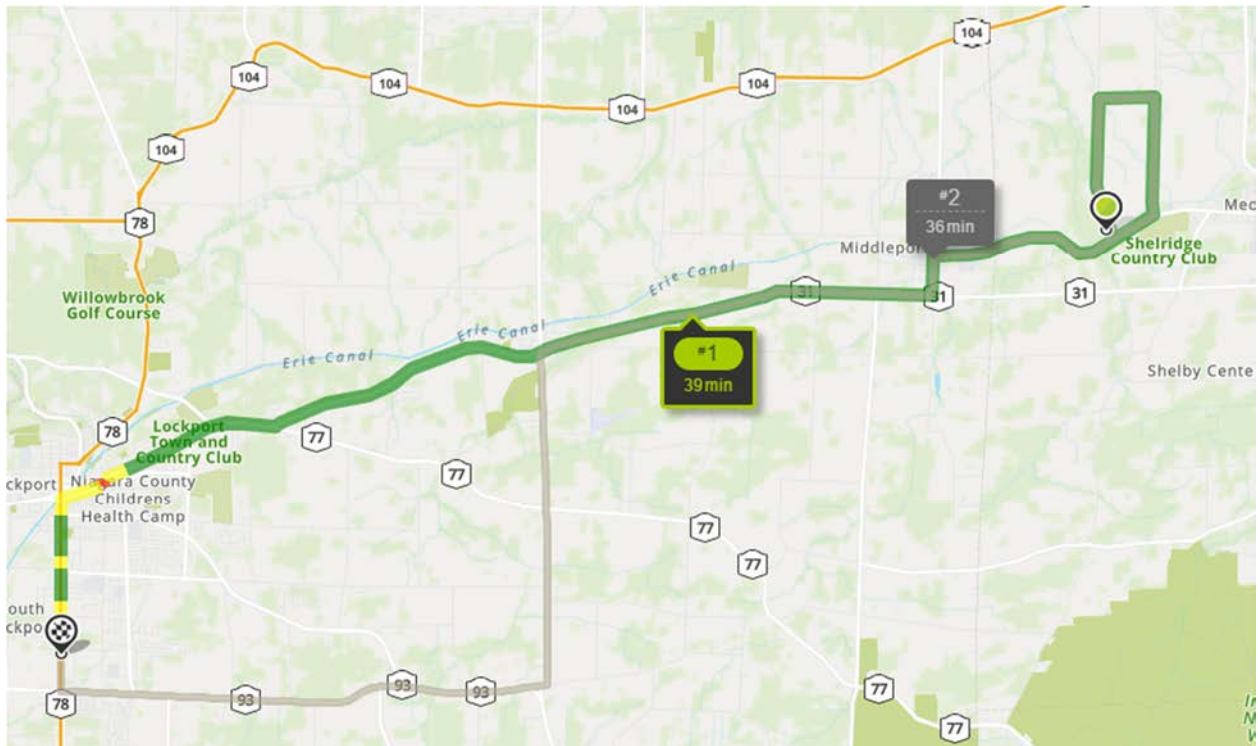
The clinic location, directions from the Site, and a driving map are shown below.

Approximate Travel Time: 39 minutes

Approximate Travel Distance: 22 miles

Main Phone Number: 716.433.2025

Clinic Route Map:



4.0 EXTERNAL EMERGENCY CONTACTS

The **911** call service can be used at the Dublin Site.

Other phone numbers:

Fire Department_____	911 (Emergency)
Police Department_____	911 (Emergency)
Ambulance _____	911 (Emergency)
Poison Control Center_____	1.800.222.1222
National Response Center (Reporting Oil and Chemical Spills)_____	1.800.424.8802
OSHA (Nationwide)_____	1.800.321.6742
UFPO (NYS One call system)_____	1.800.962.7962

Emergency Utility Contacts:

Gas	NYSEG	Emergency: (800) 572.1121
		Non Emergency: (800) 572.1111

5.0 EVACUATION PROCEDURES

In the event of an emergency that requires **evacuation** of all employees, the following procedures will be followed, as applicable:

- If an emergency occurs all personnel are required to suspend work in a safe manner and shut off all tools and equipment, and promptly move to the main gate.
- Identify the wind direction prior to evacuation to be sure you are heading in a safe direction (i.e., upwind).
- Gather at the nearest evacuation area. Upon arrival at the evacuation area, personnel are to line up with their Supervisor or employer/site contact. The team leader will conduct a role call and confirm all persons are accounted for.
- If danger exists, leave the area or exit the building through nearest exit, move to an assembly area or other safe location.

Call 911 if warranted, communicate emergency to co-workers and other site personnel. Inform the on-duty plant supervisor. No one is to leave the designated emergency assembly / evacuation areas unless authorized by the Site Supervisor or the most senior official from the responding public emergency agency.

6.0 ADVERSE WEATHER CONDITIONS

In the event of an approaching severe storm, hurricane, tornado or blizzard, the following procedure should be followed:

When preparing for an advanced severe storm event:

1. All personnel performing work on the Site will be notified that they should secure all of their equipment and materials.
2. The Site should be walked, and any loose equipment and materials should be stored inside buildings or secured prior to arrival of the storm.
3. Take video or photos of equipment and materials after all equipment safely stowed.
4. In the event of a severe Thunder and Lightning storm approaching the facility, monitor the weather forecast and radar in the local area. Any lightning observed or thunder in the immediate area triggers a **30-30 rule STOP WORK**. After you see **lightning**, start counting to **30**. If you hear thunder before you reach **30**, go indoors. Suspend all outdoor activities for at least **30** minutes after the last clap of thunder. Take immediate shelter in the nearest solid building, vehicle or project trailer until the storm has passed. Once the storm has passed, Parsons will sound TWO blasts on the air horn to signal the all clear to return to work. Remember, **WHEN THUNDER ROARS, GO INDOORS !**
5. In the event of an approaching Tornado or if a Tornado Warning has been issued in the vicinity of the site. ONE long Blast of the air horn will trigger a STOP WORK.
6. All personnel should evacuate project trailers, vehicles, extraction well huts etc. and seek immediate safe shelter such as a safe room, basement, solid block or concrete building, storm cellar or a small interior room on the lowest level of a sturdy building. Stay away from windows, doors, and outside walls. Do not go under an overpass or bridge. You're safer in a low, flat location. Watch out for flying debris that can cause injury or death. Use your arms to protect your head and neck. Personnel should remain sheltered until the weather event has passed.
7. Go to [NOAA Weather Radio](#) and your local news or official social media accounts for updated emergency information. Follow the instructions of state, local and tribal officials.

8.0 PLAN MAINTENANCE

The ERP will be updated at least annually, or more frequently in warranted by changes in Site conditions. On-site personnel will be responsible for proposing modifications to the project manager, as needed.

9.0 TRAINING AND EXERCISE

All personnel must read and understand this ERP prior to arrival on site. Employees should review the plan at least annually or as the Plan is updated as per Section 6.

10.0 NON-REGULATORY REPORTING GUIDELINES

For non-regulatory reporting guidelines, see the Site Management Plan (Arcadis, 2014).

Attachment 1 Dublin Road Reporting Contact List

Revised April 2024

All incidents occurring on the project site shall be reported. All injuries, spills, and property damage should be reported immediately. Additionally, Notices of Violation and any incident that could be reported in the media should be reported immediately. Reporting must be done to a person and not via voice message, email or fax. One must ensure contact is made. If you unable to contact the first contact on the list, then you should attempt to call the next person on the list.

Company	Position	Name	Office Phone	Cell Phone	Email
FMC	Remediation Project Manager	Chris Moretti	215.299.6252		christina.moretti@fmc.com
	Remediation Manager	Jonathan Bucca	215.299.6358	856.237.6231	jonathan.bucca@fmc.com
Parsons	Program Manager	Heather Philip		315.418.0048	heather.philip@parsons.com
	Project Manager	Jeffrey Poulsen		716.432.7685	jeffrey.poulsen@parsons.com
	Health and Safety Lead	Diana Ceaser		908.619.0220	diana.ceaser@parsons.com
NYSDEC	Spill Line		800.457.7362		
	Site Manager	McKenzie Rees	585.226.2459		Mckenzie.rees@dec.ny.gov
Other Emergency Contacts					
Emergency Services		911			

ATTACHMENT 4
COMMUNITY AIR MONITORING PLAN
(CAMP)

COMMUNITY AIR MONITORING PLAN

**FMC CORPORATION DUBLIN ROAD SITE
MEDINA, ORLEANS COUNTY, NEW YORK**

SITE 837001 - APRIL 2024

1.0 INTRODUCTION

This is Appendix B to the Health and Safety Plan (HASP), dated April 2022, and describes the community air monitoring requirements to be performed during ground invasive activities conducted at the FMC Corporation's Dublin Road Site in Medina, Orleans County, New York (the Site).

The Community Air Monitoring Plan (CAMP) will be performed in addition to worker breathing zone air monitoring required in the HASP.

The CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when ground-intrusive activities are in progress at the Site or work zone. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities do not spread contamination off-site through the air.

2.0 PURPOSE

This CAMP is a companion document to the HASP. The HASP will be directed primarily toward protection of workers within the exclusion zone. The CAMP provides protection for the downwind community.

The purpose of this CAMP is to provide real-time monitoring for airborne VOCs and particulates at the downwind perimeter of the work area during investigation and remediation activities to be conducted at the Site. In addition, the CAMP establishes response and action levels for airborne emissions that may trigger emission control actions.

3.0 SCOPE

The chemicals of potential concern at the Site consist of metals (arsenic, copper, zinc, lead) and pesticides (BHC isomers and DDT and its metabolites).

When working on contaminated areas of the Site, monitoring for VOCs and particulates will be performed during ground invasive activities. Arsenic, lead, and chlorinated pesticides are non-volatile, and any airborne emissions would be associated with particulates. When excavating soils, monitoring for VOCs and particulates will be performed.

VOCs will be monitored using a photoionization detector with an appropriate electrodeless ultraviolet discharge lamp or other equivalent instrument. Particulates will be monitored using a Particulate Air Monitor equipped with a micro-processor to measure and record real-time recordings of airborne particulate concentration in milligrams per cubic meter (mg/m³).

During ground-intrusive activities, air monitoring will be conducted continuously at the perimeter of the work area. Ground-intrusive activities include soil/sediment excavation handling, soil borings and groundwater monitoring well

installations. During sampling activities, periodic air monitoring will be conducted. Sampling activities to be conducted will include collection of groundwater, soil, sediment, and water samples. Periodic monitoring during sample collection will, at a minimum, consist of:

- taking a reading upon arrival at a sample location
- monitoring while opening a well cap or overturning soil
- monitoring during well baling/purging
- taking a reading prior to leaving a sample location

Specific monitoring requirements are described in the following section.

4.0 AIR QUALITY MONITORING

Air quality monitoring will be performed for organic vapors and airborne particulates at one upwind and two downwind locations within and around each separate work area during soil excavation, soil removal, soil placement, grading and compaction activities, and any other activity that may potentially create an airborne hazard. Other monitoring locations will be added to ensure that the following locations are monitored at all times during excavation activities regardless of indicated wind direction:

- at the perimeter of a remediation area between each work area and public street
- at the perimeter of a remediation area between each work area and each adjacent occupied residential property.

4.1 VOC Monitoring, Response Levels and Actions

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. A windsock will determine the upwind and downwind locations for air monitoring activities. Monitoring instrumentation will be as described in Section 3. The monitoring instruments will be calibrated at least daily. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. Exceeds 5 parts per million (ppm) above background for 15-minute average

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for 15-minute average, work activities will be temporarily halted and monitoring continued.

If the total organic vapor level decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. Persists at levels greater than 5 ppm over background but less than 25 ppm

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persists at greater than 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued.

After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less-but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. Level is above 25 ppm

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.

All 15-minute readings must be recorded and be available for the agencies' field representative(s) to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

4.2 Particulate Monitoring, Response Levels, And Actions

Particulate concentrations will be monitored continuously during ground-intrusive activities at the downwind perimeter of the exclusion zone. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. Particulate level is 100 mcg/m³ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area

If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

2. Particulate levels are greater than 150 mcg/m³ above the upwind level

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m³ above the upwind level, work must be stopped, and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m³ of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for the agencies' field representative(s) to review. Particulate monitoring will not be necessary during borehole or surface soil sampling activities in off-site areas.

A fugitive dust suppression system will be in place and employed whenever ground invasive and soil handling activities may potentially create an airborne hazard at remediation work areas.. In addition, to continuous monitoring, a commonsense approach will be employed to address fugitive dust (i.e., if dust is visually observed to be leaving the work area and is not detected by the monitors, dust suppression techniques will be applied.

Additional guidance on fugitive dust suppression and particulate air monitoring requirements are specified in the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (Appendix 1B Fugitive Dust and Particulate Monitoring) dated May 2010.

APPENDIX I COMMUNITY AIR MONITORING PLAN

COMMUNITY AIR MONITORING PLAN

**FMC CORPORATION DUBLIN ROAD SITE
MEDINA, ORLEANS COUNTY, NEW YORK**

SITE 837001 - APRIL 2024

1.0 INTRODUCTION

This is Appendix B to the Health and Safety Plan (HASP), dated April 2022, and describes the community air monitoring requirements to be performed during ground invasive activities conducted at the FMC Corporation's Dublin Road Site in Medina, Orleans County, New York (the Site).

The Community Air Monitoring Plan (CAMP) will be performed in addition to worker breathing zone air monitoring required in the HASP.

The CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when ground-intrusive activities are in progress at the Site or work zone. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities do not spread contamination off-site through the air.

2.0 PURPOSE

This CAMP is a companion document to the HASP. The HASP will be directed primarily toward protection of workers within the exclusion zone. The CAMP provides protection for the downwind community.

The purpose of this CAMP is to provide real-time monitoring for airborne VOCs and particulates at the downwind perimeter of the work area during investigation and remediation activities to be conducted at the Site. In addition, the CAMP establishes response and action levels for airborne emissions that may trigger emission control actions.

3.0 SCOPE

The chemicals of potential concern at the Site consist of metals (arsenic, copper, zinc, lead) and pesticides (BHC isomers and DDT and its metabolites).

When working on contaminated areas of the Site, monitoring for VOCs and particulates will be performed during ground invasive activities. Arsenic, lead, and chlorinated pesticides are non-volatile, and any airborne emissions would be associated with particulates. When excavating soils, monitoring for VOCs and particulates will be performed.

VOCs will be monitored using a photoionization detector with an appropriate electrodeless ultraviolet discharge lamp or other equivalent instrument. Particulates will be monitored using a Particulate Air Monitor equipped with a micro-processor to measure and record real-time recordings of airborne particulate concentration in milligrams per cubic meter (mg/m³).

During ground-intrusive activities, air monitoring will be conducted continuously at the perimeter of the work area. Ground-intrusive activities include soil/sediment excavation handling, soil borings and groundwater monitoring well

installations. During sampling activities, periodic air monitoring will be conducted. Sampling activities to be conducted will include collection of groundwater, soil, sediment, and water samples. Periodic monitoring during sample collection will, at a minimum, consist of:

- taking a reading upon arrival at a sample location
- monitoring while opening a well cap or overturning soil
- monitoring during well baling/purging
- taking a reading prior to leaving a sample location

Specific monitoring requirements are described in the following section.

4.0 AIR QUALITY MONITORING

Air quality monitoring will be performed for organic vapors and airborne particulates at one upwind and two downwind locations within and around each separate work area during soil excavation, soil removal, soil placement, grading and compaction activities, and any other activity that may potentially create an airborne hazard. Other monitoring locations will be added to ensure that the following locations are monitored at all times during excavation activities regardless of indicated wind direction:

- at the perimeter of a remediation area between each work area and public street
- at the perimeter of a remediation area between each work area and each adjacent occupied residential property.

4.1 VOC Monitoring, Response Levels and Actions

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. A windsock will determine the upwind and downwind locations for air monitoring activities. Monitoring instrumentation will be as described in Section 3. The monitoring instruments will be calibrated at least daily. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. Exceeds 5 parts per million (ppm) above background for 15-minute average

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for 15-minute average, work activities will be temporarily halted and monitoring continued.

If the total organic vapor level decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. Persists at levels greater than 5 ppm over background but less than 25 ppm

If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persists at greater than 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued.

After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less-but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. Level is above 25 ppm

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shut down.

All 15-minute readings must be recorded and be available for the agencies' field representative(s) to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

4.2 Particulate Monitoring, Response Levels, And Actions

Particulate concentrations will be monitored continuously during ground-intrusive activities at the downwind perimeter of the exclusion zone. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. Particulate level is 100 mcg/m³ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area

If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m³ above the upwind level and provided that no visible dust is migrating from the work area.

2. Particulate levels are greater than 150 mcg/m³ above the upwind level

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m³ above the upwind level, work must be stopped, and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m³ of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for the agencies' field representative(s) to review. Particulate monitoring will not be necessary during borehole or surface soil sampling activities in off-site areas.

A fugitive dust suppression system will be in place and employed whenever ground invasive and soil handling activities may potentially create an airborne hazard at remediation work areas.. In addition, to continuous monitoring, a commonsense approach will be employed to address fugitive dust (i.e., if dust is visually observed to be leaving the work area and is not detected by the monitors, dust suppression techniques will be applied.

Additional guidance on fugitive dust suppression and particulate air monitoring requirements are specified in the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (Appendix 1B Fugitive Dust and Particulate Monitoring) dated May 2010.

APPENDIX J QUALITY ASSURANCE PROJECT PLAN



QUALITY ASSURANCE PROJECT PLAN

FMC Dublin Road Site

NYSDEC Site No. 8-37001

EPA ID No. NYD000511857

PREPARED FOR



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APRIL 2024

RECORD OF CHANGE

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ATTACHMENTS

Attachment 1 – Field Sampling Standard Operating Procedures

ACRONYMS

Acronym	Definition / Description
ASP	Analytical Services Protocol
ASTM	American Society for Testing and Materials
°C	Degrees Celsius
CAR	Corrective Action Request
CCS	Contract compliance screening
CFR	Code of Federal Regulations
%D	Percent difference
DER	Division of Environmental Remediation
DOT	Department of Transportation
DQO	Data quality objective
DUSR	Data usability summary report
EDD	Electronic data deliverable
EDP	EQulS Data Processor
EIMS	Environmental Information Management System
ELAP	Environmental Laboratory Accreditation Program
ETU	Ethylene thiourea
Facility	FMC Dublin Road Site, New York
FMC	FMC Corporation
GC	Gas chromatography
GC/MS	Gas chromatography/mass spectroscopy
HASP	Health and Safety Plan
ICM	Interim Corrective Measure
ICP	Inductively coupled plasma
ISMP	Interim Site Management Plan
LCS	Laboratory control sample
LIMS	Laboratory Information Management System
MD	Matrix duplicate
MDL	Method detection limit
µg/L	Microgram(s) per liter
mg/kg	Milligram(s) per kilogram
mL	Milliliter
mg/L	Milligram(s) per liter
MS/MSD	Matrix spike/matrix spike duplicate
MSB	Matrix spike blank
NCM	Nonconformance Memorandum
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OMM	Operations, maintenance, and monitoring
Order	Order on Consent and Administrative Settlement

Acronym	Definition / Description
OU	Operable Unit
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PE	Performance evaluation
PID	Photoionization detector
PQL	Practical quantitation limit
QA	Quality assurance
QA/QC	Quality assurance/quality control
QC	Quality Control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
%R	Percent recovery
RL	Reporting limit
RPD	Relative percent difference
SDG	Sample delivery group
SMP	Site Management Plan
SOP	Standard operating procedure
SVOC	Semivolatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
USEPA	United States Environmental Protection Agency
VOA	Volatile organic analysis
VOC	Volatile organic compound

1 Introduction

FMC Corporation (FMC) entered into Orders on Consent in 1982, 1988, and 1992 with the NYSDEC and/or the United States Environmental Protection Agency (USEPA) to investigate and remediate the 30-acre property. The most current Order on Consent (Order No: B8-0013-84-01 dated February 9, 1988, as amended on January 16, 1992)

The Quality Assurance Project Plan (QAPP) specifies analytical methods and quality assurance (QA) and quality control (QC) protocols to be used to ensure that data collected during sampling and analytical activities are precise, accurate, representative, comparable, and complete. The specific objectives of the QAPP are to:

- Foster data quality that is sufficient to meet the investigation objectives and to support the decision-making process.
- Provide a standard for control and review of measurement data to confirm that the data is scientifically sound, representative, comparable, defensible, and of known quality.

This QAPP has been prepared in accordance with United States Environmental Protection Agency (USEPA) guidance (USEPA 2001, 2002) and NYSDEC *DER-10/Technical Guidance for Site Investigation and Remediation* (NYSDEC 2010). This QAPP is applicable to investigative and remedial work performed pursuant to the Order unless otherwise specified in project-specific sampling and analysis work plan(s) or other document(s) approved by the NYSDEC. Upon receipt of NYSDEC approval, this QAPP replaces previous versions required under the Order.

1.1 Project Overview

The site is located on Dublin Road off Fruit Avenue in the towns of Shelby and Ridgeway, Orleans County, New York.

The site is an approximately 30-acre area and is bounded by wooded areas and/or farmland to the north, the Village of Middleport municipal landfill to the east, and the New York State Erie Barge Canal to the south and Jeddo Creek to the west. Jeddo Creek runs northerly through the northeast corner of the Site (see Figure 1 – Site Map).

The primary Site contaminants consist of metals (arsenic, copper, lead, and zinc) and pesticides (i.e., benzene hexachloride and its isomers [BHCs] and DDT and its metabolites). By letter dated September 11, 2015, the NYSDEC provided notification that FMC had satisfactorily completed remedial action in accordance with the 1994 Remedial Action Work Plan, and that the site was relisted from a Class 2 to a Class 4 on the NYS registry of inactive hazardous waste sites. In September 2020, the USEPA removed the Dublin Road Landfill Superfund Site from the National Priorities List.

Key components of the environmental studies and remedial activities covered under this QAPP include engineering controls (cover system maintenance) and long term groundwater and surface water quality monitoring.

FIGURE 1-1. SITE LOCATION MAP



1.2 Scope of Work

Groundwater, surface water and waste samples will be collected in accordance with the site management Plan (SMP).

- USEPA SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA 2021)
- *Standard Methods for the Examination of Water and Wastewater* (Baird & Bridgewater, 2017)
- Other USEPA methods (USEPA 1983, 1993, 1995)

Specific project scopes, objectives, sampling and analytical descriptions, regulatory information, applicable criteria, maps, site drawings, and other project details are provided in the following plan as approved by NYSDEC:

- Dublin road Site Management Plan (draft April 2024)

1.3 Data Quality Objectives and Process

The quality assurance and quality control (QA/QC) objectives for all measurement data include:

Precision - an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and matrix spike duplicates.

Accuracy - a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. Sampling accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.

Representativeness - expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness will be determined by assessing several investigation procedures, including chain of custody, decontamination, and analysis of field blanks and trip blanks.

Completeness - the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.

Comparability - expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis, instrument calibrations, using standard reporting units and reporting formats, and data validation.

Each of these objectives is discussed in detail in **Section 3 Quality Assurance/Quality Control Objectives for Data Measurement**.

2 Project Organization

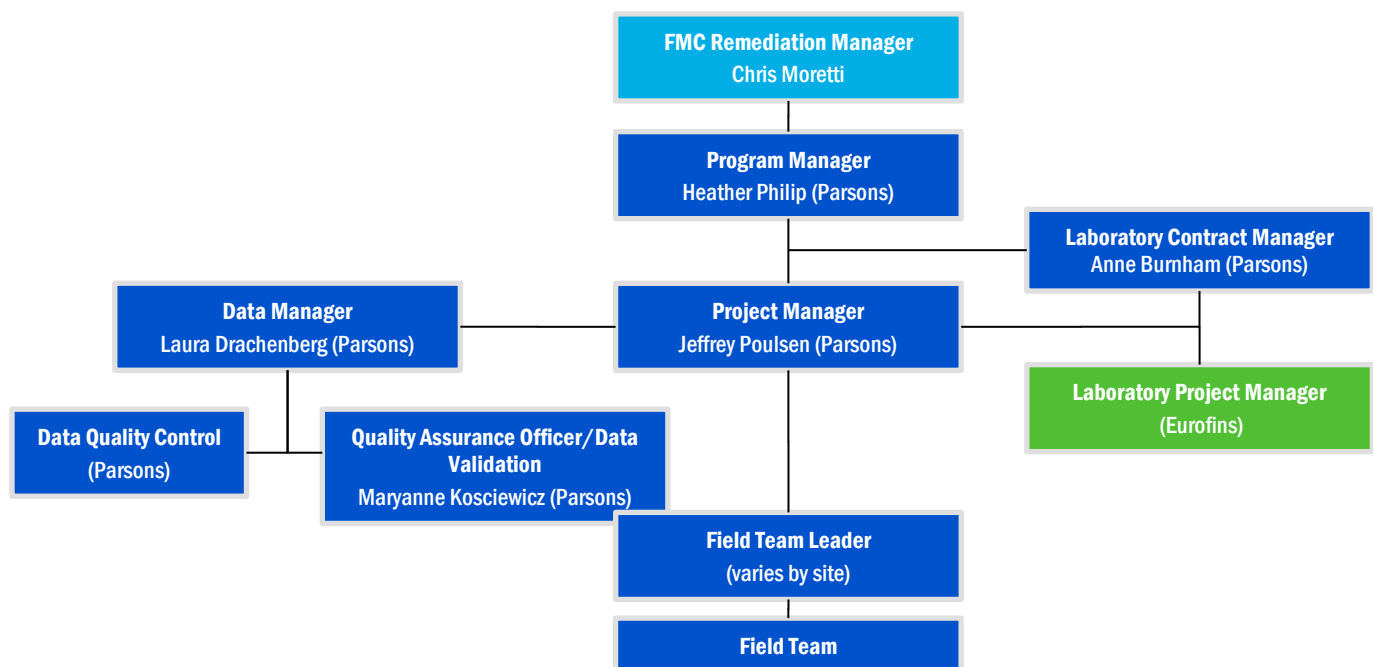
2.1 Project and Team Organization

The project organization and the function and responsibility of each group affected by the QAPP are presented in the specific work plan for each project. The project organization is designed to promote the exchange of information and for efficient project operation. **Figure 2-1** presents the organizational chart under this QAPP.

The project sites specifically included under this QAPP are:

- Dublin Road Site,

FIGURE 2-1. DATA MANAGEMENT ORGANIZATION



2.2 Analytical Services

The analytical laboratory (or laboratories) will analyze environmental samples collected for the specified project. Laboratory operations will be conducted under the supervision of a general manager or laboratory director and a quality assurance manager. A project manager and alternate will be assigned to each project.

The project manager will be the primary point of contact and will be responsible for coordination and quality of all laboratory activities associated with the project. The laboratory's project manager will manage project sample receipt, analysis scheduling, and data reporting. In case of temporary absence, the direct supervisor will assume the responsibilities of the absent employee or delegate the responsibility to qualified personnel. Sample management staff is responsible for receiving, logging, and maintaining internal custody of samples during the sample's residence in the laboratory. In addition, the laboratory will:

- ensure that project analytical requirements are met

- monitor project analytical compliance and immediately notify the task project manager if conflict or discrepancies arise
- initiate and implement appropriate corrective actions
- ensure adequate quality review of deliverables prior to release
- participate in coordination meetings

2.3 Special Training/Certification

Management and field personnel must review the requirements of this QAPP to make certain that persons assigned to specific tasks have appropriate credentials and experience. The field team leaders will check that all on-site personnel have read and understood the QAPP.

Field personnel will be required to adhere to the site Health and Safety Plan (HASP). They must also follow applicable task-specific health and safety plans that project subcontractors develop before they begin investigation activities.

Laboratories will have trained and experienced staff capable of performing the analyses specified in this QAPP. Laboratories will have New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certification for all analyses pertaining to solid and hazardous waste categories. Additionally, the laboratories must be able to demonstrate that they have analyzed performance evaluation (PE) or proficiency testing samples within 12 months of beginning the analyses.

All personnel independent of the laboratory generating the data who are performing data validation and verification must have experience in data validation, quality assurance oversight, and auditing. The data validator must have a Bachelor's degree in chemistry or natural sciences with a minimum of 20 credit hours in chemistry; one year experience in the implementation and application of analytical laboratory methodologies; and one year experience evaluating data packages of all matrices (e.g., soil, water, air, tissue) for compliance and usability with respect to the NYSDEC requirements and the USEPA National Functional Guidelines with regional modifications.

3 Quality Assurance/Quality Control Objectives for Data Measurement

A systematic planning process will develop site-specific data quality objective (DQOs). These DQOs will clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential errors. These parameters, in turn, will be the basis for establishing the quality and quantity of data needed to support the utility of the data. This section was prepared in accordance with USEPA Guidance for the Data Quality Objectives Process (USEPA 2006).

DQOs specify the underlying reason for collecting the data and the data type, quality, quantity, and uses needed to make decisions, and they provide the basis for designing data collection activities. DQOs and quality assurance objectives are related data quality planning and evaluation tools for all sampling and analysis tools.

The purpose of this QAPP is to provide a standard for control and review of measurement data to ensure they are scientifically sound, representative, comparable, defensible, and of known quality. The data will be used to evaluate the physical and chemical attributes of samples collected. The project objective for analytical testing is to characterize the physical characteristics and chemical constituents and to provide data to support the decision-making process.

The data produced during sampling activities will be compared with the defined QA objectives and criteria for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) to see that the data reported are representative of actual conditions at the site.

This data assessment activity is an on-going coordinated process with data production and is intended to ensure that data produced during the project are acceptable for use in subsequent evaluations. Both statistical and qualitative evaluations will be used to assess the quality of the data. The primary evaluation of the data will be based upon the field quality control samples described in **Section 8.1** and the laboratory quality control samples described in **Section 8.2**. The “blank” samples (laboratory QC blank samples and field QC blank samples) will be used to evaluate whether or not the laboratory and/or field sample handling represent a possible source of sample contamination. Laboratory duplicate sample results will be used to evaluate analytical precision. Field duplicate sample results will be used to evaluate the overall precision of the sampling and analysis process, as well as sample representativeness and site heterogeneity. Laboratory control samples will be used to evaluate the accuracy of analytical results, as will other analysis-specific criteria, such as surrogate compound recoveries for volatiles, semivolatiles, pesticides, herbicides, and ethylene thiourea. Matrix spike/matrix spike duplicate (MS/MSD) analysis of project samples will be used to evaluate potential sample matrix effects on the analytical results, both of the sample utilized for MS/MSD and of other samples collected from the site. For all sample results, the impact of sample-specific, analysis-specific, and site-specific factors will be evaluated, and an assessment will be made as to their impact, if any, on the data. Duplicate sample (field and laboratory QC samples) results will be used to evaluate data precision.

3.1 Data Use Objectives

Data use objectives define why analyses are being conducted and how ultimately the data will be used to meet the overall project objectives. For the project activities, these data use objectives are stated in the respective work plans.

3.2 Data Quality Objectives (PARCCS Parameters)

DQOs are based on the premise that different data uses require different levels of data quality. The term data quality refers to a degree of uncertainty with respect to PARCCS data quality indicators. Specific objectives are established to develop sampling protocols and identify applicable documentation, sample handling procedures, and measurement system procedures. These DQOs are established by on-site conditions, objectives of the project, and knowledge of available measurement systems. Overall project DQOs are presented and discussed in detail in this QAPP.

A wide range of data quality is achieved through the use of various analytical methods. The following data quality levels are widely accepted as descriptions of the different kinds of data that can be generated for various purposes:

- Level I** - Field screening or analysis using portable instruments (e.g., photoionization detector [PID]). Results are often not compound-specific, but results are available in real time. Depending on the analysis being performed and the instrumentation used, the results may be considered qualitative, semi-quantitative, or quantitative.
- Level II** - Field analysis using more sophisticated portable analytical instruments (e.g., on-site mobile laboratory). There is a wide range in the quality of data that can be generated depending on the use of suitable calibration standards, reference materials, and sample preparation equipment. Results are available in real-time or typically within hours of sample collection.
- Level III** - All analyses performed in an off-site analytical laboratory using methods other than USEPA-approved analytical methods. These data generally do not include the level of formal documentation required under Level IV and are not subject to formal data validation. These data are typically used for engineering studies (e.g., treatability testing), site investigations and remedial design.
- Level IV** - Data generated using USEPA methods and enhanced by a rigorous QA program, supporting documentation, and data validation procedures. These data are typically used for engineering studies (e.g., treatability testing), risk assessment, site investigations, and remedial design, and may be suitable for litigation or enforcement activities. Results are both qualitative and quantitative.

3.2.1 PRECISION

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), absolute difference (D), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

The objectives for precision for each chemical are based on the capabilities of the approved USEPA analytical method with respect to laboratory performance. For this project, field-sampling precision will be determined by analyzing coded (blind) duplicate samples for the same parameters, and then, during data validation, calculating the %RPD for duplicate sample results. The laboratory will determine analytical precision by calculating the %RPD or %D, as applicable to the analytical method being used, e.g., pH will be evaluated using %D.

The laboratory will determine analytical precision by calculating the RPD for the results of the analysis of the laboratory duplicates and matrix spike duplicates. The formula for calculating %RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2}$$

Where:

- RPD = Relative percent difference
- V1, V2 = Values to be compared
- $|V1 - V2|$ = Absolute value of the difference between two values
- $(V1 + V2)/2$ = Average of the two values

For data evaluation purposes, in instances where both sample concentrations are less than five times (<5x) the reporting limit (RL), duplicate precision will be evaluated using the calculated %D result. In this instance, the applicable precision criterion will be two times the RL (2xRL). If a value is not detected, the %RPD criterion will be considered to be not applicable and the %RPD will not be calculated (i.e., precision will not be quantitatively determined).

Analytical evaluation of precision is presented in **Table 3-1** (water) and **Table 3-2** (soil, sediment, and waste). For the evaluation of field duplicate precision, soil samples will be evaluated using a 50%RPD QC limit and aqueous samples will be evaluated using a 30%RPD QC limit.

3.2.2 ACCURACY

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987) or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material and is expressed as the percent of the known quantity that is recovered or measured. The recovery of a given analyte depends on the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes that are less than the quantitation limits are less accurate because they are more affected by such factors as instrument "noise." Higher concentrations will not be as affected by instrument noise or other variables and, thus, will be more accurate.

The objectives for accuracy for each chemical are based on the capabilities of the approved USEPA analytical method with respect to laboratory performance. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), the percent recoveries of matrix spike compounds added to selected samples, and the percent recoveries of spike compounds added to laboratory control samples (LCS). An LCS will be analyzed to provide additional information on analytical accuracy. Additionally, initial and continuing calibrations must be performed and accomplished within the established method control limits to define the instrument accuracy before analytical accuracy can be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike or laboratory control). The accuracy on a per sample basis will be measured using surrogates for the organic analyses. Positive detects from pesticide, herbicide, and ethylene thiourea (ETU) analysis will be confirmed using second column confirmation. When the percent difference (%D) between the results for the two columns exceeds 25%, the results from both columns will be reported and qualified with an explanation documented in the laboratory case narrative. The %R is calculated as follows for matrix spikes, surrogates, and LCS:

Matrix Spike Recovery

$$\% R = \frac{SSR - SR}{SA} \times 100$$

Surrogate or LCS Recovery

$$\% R = \frac{SSR}{SA} \times 100$$

Where:

% R = Percent recovery

SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added

SR = Sample result: the background value (i.e., the concentration of analyte obtained by analyzing the sample)

SA = Spiked analyte: concentration of the analyte spike added to the sample

Analytical accuracy quality control limits are presented in **Table 3-1** (water) and **Table 3-2** (soil, sediment, and waste).

TABLE 3-1. QUALITY CONTROL LIMITS FOR WATER SAMPLES

Analytical Parameters and Methods (a)	Matrix Spike (MS) Compound	MS/MSD (b) % Recovery	Duplicate RPD (c)	LCS (d) % Recovery	Surrogate	Surrogate % Recovery
VOLATILE ORGANIC COMPOUNDS (VOCs)						
8260C 624.1	All target VOCs	Lab determined QC limits	≤30	70-130 Or Lab QC Limit	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4 Dibromofluoromethane	Lab determined QC limits
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)						
8270D 625	All target SVOCs	Lab determined QC limits	≤30	70-130 Or Lab QC Limit	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol 2-Chlorophenol-d4 1,2-Dichlorobenzene	Lab determined QC limits
PESTICIDES						
8081B	All target pesticides	Lab determined QC limits	≤30	70-130 Or Lab QC Limit	TCMX DCB	Lab determined QC limits
HERBICIDES						
8151A	All target herbicides	Lab determined QC limits	≤30	50-150 Or Lab QC Limit	DCAA	Lab determined QC limits
METALS						
6010C/ 7470A 200.7 200.8	All target metals	75-125	≤20	85-115	NA	NA
ETHYLENE THIOUREA (ETU)						
509	ETU	Lab determined QC limits	≤20	80-120	Propylene Thiourea	70-130
TOTAL SUSPENDED SOLIDS (TSS)						
SM2540D	TSS	80-120	≤20	90-110	NA	NA
TOTAL DISSOLVED SOLIDS (TDS)						
SM2540C	TDS	80-120	≤20	90-110	NA	NA
HARDNESS						
SM2340C	Hardness	75-125	≤20	85-115	NA	NA

Notes

- (a) USEPA and Standard Methods analytical methods
 - (b) Matrix Spike/Matrix Spike Duplicate
 - (c) Relative Percent Difference
 - (d) Laboratory Control Sample
 - (e) As of the date of this document, an analytical laboratory could not be found to run this method/parameter
- NA - Not Applicable

TABLE 3-2. QUALITY CONTROL LIMITS FOR SOIL, SEDIMENT, AND WASTE SAMPLES

Analytical Parameters and Methods (a)	Matrix Spike (MS) Compound	MS/MSD (b) % Recovery	Duplicate RPD (c)	LCS (d) % Recovery	Surrogate	Surrogate % Recovery
VOCS AND TCLP VOCS						
8260C	All target VOCs	Lab determined QC limits	≤30	70-130 Or Lab QC Limit	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4	Lab determine d QC limits
SVOCs AND TCLP SVOCs						
8270D	All target SVOCs	Lab determined QC limits	≤30	50-150 Or Lab QC Limit	Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol 2-Chlorophenol-d4 1,2-Dichlorobenzene-d4	Lab determine d QC limits
PESTICIDES AND TCLP PESTICIDES						
8081B	All target pesticides	Lab determined QC limits	≤30	70-130 Or Lab QC Limit	TCMX DCB	Lab determine d QC limits
HERBICIDES AND TCLP HERBICIDES						
8151A	All target herbicides	Lab determined QC limits	≤30	70-130 Or Lab QC Limit	DCAA	Lab determine d QC limits
METALS AND TCLP METALS						
6010C 7470A	All target metals	75-125	≤30	85-115	NA	NA
IGNITABILITY, CORROSIVITY, REACTIVITY						
1010B 9045 9014 9034	NA	NA	≤30	80-120	NA	NA

Notes

(a) Analytical methods: USEPA SW-846, 3rd edition, revised March 2009, subsequent revisions supersede this information

(b) Matrix Spike/Matrix Spike Duplicate

(c) Relative Percent Difference

(d) Laboratory Control Sample

(e) As of the date of this document, an analytical laboratory could not be found to run this method/parameter

NA - Not Applicable

TCLP – Toxicity Characteristic Leaching Procedure

3.2.3 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point or an environmental condition. Representativeness is a qualitative parameter and is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. An important factor in the selection of sample locations and sampling procedures will be obtaining representative samples.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree technically possible, that the data derived represents the in-place quality of the material sampled. Care will be exercised to see that chemical compounds are not introduced to the sample from sample containers, handling, and analysis. Field blanks, trip blanks, and laboratory method/prep blanks will be analyzed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded (blind) field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis such that the reported results are representative of the sample received. Chain-of-custody procedures will be followed to document the possession of sample containers from the time of container preparation through sample collection and receipt back at the laboratory. Field QC samples will be collected and analyzed to provide information to evaluate sample representativeness. Details of field QC sample collection (rinse blanks, trip blanks, temperature blanks, field duplicates) and chain-of-custody procedures are presented in **Section 4.2 Sample Handling and Custody** and **Section 8.1 Field Quality Control Samples**.

3.2.4 COMPLETENESS

Completeness is defined as the percentage of measurements that meet the project's DQOs (USEPA, 1987). Completeness is calculated for each method (or analyte) and sample matrix for an assigned group of samples. Completeness for a data set represents the results usable for data interpretation and decision making. The completeness objective for the analytical and field data is 90%. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

Where:

%C = Percent completeness

V = Number of measurements judged valid (not rejected during data validation)

T = Total number of measurements

Completeness, which is expressed as a percentage, is calculated by subtracting the number of rejected and unreported results from the total planned results and dividing by the total number of results. Results rejected because of out-of-control analytical conditions, severe matrix effects, broken or spilled samples, or samples that could not be analyzed for any other reason, negatively affect influence completeness and are subtracted from the total number of results to calculate completeness.

3.2.5 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be managed by:

- Using identified standard methods (including laboratory standard operating procedures) for both sampling and analysis phases of this project

- Requiring traceability of all analytical standards and/or source materials to the USEPA or National Institute of Standards and Technology (NIST)
- Requiring that calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable)
- Using standard reporting units and reporting formats including the reporting of QC data
- Performing data validation on the analytical results, including the use of data qualifiers in all cases where appropriate
- Evaluating the sample collection information and analytical QC sample results
- Requiring that the significance of all validation qualifiers be assessed any time an analytical result is used for any purpose

By taking these steps during the investigation, future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

3.2.6 SENSITIVITY AND QUANTITATION LIMITS

When selecting an analytical method during the DQO process, the achievable method detection limit (MDL) and RL must be evaluated to verify that the method will meet the project quantitation limits necessary to support project decision making requirements. This process ensures that the analytical method sensitivity has been considered and that the methods used can produce data that satisfy users' needs while making the most effective use of resources. The concentration of any one target compound that can be detected and/or quantified is a measure of sensitivity for that compound. Sensitivity is instrument-, compound-, method-, and matrix-specific and achieving the required project quantitation limit and/or MDL objectives depends on instrument sensitivity and potential matrix effects. With regard to instrument sensitivity, it is important to monitor the instrument performance to ensure consistent instrument performance at the low end of the calibration range. Instrument sensitivity will be monitored through the analysis of method/prep blanks, calibration check samples, and low standard evaluations.

Laboratories generally establish limits that are reported with the analytical results; these results may be called reporting limits, detection limits, quantitation limits, or other terms. These laboratory-specific limits apply undiluted analyses and must be less than or equal to the project RLs. The RL, also known as the practical quantitation limit (PQL), represents the concentration of an analyte that can be routinely measured in the sampled matrix within stated limits and with confidence in both identification and quantitation. Throughout various documents, RL and PQL may be interchanged, but they effectively have the same meaning. The RLs are established based on specific knowledge about the analyte, sample matrix, project-specific requirements, and regulatory requirements. The RL is typically established by the laboratory at the level of the lowest calibration standard and is generally in the range of two to ten times the MDL.

The MDL is defined as "the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results" (40 CFR 136 Appendix B¹). MDLs are experimentally determined and verified for each target analyte of the methods in the sampling program. The laboratory will determine MDLs for each analyte and matrix type prior to analysis of project samples. In addition, when multiple instruments are employed for the analysis of the same method, each individual instrument will maintain a current MDL study. MDLs are statistically calculated in accordance with the Title 40, Code of Federal Regulations Part 136 (40 CFR 136) as promulgated in September 2017. If risk-based project objectives are developed, then where practicable, MDLs must be lower than the risk-based criteria determined for the project.

¹ 40 CFR Appendix B to Part 136 - "Definition and Procedure for the Determination of the Method Detection Limit-Revision 2" Code of Federal Regulations (annual edition). Title 40: Protection of Environment. Part 136: *Guidelines Establishing Test Procedures for The Analysis of Pollutants*.

Laboratory RLs and MDLs for all analyses will meet at a minimum the standards criteria specified in:

- NYSDEC 6 NYCRR Part 375-6.3 Unrestricted Use Soil Cleanup Objectives
- NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) “Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations” (NYSDEC 1998)
- NYSDEC Division of Fish, Wildlife, and Marine Resources “Screening and Assessment of Contaminated Sediment” (NYSDEC 2014)

All analytical results will be reported to the MDL. Analytical results below the MDL will be flagged with a U at the RL or MDL to indicate the data are non-detect. However, the laboratory will flag analytes detected at a level less than the RL but greater than the MDL (or the laboratory’s determined minimum reportable concentration) with a J to denote an estimated concentration.

When results are corrected for dry weight, the reporting limits are then elevated accordingly. To compensate for the low solids, modifications are made either to increase the initial volume extracted/digested or to reduce the final volume of extract/digestate.

For samples that do not meet the project-specific RLs or MDLs, (taking into consideration elevated detection limits due to percent solids or percent moisture and aliquots used for the designated analysis), the laboratory must make available compelling documentation (e.g., screening data) and a justifiable explanation for its inability to meet the specified limits using the project protocols. It must also provide an appropriate, justifiable explanation of the issues and resolution in the analytical report/data package (dilution factor, interference, etc.). Excessive, unnecessary dilutions on any sample for a project are unacceptable. The laboratory will analyze all samples initially undiluted, unless for gas chromatography–mass spectrometry (GC/MS) analyses (i.e., SW8260C and SW8270D), a preliminary gas chromatography (GC) screen is performed and indicates that GC/MS instrument damage or compromise may occur if the sample is not analyzed initially at dilution. In this instance, the sample will be analyzed at the lowest possible dilution factor. If multiple extractions/analyses are performed (such as undiluted and diluted analyses), resulting in several data sets for the same sample, the laboratory will report all data and results from each of the multiple analyses in the data package.

4 Data Acquisition

4.1 Sampling Methods

This QAPP describes management, handling, and tracking procedures for investigation-derived waste, including solid and liquid materials, and personal protective equipment. The special precautions described here will be taken so that each sample collected is representative of the conditions at that location and that the sampling and handling procedures neither alter nor contaminate the sample. If failure in the sampling or measurement system occurs, the procedures specified in **Section 10 Assessment and Oversight** of this QAPP will be followed to identify who is responsible for implementing the appropriate corrective action.

This section presents sample container preparation procedures, sample preservation procedures, and sample holding times. Field sampling standard operating procedures (SOPs) are provided in **Attachment 1** and/or in project-specific sampling and analysis work plan(s) or other document(s) approved by NYSDEC.

The laboratory will purchase and distribute certified clean sample containers with chemical preservatives, as required by the project. The sample containers used for chemical analysis must be virgin bottle ware, I-Chem Series 300 (or equivalent). Vendors are required to provide documentation of analysis for each lot of containers, and the documentation will be kept on file at the laboratory. Alternatively, the laboratory may perform testing to certify that the sample containers are not contaminated. Since the containers supplied by the laboratory will be certified clean, the bottles will not be rinsed in the field prior to use.

Laboratory-supplied sample kits (coolers containing field chain-of-custody forms, custody seals, sample containers, preservatives, and packing material) will be prepared by the laboratory's sample management staff and shipped to the field team leader. Samples requiring chemical preservation will be collected in sample containers provided by the analytical laboratory that already contain sufficient quantities of the appropriate preservative(s) to ensure that the sample is kept in accordance with the method requirements. The laboratory must provide an adequate amount of pre-preserved bottles with traceable high-purity preservatives, and additional preservative for use if the added amount is not sufficient, based on request by the field team leader and on an as-needed basis if additional bottle ware is needed during the field activities. The field team leader must verify that the preservative has been added appropriately.

4.2 Sample Handling and Custody

This section presents sample handling and custody procedures for both the field and laboratory. Implementation of proper handling and custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the chain of custody and transfer of samples will be trained as to the purpose and procedures prior to implementation. For transfer of samples within the laboratory, an internal chain of custody will be required.

4.2.1 SAMPLE HANDLING

Samples to be collected for each project will be specified in the work plan(s). Field sampling SOPs are presented in **Attachment 1** and/or project-specific sampling and analysis work plan(s) or other document(s) approved by NYSDEC. After the samples are collected, they will be split as necessary among preserved containers appropriate to the parameters to be analyzed. Each container will be provided with a sample label that will be filled out at the time of collection. The sampler will print label information, specified below, on each label either before or immediately after collecting the sample with an indelible writing instrument. The label will be protected from water and solvents with clear label packing tape.

The following information, at a minimum, is required on each sample label. The location ID and the sample ID as described in the **Section 5 Data Management** inherently identify some of this information:

- Client
- Project name
- Sampling location
- Sample number
- Date and time of sample collection
- Parameters to be analyzed
- Preservative(s) added, if any
- Initials of the sampler

Following sample collection, excess soil, water, etc., will be wiped from the outside of the sample containers with a paper towel and the lids will be checked to verify they are tightly closed. Each glass container will be wrapped with bubble wrap to minimize breakage during transport. Bottles containing soil, sediment, and water samples will be placed in separate Ziploc bags (one bag) and set on ice (ice bath not necessary). Documentation of equipment and methods used in the field for treating the samples will be maintained in the field logbooks, and a chain of custody will be initiated to document transfer of the samples from the field team to the laboratory. In preparation for shipment to the analytical laboratory, the shipment cooler will be packaged as follows:

1. Fill a dry shipment cooler with inert cushioning to a depth of 1 inch to prevent bottle breakage.
2. Place the bagged samples and the laboratory-provided temperature blank upright in the sample cooler. The temperature blank should be placed in the center (horizontally and vertically) with the samples surrounding.
3. Place additional cushioning material around the sample bottles as necessary.
4. Place bags of ice in the remaining void space to keep the samples cooled to 4 degrees Celsius.
5. Complete the chain-of-custody form (see **Section 4.2.2 Field Sample Custody**). Place the chain-of-custody form in a polyethylene, sealable bag (such as a 1-gal Ziploc bag or equivalent) and tape the bag to the interior of the cooler lid. Field personnel retain a copy of the chain-of-custody form; another copy is transmitted to the quality assurance officer (QAO) and the project manager specified in the work plan.
6. Prior to sealing for shipment, the list of samples will be checked against the container contents to verify the presence of each sample listed on the chain-of-custody record including the temperature blank.
7. Affix a custody seal to the cooler.
8. Seal the cooler securely with packing tape, taking care not to cover labels if already present.
9. Label the cooler appropriately in accordance with the Department of Transportation (DOT) regulations (49 CFR 171 through 179).
10. Ship the samples in accordance with the DOT requirements outlined in 49 CFR 171 through 179. Complete the carrier bill of lading and retain a copy on file.
11. Samples will be delivered to the laboratory by the most expedient means to meet holding times. Samples will be shipped on the day of collection for delivery to/receipt by the laboratory the morning of the day after collection. The laboratory will be required to adhere to extraction and analytical holding times as stated in **Table 4-1** (water) and **Table 4-2** (soil, sediment, and waste) of this QAPP. The field team will carefully coordinate sampling activities with the laboratory to see that holding times are met.

The required holding times must be adhered to for the initial sample preparation/analysis. If subsequent reanalysis or re-extraction becomes necessary because of method requirements or additional requirements stated here, the laboratory will make every effort to perform those re-extractions and/or reanalysis within the primary holding times. Any holding time that is exceeded will be reported to the project manager and the QAO by the laboratory QA manager.

4.2.2 FIELD SAMPLE CUSTODY

The primary objective of sample custody procedures is to create a complete and accurate written record that can be used to trace the possession and handling of samples from the moment of their collection through analysis until their final disposition. A sample (or sample container) will be considered under custody if:

- In a person's possession
- In a secured area that is restricted to authorized personnel
- Locked and tagged with custody seals placed on the sample cooler so that no one can tamper with it after having been in physical custody

The sample custody flowchart is shown in **Figure 4-1**.

The following lists are the data required on chain-of-custody record:

- Project name and client
- Signature of sampler
- Sample number, date and time of collection, and grab or composite sample designation
- Signatures of individuals involved in sample transfer, along with date/time of transfer
- If applicable, the air bill or other shipping number

Additional data that should be included on the chain-of-custody record include:

- Sample matrix
- Number of sample containers
- Analyses to be performed
- Preservative(s)
- Name of the analytical laboratory to which the samples are sent
- Method of sample shipment
- Project number

A chain-of-custody record (**Figure 4-2**) will accompany the samples from the time the samples leave the original sampler's possession through the sample shipments' receipt at the laboratory. Triplicate copies of the chain-of-custody record must be completed for each sample set collected. See chart for data requirements.

If samples are split and sent to different laboratories, a copy of the chain-of-custody record is sent with each sample.

The REMARKS space on the chain-of-custody form is used to indicate if the sample is an MS/MSD, or any other sample information for the laboratory. Since they are not specific to any single sample point, blanks are indicated on separate rows. Immediately prior to sealing the sample cooler, the sampler will sign the chain-of-custody form and write the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper air bill number on the top of the chain-of-custody form. Mistakes will be crossed out with a single line in ink and initialed by the author.

Sampling personnel will retain one copy of the chain-of-custody form, and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. Field personnel then relinquish the cooler to personnel responsible for shipment, typically an overnight carrier.

The chain-of-custody seal must be broken to open the sample cooler. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the field team leader for direction on whether to proceed with the analyses.

Sampling personnel record the information placed on the chain-of-custody record in the field logbook. They also include in the logbook a detailed description of the exact locations from which the samples were collected, any pertinent conditions under which the samples were obtained, and the lot number of the containers used.

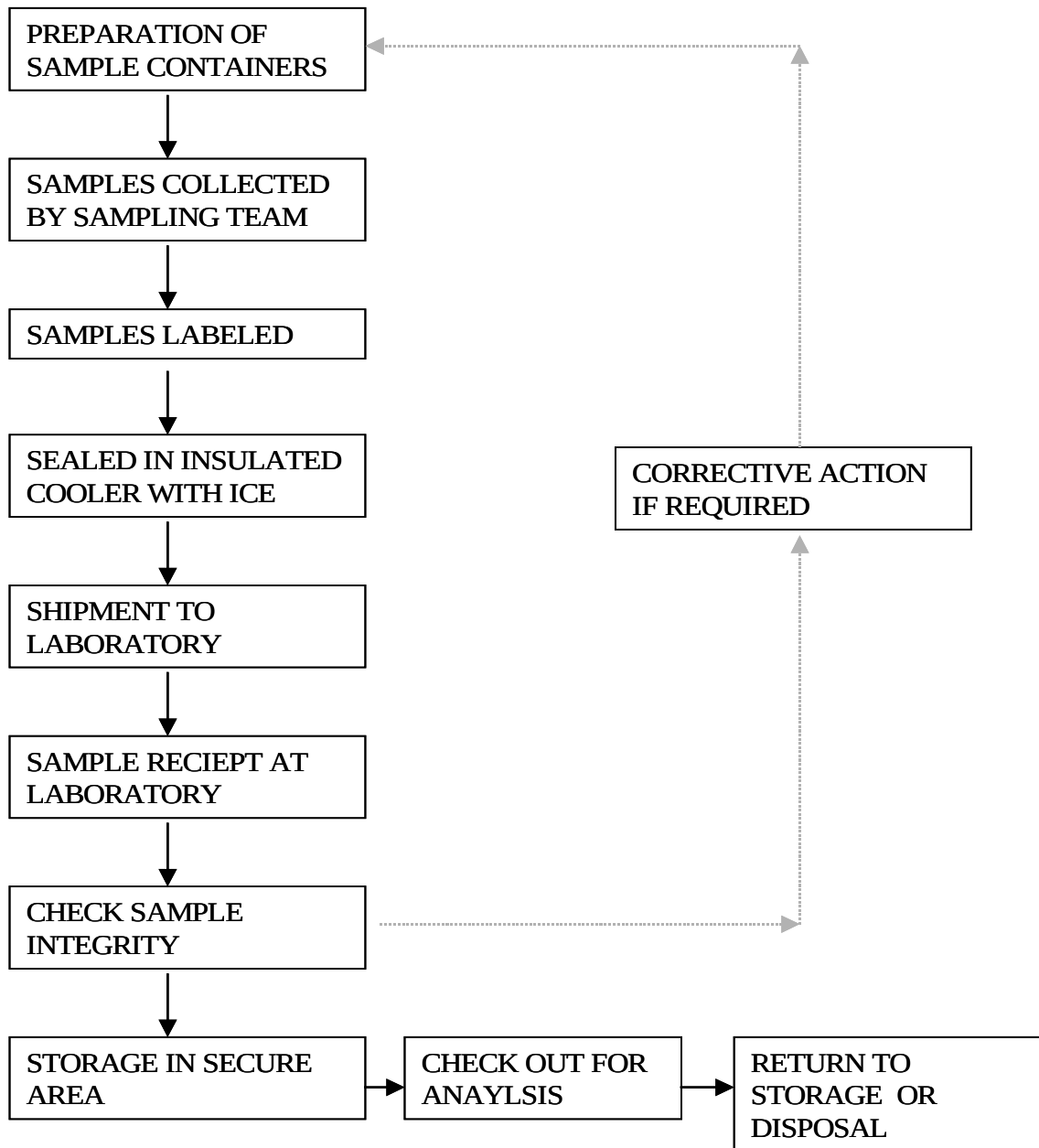
FIGURE 4-1. SAMPLE CUSTODY FLOW CHART

FIGURE 4-2. EXAMPLE CHAIN-OF-CUSTODY RECORD

[illegible]

4.2.3 LABORATORY SAMPLE MANAGEMENT

The laboratory has a designated sample management staff responsible for receiving samples in the laboratory, opening the coolers, checking the sample integrity and custody seals, logging samples into the laboratory information management system (LIMS), and controlling the handling and storage of samples while in the laboratory. The laboratory is a secure facility, and only authorized laboratory personnel are allowed to handle active samples. The laboratory maintains an SOP for sample management.

4.2.4 SAMPLE RECEIPT AND LOGGING

Upon receipt at the laboratory, sample-receiving personnel inspect the samples for integrity of the custody seal, check the shipment against the chain-of-custody form, and note any discrepancies. Specifically, the sample-receiving personnel note any damaged or missing sample containers. At this time, the field chain-of-custody record is completed and signed by the sample management staff.

Using the temperature blank in each cooler, the temperature of each incoming sample cooler is measured and recorded during the sample receipt and log-in procedures before samples are placed in laboratory cold storage. Similarly, the laboratory documents that its cold storage facilities are being maintained through daily (at a minimum) documented temperature measurements using a thermometer.

Upon receipt, sample management staff measure and record on the preservation documentation sheet the pH of acid- or base-preserved aqueous samples. Any problems observed during sample receipt must be communicated to the field team leader and/or the QAO verbally and either by fax transmission or email within 24 hours (preferably three hours beginning with the normal business day or immediately following for problems noted during second shifts or weekends) after discovery and before samples are released to the laboratory for analysis. Problems may include, but are not limited to, broken bottles, errors or ambiguities in paperwork, insufficient sample volume or weight, inappropriate pH, and elevated temperature.

When the shipment is inspected and the chain-of-custody record agrees with the shipping container contents, the sample receiving personnel enter the sample and analysis information into the LIMS and assign each sample a unique laboratory number. This number is affixed to each sample bottle.

4.2.5 SAMPLE STORAGE SECURITY

While in the laboratory, the samples and aliquots that require cold storage will be stored and will be maintained in a secured refrigerator unless they are being used for preparation and/or analysis. All of the refrigerators in the laboratory used for storage of samples have restricted access and are numbered. In addition, dedicated refrigerators are designated for extracts and analytical standards. The sample storage areas are in the laboratory, and access is limited to laboratory personnel. Specific requirements for sample storage are described below:

- Samples will be removed from the shipping container and stored in their original containers unless damaged.
- Damaged samples will be disposed in an appropriate manner, and the disposal will be documented or repacked as necessary and appropriate.
- Samples and extracts will be stored in a secure area designed to comply with the storage method(s) defined in the contract.
- The storage area will be kept secure at all times. The sample custodian or designated personnel will monitor access to the storage area.
- Standards or reagents will not be stored with samples or sample extracts.

The following standard operating procedures for laboratory sample security will be implemented to confirm that the laboratory satisfies sample chain-of-custody requirements:

- Samples will be stored in a secure area.
- Access to the laboratory will be through a monitored area. Other outside access doors to the laboratory will be kept locked.

- Visitors must sign a visitor's log and will be escorted while in the laboratory.
- Refrigerators, freezers, and other sample storage areas will be securely maintained.

Storage blanks will be initiated and analyzed on a weekly basis for each cold storage unit used to hold samples submitted for the analysis of volatile organic compounds (VOCs). Field QC samples must be stored in the same cold storage units as the samples that they are associated with (even if the matrices are different). All soil samples must undergo thorough sample homogenization (stirred within the original sample container) using inert utensils and mixing platforms that will not interfere with the target analytes being requested for analysis with the exception of soil samples submitted for the analysis of VOCs. Samples for VOC determinations will be stored in a secure refrigerator separate from other samples, sample extracts, reagents, and standards.

4.2.6 RETENTION AND DISPOSAL OF SAMPLES

The laboratory must retain all excess samples within their original sample bottles for a minimum of 30 days in cold storage (below 4 degrees Celsius) following submission of the validated data to NYSDEC. At that time, the laboratory must contact the field team leader for authorization for responsible disposal or further storage instructions. At the point at which the laboratory is provided written authorization to dispose of the samples, the laboratory will be responsible, and will assume all liability for proper characterization and disposal of samples and bottle ware in accordance with all local, state, and federal regulations.

4.3 Sample Container Preparation and Sample Preservation

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA and NYSDEC. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be tagged, and the appropriate preservatives will be added. The types of containers and preservation techniques shall be in accordance with Table 4-1 (water) and **Table 4-2** (soil, sediment, and waste).

Following sample collection, the sample bottles should be placed in the shipping cooler, cooled to 4 degrees Celsius with ice, and delivered to the laboratory within 24 hours of collection. Every effort will be made, to the extent practical, to ship samples on the day of collection and have the samples delivered to the laboratory in the morning of the day after collection. Samples designated for Saturday delivery may not arrive at the laboratory until Monday.

4.4 Sample Holding Times

The sample holding times for organic and inorganic parameters are given in Table 4-1 (water) and **Table 4-2** (soil, sediment, and waste). These holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to the QAO.

TABLE 4-1. WATER SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Analytical Parameter	Analytical Method	Bottle Type	Preservation ^(a)	Holding Time ^(b)
VOCs	EPA8260C	Two 40-mL glass vial w/Teflon septum	HCl to pH<2 Cool to 4 ± 2 °C	14 days
SVOCs Pesticides Herbicides Methyl Carbamates/ Dithiocarbamates	EPA8270D EPA8081B EPA8151A EPA630.1/630.2	Two 1-Liter amber glass containers with Teflon-lined lid for each analysis (an additional two 1-Liter containers required every 20 samples for MS/MSD for each analysis .)	Cool to 4 ± 2 °C	7 days for extraction 40 days for analysis
Metals,	EPA6010C EPA7470A	1000 mL plastic bottle	Nitric Acid to pH<2 Cool to 4 ± 2 °C	6 months Mercury - 28 days
Phenolic Compounds		1000 mL amber glass	H2SO4 to pH<2. Cool to 4 ± 2 °C	28 days
Cyanide		250 mL Plastic	NaOH to pH >8 Cool to 4 ± 2 °C	14 days
Ammonia	EPA 350.1	500 mL plastic bottle	H2SO4 to pH<2 Cool to 4 ± 2 °C	28 days
TSS TDS	SM3540D SM2540C	500 mL plastic bottle	Cool to 4 ± 2 °C	7 days
Hardness	SM2340C	250 mL plastic bottle	HNO3 to pH<2 Cool to 4 ± 2 °C	180 days

Notes

(a) All samples to be preserved in ice during collection and transport.

(b) Days from date sampled.

(e) As of the date of this document, an analytical laboratory could not be found to run this method/parameter.

°C = degrees Celsius

mL = milliliter

TABLE 4-2. SOIL/SEDIMENT/WASTE SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Analytical Parameter	Analytical Method	Bottle Type	Preservation^(a)	Holding Time^(b)
VOCs	8260C	Encore or TerraCores	Cool to 4 ± 2 °C	48 hours for analysis, 14 days for analysis if frozen
TCLP VOCs	1311/8260C	Wide-mouth glass container with Teflon lined lid	Cool to 4 ± 2 °C	14 days for extraction 14 days for analysis
SVOCs including carbofuran TCLP SVOCs	8270D 1311/8270D	Wide-mouth glass container with Teflon-lined lid. (2 additional wide-mouth glass containers every 20 samples for MS/MSD).	Cool to 4 ± 2 °C	14 days for extraction 40 days for analysis *
Pesticides TCLP Pesticides	8081B 1311/8081B	Wide-mouth glass container with Teflon-lined lid. (2 additional wide-mouth glass containers every 20 samples for MS/MSD).	Cool to 4 ± 2 °C	14 days for extraction 40 days for analysis *
Herbicides TCLP Herbicides	8051A 1311/8015A	Wide-mouth glass container with Teflon-lined lid. (2 additional wide-mouth glass containers every 20 samples for MS/MSD).	Cool to 4 ± 2 °C	14 days for extraction 40 days for analysis *
Metals TCLP Metals	6010C/6020A/ 7470A 1311/6010C/ 6020A/7470A	Wide-mouth glass container.	Cool to 4 ± 2 °C	6 months Mercury – 28 days
Cyanide	9012B	500 mL Wide-mouth glass container.	Cool to 4 ± 2 °C	14 days
Ignitability Reactivity	1010A 9012B/9030B	Wide-mouth glass container.	Cool to 4 ± 2 °C	7 days

Notes

(a) All samples to be preserved in ice during collection and transport.

(b) Days from date sampled.

(e) As of the date of this document, an analytical laboratory could not be found to run this method/parameter

* Soxhlet extraction must be completed within 14 days from date sampled.

°C = degrees Celsius

mL = milliliter

TCLP – Toxicity Characteristic Leaching Procedure

4.5 Field QC Samples

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses during sampling events as referenced in the specific project work plan. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and MS/MSDs.

The blanks will include:

- Trip blanks
- Field rinse blanks

The duplicates will consist of:

- Coded field duplicate
- Matrix spike/matrix spike duplicate

4.5.1 TRIP BLANKS

A trip blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-milliliter (mL) volatile organic analysis (VOA) vial containing distilled, deionized water, which accompanies the other aqueous sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples that are designated for volatiles analysis. The trip blank will be analyzed for VOCs to assess if there is any contamination from sampling and transport, and internal laboratory procedures.

4.5.2 FIELD RINSE BLANKS

Field rinse blanks or equipment blanks will be taken at a frequency of one per decontamination event, maximum of one day per sampling equipment type, minimum of one per week. Field rinse blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. It is a sample of deionized, distilled water provided by the laboratory, which has passed through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The field rinse blank may be analyzed for all the parameters of interest.

4.5.3 CODED FIELD DUPLICATE

To determine the representativeness of the sampling methods, coded field duplicates will be collected at a frequency of one per 20 environmental samples per matrix. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise.

4.5.4 MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples for a given matrix type, where matrix spiking solution available. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The percent recoveries and RPDs are presented in **Table 3-1** (water) and **Table 3-2** (soil, sediment, and waste).

5 Data Management

The electronic data management systems for each work assignment will be implemented to process the information effectively without loss or alteration. As of April 1, 2011, the NYSDEC Division of Environmental Remediation (DER) has implemented an Environmental Information Management System (EIMS). The EIMS uses the database software application EQuIS from EarthSoft Inc. In an effort to improve the management of environmental data and reduce paper quantities, all laboratory analytical data minus instrument raw data must be submitted in the NYSDEC-approved Electronic Data Deliverable (EDD).

Data providers must download and install the EQuIS Data Processor (EDP) to check their properly formatted EDD as well as the NYSDEC DER Format file. The EDP performs a series of formatting checks on the EDD and identifies any errors in the data file prior to submission. All EDDs are to be error free when submitted and will be submitted to NYSDEC within 45 days of the submittal of the final report with which the data are associated. It is important that the most recent version of the EDP and the NYSDEC format file are employed since the valid values used by EIMS are periodically updated for the EDP.

5.1 Field Data Management

The field team leader will manage data generated in the field. The leader or their designee will be responsible for recording and documenting sampling activities in the field logbook, on sampling records (as appropriate), and on chain-of-custody forms (when samples are collected) as described in **Section 4.2.2**. The records may be photocopied and stored in the project file along with the original.

A sample nomenclature system will be coordinated with the data management team. Each sample name will be unique to include location ID and field sample ID. The database manager will add data to EIMS through the input module of the system.

Data input to EIMS may include:

- Sample planning information (e.g., sample depth)
- Chain-of-custody data
- Sediment coring logs
- Geotechnical data
- Location and geographic data
- Field measurements
- Meteorological data
- Waste characterization data
- Groundwater levels
- Radiometric data
- Laboratory analytical data

5.2 Laboratory Data Management

Laboratory data management involves several important stages that include data transformation, review, verification, and validation, as well as data storage, retrieval, and security. The laboratory will implement a data management system to manage the data from its generation in the laboratory to its final reporting and storage. The data management system will include, but not be limited to, the use of standard record-keeping practices, standard document control systems, and the electronic data management system.

The laboratory data reduction, verification, validation, and reporting procedures and project data management activities, data/information exchange procedures ensure that complete documentation is maintained, transcription and reporting errors are minimized, and data are properly reviewed.

Specific laboratory data management requirements and procedures are discussed in **Section 6** (*Documents and Records*) and **Section 9** (*Data Validation and Usability Elements*) of this QAPP.

6 Documents and Records

Records will be maintained to document accurately the data generation process during investigation in the field, sample analysis in the laboratory, and during data validation. Project documentation will be maintained in general accordance with guidelines in the National Enforcement Investigation Center Policies and Procedures (USEPA, 1986). A project file will be maintained that will contain appropriate project documentation. Some of this documentation may be retained electronically in lieu of paper copies. The following are the minimum components of the project file:

- Project plans and specifications
- Field logbooks and data records
- Photographs, maps, and drawings
- Sample identification documents
- Chain-of-custody records
- Data review notes
- Report notes and calculations
- Progress and technical reports
- Correspondence and other pertinent information
- Full analytical data deliverables package provided by the laboratory, including QC documentation and electronic data deliverable.

6.1 Field Records

Field personnel are responsible for documenting sample handling activities, observations, and data in field sampling records including field logbooks, chain-of-custody records, photographs, and pre-design investigation records. The field team leader is responsible for maintaining these documents. Field logbooks, electronic field data management, and chain-of-custody records are further detailed below.

6.1.1 FIELD LOGBOOK

A field logbook will be used to document investigation activities. The field logbook will have consecutively numbered pages, and documentation will be recorded using waterproof ink. Incomplete lines, pages, and changes in the logbook will be lined out with a single line, dated, and initialed. More detailed procedures for documenting investigation activities (such as field sampling records and boring log forms) and type of information to include in the field logbook may be developed. The following are the minimum information requirements in the field log:

- Responsible person's name
- Date and time of activity
- Equipment and methods used for field preparation of samples
- Field measurements of samples (e.g., pH, temperature)
- Information coordinating sample handling activities with appropriate field activities and chain-of-custody documentation

The following are the minimum information requirements for daily calibration activities

- Calibrator's name
- Instrument name and model
- Date and time of calibration
- Standards used and their source
- Temperature (if appropriate)
- Results of calibration
- Corrective actions taken (if any)

6.1.2 ELECTRONIC FIELD DATA MANAGEMENT

The field sampling program will have an electronic data management component. The system will be designed to specify the necessary samples taken at any given location and to provide the ability to be updated and amended in the field. This will provide a management system that efficiently tracks the needs of the sampling scope. As the samples are taken, log entries are put in the database, and sample labels are printed. At any given time, a chain-of-custody record can be printed as well.

6.1.3 CHAIN-OF-CUSTODY RECORD

The chain-of-custody record establishes the documentation necessary to trace sample possession from the date and time of sample collection, through sample shipment, to the date and time of arrival at the laboratory designated to perform analysis. The ability to trace the history of a sample is essential to show that the sample collected was, indeed, the sample analyzed and that the sample was not subjected to biasing influences. Evidence of sample traceability and integrity is provided by chain-of-custody procedures. These procedures are necessary to support the validity of the data and will accompany each shipping container.

A copy of the chain-of-custody record will be detached and kept with the field logbook or placed in the project file; the original record will accompany the shipment.

6.2 Laboratory Records

Laboratories providing analytical support for this project must maintain records to ensure that all aspects of the analytical processes are adequately documented to ensure legal defensibility of the data.

When a mistake is made, the wrong entry is crossed out with a single line, initialed, and dated by the person making the entry, and the correct information recorded. Obliteration of an incorrect entry or writing over it is not allowed, nor is the use of correction tape or fluid on any laboratory records.

Overwriting or disposal of any electronic media prior to a five-year expiration period is strictly prohibited. All electronic and hardcopy data must be stored in an easily accessible climate-controlled environment. The laboratory will exercise “best practices” in terms of frequent, redundant electronic backup procedures on proper long-term storage media to assure that all electronic data representing FMC sample analyses will be maintained for the five-year storage period. Electronic data must be stored in a secure, limited-access area with redundant copies stored in fireproof vaults and/ or stored off-site of the laboratory facilities.

Sample preparation in the laboratory must be fully documented and include sample preparation conditions (such as digestion temperatures). In addition, documentation must allow complete traceability to all prepared or purchased reagents, acids and solvents, and reference solutions. All spike solutions and calibration standards must be used prior to labeled expiration dates and stored in accordance with manufacturers recommended conditions. Complete and unequivocal documentation must exist to enable traceability of all prepared spike solutions, calibration standards, and prepared reagents back to the reference materials utilized. Organic extracts must be stored in the same type of vials (amber or clear) as the associated standards at the appropriate storage temperatures.

The unit conventions set forth in the figures for reported data will be consistent with standard laboratory procedures. Reporting units used are those commonly used for the analyses performed. Concentrations in soil and sediment samples will be expressed in terms of weight per unit dry weight, with moisture content reported for each sample.

Laboratory records used to document analytical activities in the laboratory will include reagent and titrant preparation records, standard preparation logs, sample preparation logs, bench data sheets, instrument run logs, and strip chart recordings/chromatograms/computer output. Additional records will include calibration records, maintenance records, nonconformance memos, and Corrective Action Request (CAR) forms.

Laboratory records should convey:

- What was done
- When it was done
- Who did it
- What was found

Requirements for laboratory recordkeeping include:

- Data entries must be made in indelible water-resistant ink
- Date of each entry and observer must be clear
- Observer uses their full name or initials
- Initial and signature log is maintained so the recorder of every entry can be identified
- Information must be recorded in notebook or on other records when the observations are made
- Recording information on loose pieces of paper not allowed

6.2.1 OPERATIONAL CALIBRATION RECORDS

Operational calibration records will document the calibration of instruments and equipment that are corrected on an operational basis. Such calibration generally consists of determining instrumental response against compounds of known composition and concentration or the preparation of a standard response curve of the same compound at different concentrations. Records of these calibrations are maintained in the following documents:

Standard Preparation Logs. Standard preparation information, to trace the standards to the original source solution of neat compound, is maintained in LIMS or laboratory standard preparation logs.

Instrument Logbook. The instrument logbook provides an ongoing record of the calibration for a specific instrument. The logbook should be indexed in the laboratory operations records and should be maintained at the instrument by the chemist. The chemist must sign and date all entries, and the QM or his designee must review them.

Raw Calibration Data. For Level IV data packages, copies of the raw calibration data will be kept with the analytical sample data so the results can readily be processed and verified as one complete data package. If samples from several projects are processed together, the calibration data is copied and included with each group of data. The laboratory will maintain all calibration, analysis, and corrective action documentation (both hard copy and electronic data) for a minimum of seven years. The documentation maintained must be sufficient to show all factors used to derive the final (reported) value for each sample. Documentation must include all calculation factors such as dilution factor, sample aliquot size, and dry-weight conversion for solid samples. The individual who performs hand calculations must sign and date them. This documentation must be stored with the raw data. Calculations performed by the data system will be documented and stored as electronic and hard copy data. The instrument printouts will be kept on file, and the electronic data will be stored by the laboratory for a minimum of seven years.

6.2.2 MAINTENANCE RECORDS

Maintenance records will be used to document maintenance activities, service procedures, and schedules. They must be traceable to each analytical instrument, tool, or gauge. The individual responsible for the instrument must review, maintain, and file these records. These records may be audited by the QAO to verify compliance. Logs must be established to record and control maintenance and service procedures and schedules.

6.2.3 NONCONFORMANCE MEMORANDA

Nonconformance Memos (NCM) may be either a hard copy record or an electronic database record. In either case, review and release of the record must be documented by the initiator, the analytical group leader where appropriate, the laboratory project manager, and the laboratory QA manager. All internal laboratory nonconformance documentation will

be communicated to the field team leader by the laboratory project manager verbally and summarized in the report narrative. The NCM will be used to document equipment that fails calibration and will identify any corrective actions taken.

6.2.4 CORRECTIVE ACTION REQUEST FORMS

The laboratory must use CAR forms to document any incidents requiring corrective action. The CAR form will be issued to the personnel responsible for the affected item or activity. A copy will also be submitted to the laboratory project manager. The individual to whom the CAR is addressed will return the requested response promptly to the QA personnel and will affix their signature and date to the corrective action block after stating the cause of the conditions and corrective action to be taken. QA personnel will maintain a log for status of CAR forms to confirm the adequacy of the intended corrective action and to verify its implementation. CARs will be retained in the project record file.

6.2.5 ANALYTICAL DATA REPORTS

Analytical data will be reported as an EDD and as an analytical data package either as a summary data package (NYSDEC Analytical Services Protocol [ASP] Category A) or full data package (NYSDEC ASP Category B) that includes all QC and instrument raw data. The analytical data package required by the program is presented in **Table 6-1** and is dependent on the general sampling objective(s). The analytical laboratories are required to submit all data, preliminary and final, in formatted EDDs in accordance with NYSDEC's requirements. The laboratory must meet 100% compliance with these requirements. The project database manager will submit written requests dictating the requirements and appropriate files to be supplied by the laboratory. The specifications of the EDD are presented in **Section 5 Data Management**.

Analytical data reports will be provided by the laboratory within 28 calendar days following receipt of a complete Sample Delivery Group (SDG). An SDG is considered to include all samples received for the same project or site, to a maximum of twenty investigative samples. Additionally, the completed copies of the chain-of-custody records, accompanying each sample from the time of initial bottle preparation to completion of analysis, must be attached to the analytical reports.

6.3 Data Validation and Audit Reports

Data validation personnel are responsible for documenting validation procedures and results in the form of a data usability summary report (DUSR). The QAO will be responsible for maintaining this report, and the QAO will be responsible for its distribution. Additionally, audit reports will be prepared and distributed by the QAO. A brief description of each report is provided below.

6.3.1 DATA USABILITY SUMMARY REPORTS

The DUSR will summarize the impacts of using data that do not achieve overall DQOs or that do not meet PARCCS criteria identified in **Section 3.2 Data Quality Objectives (PARCCS Parameters)**. Additionally, the report will be used to identify, assess, and present issues associated with the overall data. All DUSRs will be retained in the project files. DUSRs will be submitted with any NYSDEC ASP Category B submissions to the NYSDEC.

6.3.2 AUDIT REPORTS

Among other QA audit reports, which may be generated during the conduct of activities, a final audit report for this project may be prepared by the QAO. The report will include:

- Periodic assessment of measurement data accuracy, precision, and completeness
- Results of performance audits and/or system audits
- Significant QA problems and recommended solutions for future projects
- Status of solutions to any problems previously identified

TABLE 6-1. LABORATORY DATA PACKAGE AND DATA VALIDATION REQUIREMENTS

Sampling Program	Frequency	Laboratory Report Requirement	Validation Required? (Yes/No)
ROUTINE OMM OF ICMS OR ENGINEERING CONTROLS			
Groundwater and surface water sampling	Semiannual/Biennial, as specified in the SMP	NYSDEC Category B	Yes
Waste Characterization	As necessary	NYSDEC Category A	No

7 Analytical and Standard Operating Procedures

7.1 Analytical Procedures

To meet program-specific regulatory requirements for chemicals of concern, all methods will be followed as stated. Chemical analyses for inorganics, organics, and wet chemistry parameters will be conducted in accordance with the QAPP, the work plan scoping documents, NYSDEC, the laboratory's SOPs (maintained at the laboratory), and with referenced analytical methods including:

- USEPA SW846 Test Methods for Evaluating Solid Waste, Physical/Chemical (USEPA 2021)
- Methods for Chemical Analysis of Water and Wastes (USEPA 1983)
- Standard Methods for the Examination of Water and Wastewater (Baird & Bridgewater 2017)
- Other USEPA methods (USEPA 1993, 1995)

Where requirements conflict, the technical and QA/QC requirements in this QAPP or the work plan take precedence.

7.2 Standard Operating Procedures

SOPs are a written step-by-step description of laboratory operating procedures exclusive of analytical methods. Laboratories providing analytical support for this project will be required to document all procedures in SOPs. The SOPs must address the following areas:

- Storage containers and sample preservatives
- Sample receipt and logging
- Sample custody
- Sample handling procedures
- Sample transportation
- Glassware cleaning
- Laboratory security
- QC procedures and criteria
- Equipment calibration and maintenance
- Documentation
- Safety
- Data handling procedures
- Document control
- Personnel training and documentation
- Sample and extract storage
- Preventing sample contamination
- Traceability of standards
- Data reduction and validation
- Maintaining instrument records and logbooks
- Nonconformance
- Corrective actions
- Records management

8 Quality Control

A QC program is a systematic process that controls the validity of analytical results by:

- measuring the accuracy and precision of method and matrix
- developing expected control limits
- using control limits to detect anomalous events
- requiring corrective action techniques to prevent or minimize the recurrence of anomalous events

QC measurements for analytical protocols are designed to evaluate laboratory performance and measurement biases resulting from the sample matrix and field performance.

Field performance: QC samples are used to evaluate the effectiveness of the sampling program to obtain representative samples, eliminating any cross contamination. These samples will include trip blanks, field duplicates and rinse blanks.

Sample performance: Factors associated with sample preparation and analysis influence accuracy and precision. Such factors are monitored by the use of internal QC samples. QC field samples are analyzed to evaluate measurement bias due to the sample matrix based on evaluation of the MS/MSDs, and/or matrix duplicate (MD) samples. If acceptance criteria are not met, matrix interferences are confirmed either by reanalysis or by inspection of the LCS or matrix spike blank (MSB) results to verify that laboratory method performance is in control. Data are reported with appropriate qualifiers or discussion.

Laboratory method performance: All QC criteria for method performance should be met for all target analytes for data to be reported. These criteria generally apply to instrument detector assessment (such as tunes, inductively coupled plasma (ICP) interference check sample), calibration, method blanks, and LCS. Variances will be documented and noted in the case narrative of the report.

8.1 Field Quality Control Samples

QC samples will be collected in the field as part of the sampling program to allow evaluation of data quality. Field QA/QC samples will consist of the collection and analysis of rinse blanks, field duplicates, and “extra volume samples,” to be used as MS/MSD samples, at a frequency of 1:20 for each sample media (water and soil). Temperature blanks will accompany each sample container (cooler) shipped to the laboratory for sample analyses. A rinse blank will be collected from disposable sampling equipment at a frequency of one per lot. Standard sample identifiers will be used for field QA/QC samples; these identifiers will not provide any indication of their nature as QA/QC samples.

A summary of the type and collection frequency of field QC samples to be collected respective to the sampling programs specified in this QAPP, is included in **Table 8-1**.

TABLE 8-1. SUMMARY OF FIELD QC SAMPLE TYPES AND COLLECTION FREQUENCY

Field QC Sample Type	Sample Matrix	Collection Frequency
Equipment Rinse Blanks	Soil/sediment, water	Once per day of sampling for non-disposable sampling equipment
Field Duplicates	Soil/sediment, water	1:20 samples
Extra Volume Sampling (collected for MS/MSD)	Soil/sediment, water	1:20 samples

Field QA/QC samples will be labeled using standard sample identifiers that will provide no indication of their nature as QA/QC samples

8.1.1 EQUIPMENT RINSE BLANKS

To assess field sampling and decontamination performance, equipment rinse blanks will be used to evaluate the effectiveness of the decontamination procedures for chemical sampling equipment. These rinse blanks will be collected as part of all chemical sampling programs, except for waste characterization. An equipment rinse blank is a sample of

deionized water provided by the laboratory that is poured over or through the sampling equipment (such as a split spoon or a wipe template) into the sample container. An equipment rinse blank will be collected at a frequency of 1:20 samples per type of sample collection activity using non-disposable sampling equipment.

8.1.2 FIELD DUPLICATES

Field duplicates are collected for two purposes:

- to assess the precision of field sampling procedures
- to evaluate the representativeness and effectiveness of homogenization and proper mixing for soil and aqueous samples

Coded (blind) field duplicates will be used to assess the precision of field sampling procedures. Precision is calculated by quantifying the RPD between two sample measurements (**Section 3.2.1**). If the RPD of field duplicate results is greater than the precision criterion, environmental results for the field duplicate pair will be qualified as estimated. The field leader responsible for sample collection and processing should be notified to identify the source of variability (if possible), and corrective action should be taken (**Section 10.6**).

Coded (blind) field duplicates will be collected to evaluate the representativeness and effectiveness of homogenization and proper mixing for soil and aqueous samples. The field duplicate will be analyzed for all the parameters for which the associated samples are being analyzed. The samples will be labeled in such a manner that the laboratory will not be able to identify the sample as a duplicate sample. This will eliminate bias that could arise by laboratory personnel.

8.1.3 TRIP BLANKS

During field sampling and sample shipping, contamination may be introduced to the samples that could affect the accuracy of analysis results. Trip blanks will be used during sample shipment to detect cross-contamination. Trip blanks are prepared only when VOCs samples are taken and are analyzed for VOCs analytes. Each cooler of aqueous samples sent to the laboratory for analysis of VOCs will contain one trip blank. The trip blank consists of a VOC sample vial filled in the laboratory with American Society for Testing and Materials (ASTM) Type II reagent grade water, transported to the sampling site, handled like an environmental sample, and returned to the laboratory for analysis. Trip blanks are not opened in the field.

8.1.4 TEMPERATURE BLANK

The temperature blank is used to indicate the temperature of the sample cooler upon receipt at the laboratory. A temperature blank consists of laboratory reagent in a 40-mL glass vial sealed with a Teflon septum. Any cooler temperature exceeding the allowable 4 ± 2 degrees Celsius must be noted and the QAO notified prior to sample analyses.

8.2 Laboratory Quality Control Samples

QC data from the laboratory are necessary to determine precision and accuracy of the analyses and to demonstrate the absence of interferences and contamination of glassware and reagents. The laboratory will analyze QC samples routinely as part of the laboratory QC procedures. Laboratory QC results will consist of analysis of MS/MSD, LCS, method blanks, preparation blanks, and surrogate spikes. The frequency of the analysis of laboratory QC is summarized in **Table 8-2**. QC samples will be prepared and analyzed using the same preparation and analysis procedures as the field samples. These laboratory QC sample analyses will be run independently of the field QC samples. Results of these analyses will be reported with the sample data and kept in the project QC data file.

TABLE 8-2. LABORATORY QC SAMPLE FREQUENCY PER SAMPLE MATRIX

QC Sample	Frequency
Method/prep Blanks	One per analytical batch of 1 to 20 samples, per preparation event
Laboratory Control Sample	One per analytical batch of 1 to 20 samples, per preparation event
Surrogates	Spiked into all field and QC samples (Organic Analyses)
Matrix Spike/Matrix Spike Duplicate or Matrix (Laboratory) Duplicate	One per batch of 1 to 20 samples

QC samples will be prepared and analyzed utilizing the same preparation and analysis procedures as the field samples. Re-preparation and/or reanalysis of the laboratory QC samples due to a failing recovery and/or precision failure without the re-preparation and reanalysis of the associated samples is prohibited. In all events, QC failures, holding time exceedances or any other non-standard occurrence must be communicated immediately to the QAO prior to reporting and then, with approval to report the data, summarized in the case narrative. If the criteria are not met, appropriate corrective action must be taken as specified in **Section 9.1 Data Review, Verification, and Validation** and **Section 10 Assessment and Oversight**.

8.2.1 MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD samples for organics, metals, and wet chemistry parameters will be taken at a frequency of 1 per 20 field samples (per SDG) per matrix per method. A “batch” is defined as up to twenty samples from the same matrix, of the same extraction/digestion type, prepared and/or analyzed by a given analyst, within 12 hours or within an extraction/digestion event, whichever is more frequent. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes by spiking a normal field sample with a known concentration of the analyte of interest. Samples identified as rinse blanks will not be used for the MS/MSD preparation or analysis.

Spiked samples will be analyzed, and the percent recovery will be calculated. Results of the analysis will be used to evaluate accuracy and precision of the actual sample matrix. For MS/MSD, the result will be compared and used to evaluate the precision of the actual sample matrix. The percent recovery for each analyte in the MS and MSD should fall within the limits established by laboratory QC protocol.

The original sample and MS/MSD sample aliquots will be treated exactly the same throughout the sample preparation and analysis and will not be homogenized more than any other project sample (either in the field or at the laboratory). The spike samples will be analyzed for the same parameters as the sample. Field personnel must indicate on the chain-of-custody form which sample(s) are designated as MS/MSD. If samples are not designated for these QC purposes and/or insufficient sample is available, the project manager and/or QAO will be notified for resolution.

8.2.2 LABORATORY CONTROL SAMPLES

LCS are designed to check the accuracy of the analytical procedure by measuring a known concentration of an analyte of interest. An LCS will be analyzed for each analytical batch requested for sample preparation and analysis. LCSs must be prepared at a frequency of one per batch for all analytical methods. If high LCS recoveries are observed and the associated samples are reported as “not detected” for the requested target analytes, no action is necessary other than to note the issue in the case narrative of the final analytical report.

8.2.3 METHOD OR PREPARATION BLANKS

Laboratory blank samples (also referred to as method or preparation blanks) are designed to detect contamination resulting from the laboratory environment or sample preparation procedure. Method blanks verify that method interferences caused by contaminants in solvents, reagents, glassware, or in other sample processing hardware are known. Method blanks will be analyzed for each analytical batch using similar preparation techniques (separatory funnel

and liquid/liquid extraction) to assess possible contamination and evaluate which corrective measures may be taken, if necessary.

Method blanks associated with field samples must undergo all the processes performed on investigative samples, including but not limited to pre-filtration and sample cleanups. The blank will be deionized water for water samples or a purified solid matrix such as sodium sulfate for extractable soil samples. Where all the field samples in a batch do not require an additional cleanup procedure, an additional blank may be prepared to check the performance of the additional cleanup and will be associated with the field samples getting the specific additional cleanup. Where this is done, both blanks will be reported, and the procedure described in the case narrative. Method blanks must be prepared at a frequency of one per analytical batch.

8.2.4 SURROGATE SPIKE ANALYSES

Surrogate spikes (applicable to organic analysis only) are used to determine the efficiency of analyte recovery in sample preparation and analysis. Calculated percent recovery of the spikes is used to measure the accuracy of the analytical method. A surrogate spike is prepared by adding a known amount of a compound similar in type to the analytes of interest. Surrogate compounds will be added to all samples analyzed by USEPA methods, including method blanks, MS/MSDs, project environmental samples, and duplicate samples in accordance with the method.

8.3 Instrument/Equipment Testing, Inspection, and Maintenance

8.3.1 FIELD EQUIPMENT

Equipment failure will be minimized by routinely inspecting all field equipment to ensure that it is operational and by performing preventative maintenance procedures. Field sampling equipment will be inspected prior to sample collection activities, and repairs will be made prior to pre-sampling decontamination and use/reuse of the sampling equipment. Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedure, based on the manufacturer's instructions or recommendations. Maintenance will be performed in accordance with the schedule specified by the manufacturer to minimize the downtime of the measurement system. Qualified personnel must perform maintenance work.

Minimum routine preventive maintenance includes the following:

- Removal of foreign debris from exposed surfaces
- Storage in a cool dry place protected from the elements
- Daily inspections
- Verification of instrument calibrations (**Section 8.4 Instrument/Equipment Calibration and Frequency**).

A list of critical spare parts will be developed prior to the initiation of fieldwork. Field personnel will have ready access to critical spare parts to minimize downtime while fieldwork is in progress. A service contract for rapid instrument repair or backup instruments may be substituted for the spare part inventory.

Non-routine maintenance procedures require field equipment to be inspected prior to initiation of fieldwork to determine whether or not it is operational. If it is not operational, it will be serviced or replaced. Batteries will be fully charged or fresh, as applicable.

8.3.2 LABORATORY INSTRUMENTATION

Periodic preventive maintenance is required for all sensitive equipment. Instrument manuals will be kept on file for reference if equipment needs repair. The troubleshooting section of factory manuals may be used in assisting personnel in performing maintenance tasks.

Major instruments in the laboratory are covered by annual service contracts with manufacturers or other qualified personnel (internal or external). Under these agreements, trained service personnel make regular preventive

maintenance visits. Maintenance is documented and the documentation is kept in permanent records by the individual responsible for each instrument.

The laboratory manager is responsible for preparation, documentation, and implementation of the program. The laboratory QA manager reviews implementation to verify compliance during scheduled internal audits.

Written procedures will establish the schedule for servicing critical items to minimize the downtime of the measurement system. The laboratory will adhere to the maintenance schedule and arrange any necessary and prompt service. Qualified personnel will perform required service.

8.4 Instrument/Equipment Calibration and Frequency

Both field and laboratory instruments used to perform chemical measurements will be properly calibrated prior to use to obtain valid and usable results. The requirement to properly calibrate instruments prior to use applies equally to field instruments as it does to fixed laboratory instruments to generate appropriate data to meet DQOs.

8.4.1 FIELD INSTRUMENTS

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures of field instruments (such as PID, pH, temperature), will conform to manufacturer's standard instructions to ensure that the equipment functions within the allowable tolerances established by the manufacturer and required by the project. Personnel performing instrument calibrations must be trained in its proper operation and calibration. Records of all instrument calibration will be maintained by the field team leader in the field logbook (**Section 6.1 Field Records**) and will be subject to audit by the QAO or authorized personnel. The field team leader will maintain copies of all the instrument manuals on the site.

8.4.2 LABORATORY INSTRUMENTS

A formal calibration program will control instruments and equipment used in the laboratory. The program will verify that equipment is of the proper type, range, accuracy, and precision to provide data compatible with specified requirements. Instruments and equipment that measure a quantity or whose performance is expected at a stated level will be subject to calibration. Laboratory personnel or external calibration agencies or equipment manufacturers will calibrate the instruments using reference standards.

This section provides an overview of the practices used by the laboratory to implement a calibration program. Detailed calibration procedures, calibration frequencies, and acceptance criteria are specified in the laboratory's analytical method SOPs. The requirements for the calibration of instruments and equipment depend on the type and expected performance of individual instruments and equipment. Therefore, the laboratory will use the guidelines provided here to develop a calibration program.

Two types of calibration are described in this section: periodic calibration and operational calibration. The results of the calibration activities will be documented in the analytical data package and the calibration records (**Section 6.2.1**).

Periodic calibration: Performed at prescribed intervals for equipment, such as balances and thermometers. In general, equipment that can be calibrated periodically is a distinct, singular purpose unit and is relatively stable in performance.

Operational calibration: routinely performed as part of an analytical procedure or test method, such as the development of a standard curve for use with an atomic absorption spectrophotometer. Operational calibration is generally performed for instrument systems.

8.4.3 CALIBRATION SYSTEM

The calibration system includes calibration procedures, equipment identification, calibration frequency, calibration reference standards, calibration failure, and calibration records. These elements are described next.

8.4.3.1 Calibration Procedures

Written procedures will be used by the laboratory for all instruments and equipment subject to calibration. Whenever possible, recognized procedures, such as those published by ASTM or USEPA, will be adopted. If established procedures are not available, a procedure will be developed considering the type of equipment, stability characteristics of the equipment, required accuracy, and the effect of operational error on the quantities measured. Calibration procedure established by the laboratory must, at a minimum, meet the calibration requirements of the method on which the SOP is based. The following are the minimum calibration procedures that must be followed:

- Equipment to be calibrated
- Reference standards used for calibration
- Calibration technique and sequential actions
- Acceptable performance tolerances
- Frequency of calibration
- Calibration documentation format

8.4.3.2 Equipment Identification

Equipment that is subject to calibration is identified by a unique number assigned by the laboratory. Calibration records reference the specific instrument identification.

8.4.3.3 Calibration Frequency

Instruments and equipment will be calibrated at prescribed intervals and/or as part of the operational use of the equipment. Calibration frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values provided in recognized standards, intended data use, specified analytical methods, effect of error upon the measurement process, and prior experience.

8.4.3.4 Calibration Reference Standards

Two types of reference standards will be used by the laboratory for calibration: physical standards and chemical standards.

Physical standards, such as weights for calibrating balances and certified thermometers for calibrating working thermometers, refrigerators and ovens, are generally used for periodic calibration. Physical reference standards that have known relationships to nationally recognized standards (such as NIST) or accepted values of natural physical constants will be used whenever possible. If national standards do not exist, the basis for the reference will be documented. Physical reference standards will be used only for calibration and will be stored separately from equipment used in analyses. In general, physical standards will be recalibrated annually by a certified external agency, and documentation will be maintained. Balances will be calibrated against class "S" weights by an outside source annually. Physical standards such as the laboratory's class "S" weights will be recertified annually.

Chemical standards, such as vendor certified stock solutions and neat compounds, will generally be used for operational calibration. The laboratory, to provide traceability for all standards used for calibration and QC samples, will document standard preparation activities.

8.4.3.5 Calibration Failure

Equipment that cannot be calibrated or becomes inoperable will be removed from service. Such equipment must be repaired and satisfactorily recalibrated before reuse. For equipment that fails calibration, analysis cannot proceed until

appropriate corrective action is taken, and the analyst achieves an acceptable calibration. This type of failure will be documented in an NCM (Section 10 Assessment and Oversight).

8.4.3.6 Calibration Records

Upon request, the laboratory will provide all data and information to demonstrate that the analytical system was properly calibrated at the time of analysis including calibration method, frequency, source of standards, concentration of standards, response factors, linear range, check standards, and all control limits. This data will be documented in a calibration record (Section 6.2.1). Calibration records will be prepared and maintained for each piece of equipment subject to calibration.

8.4.4 OPERATIONAL CALIBRATION

Operational calibration will generally be performed as part of the analytical procedure and will refer to those operations in which instrument response (in its broadest interpretation) is related to analyte concentration. Formulas used for calibration are listed in **Table 8-3**.

TABLE 8-3. OPERATIONAL CALIBRATION FORMULAS

Application	Formula	Symbols
Linear calibration curves	$C = (R - a_0)/a_1$	C = analytical concentration R = instrument response a_0 = intercept of regression curve (instrument response when concentration is zero) a_1 = slope of regression curve (change in response per change in concentration)
Calibration factors ¹	$CF = A_x / C$	CF = calibration factor A_x = peak size of target compound in sample extract C = concentration (µg/L)
Response factors ²	$RF = C_{is} A_x / C A_{is}$	RF = internal standard response factor C_{is} = concentration of the internal standard (µg/L) A_x = area of the characteristic ion for the target compound C = concentration (µg/L) A_{is} = area of the characteristic ion for the internal standard

¹ Used for quantitation by the external standard technique

² Used for quantitation by the internal standard technique

µg/L = micrograms per liter

Note: For organic analysis, the laboratory will make efforts to use the best curve technique for each analyte. This practice is described in detail in the laboratory calibration criteria documents for GC analysis. This may require the use of a quadratic curve for some compounds.

8.4.4.1 Preparation of a Calibration Curve

Preparation of a standard calibration curve will be accomplished by analyzing calibration standards that are prepared by adding the analyte(s) of interest to the solvent that is introduced into the instrument. The concentrations of the calibration standards will be chosen to cover the working range of the instrument or method. All sample measurements will be made within this working range. Average response factors will be used, or a calibration curve will be prepared by plotting or regressing the instrument responses versus the analyte concentrations. Where appropriate, a best-fit curve may be used for nonlinear curves and the concentrations of the analyzed samples will be back-calculated from the calibration curve. **Table 8-4** presents the sample concentration calculation formulas.

TABLE 8-4. SAMPLE CONCENTRATION CALCULATION FORMULAS

Application	Formula	Symbols
Linear regression calibration curves	$C = (R - a_0) / a_1$	C = analytical concentration R = instrument response a_0 = intercept of regression curve (instrument response when concentration is zero) a_1 = slope of regression curve (change in response per change in concentration)
Calibration factors ¹	$C = A_x V_f / CF V_i$	C = concentration (µg/L) A_x = peak size of target compound in sample extract V_f = final volume of extracted sample (mL) CF = calibration factor V_i = initial volume of sample extracted (mL)
Response factors ²	$C = C_{is} A_x V_f / RF A_{is} V_i$	C = concentration (µg/L) C_{is} = concentration of the internal standard (µg/L) A_x = area of the characteristic ion for the target compound V_f = final volume of extracted sample (mL) RF = internal standard response factor A_{is} = area of the characteristic ion for the internal standard V_i = initial volume of sample extracted (mL)
Residues ³	$R = (W - T) / V \times 1,000,000$	R^5 = residue concentration (mg/L) W = weight of dried residue + container (g) T = tare weight of container (g) V = volume of sample used (mL)
Solid samples ⁴	$K = C V D / W (\%S / 100)$	K = dry-weight concentration (mg/kg) C = analytical concentration (mg/L) V = final volume (mL) of processed sample solution D = dilution factor W = wet weight (g) of as-received sample taken for analysis %S = percent solids of as-received sample
1 Used for quantitation by the external standard technique 2 Used for quantitation by the internal standard technique 3 Used for total, filterable, non-filterable and volatile residues as well as gravimetric oil and grease 4 Used to calculate the dry-weight concentration of a solid sample from the analytical concentration of the processed sample 5 Conversion factors to convert grams per milliliter (g/mL) to milligrams per liter (mg/L): $\frac{mg}{L} = \frac{g}{mL} \times \frac{10^3 mL}{L} \times \frac{10^3 mg}{g}$		

8.4.4.2 Periodic Calibration

Periodic calibrations are performed for equipment (such as balances and thermometers), that is required in the analytical method, but that is not routinely calibrated as part of the analytical procedure. **Table 8-5** lists the periodic calibration requirements used by the laboratories.

TABLE 8-5. PERIODIC CALIBRATION REQUIREMENTS

Instrument	Calibration Frequency		Corrective Actions
Analytical Balances	Daily	Sensitivity (with a Class S-verified weight)	Adjust sensitivity
	Annually	Calibrated by outside vendor against certified Class S weights	Service balance
Thermometers	Annually	Calibrated against certified NIST thermometers	Tag and remove from service
Automatic Pipettors	Quarterly	Gravimetric check	Service or replacement

8.5 Inspection/Acceptance of Supplies and Consumables

In the laboratory, personnel qualifying reagents and standards must be trained to perform the associated instrumental analysis, including instrument calibration, calculations, and data interpretation. Laboratory personnel must document the purchase, receipt, handling, storage, and tracking of supplies and consumables used during analysis. For example, analytical standards, source materials, and reference materials used for instrumental calibration/tunes/checks must be certified and traceable to the USEPA or NIST through reference numbers documented directly in each analytical sequence. Calibration for all requested analyses must be verified by an independent second-source reference. Adhering to these procedures precludes the use of expired supplies and consumables or supplies and consumables that do not meet standard acceptance criteria.

Records must be maintained on reagent and standard preparation in the LIMS reagent system or laboratory standard preparation logs. The records should indicate:

- traceability of the standards to their original source solution or neat compound
- the name of the material
- concentration
- the method and date of preparation
- the expiration date
- storage conditions
- the preparer's initials

Each prepared reagent or standard should be labeled with a unique identifier that links the solution to the preparation documentation that specifies an expiration and/or re-evaluation date for the solution.

9 Data Validation and Usability Elements

9.1 Data Review, Verification, and Validation

The data collected during this project will undergo a systematic review for compliance with the DQOs and performance objectives as stated in **Section 3**. In particular, field, laboratory, and data management activities will be reviewed to confirm compliance with the method QC criteria for performance and accuracy and to show that data were collected in a manner that is appropriate for accomplishing the project objectives. These data will be evaluated as to their usability during data verification. In particular, data outside QC criteria, but not rejected, will be reviewed for possible high and low bias. All data will be validated following verification and reduction.

Qualified data validation personnel will assess and verify data. At least 15 days prior to the start of any field sampling activity that requires NYSDEC ASP Category B data deliverables, FMC will submit the resume of the qualified data validator(s) to NYSDEC for review and approval under separate cover.

The data validator will review the data against QC criteria, DQOs (**Sections 3** and **9.2.2**), and analytical methodologies to identify outliers or errors and to flag suspect values. Field and laboratory activities that should be reviewed include, at a minimum:

- sample collection, handling, and processing techniques
- field documentation records
- verification of proper analytical methods
- analytical results of QC samples
- calibration records for laboratory instruments and field equipment

A review of such elements is necessary to demonstrate whether the DQOs outlined in **Section 3** were met. Samples that deviate from the experimental design and affect the project objectives must be reported to the QAO and data validation personnel.

Departures from standard procedures (in the HASP, this QAPP, or the laboratory SOPs), may lead to exclusion of that data from the project database or validation process, based on discussions with and approval of the NYSDEC. However, routine field audits involving thorough reviews of sample collection procedures and sample documentation should preclude such deviations from occurring. Additionally, routine laboratory audits will be used to document proper sample receipt, storage, and analysis; instrument calibration; use of the proper analytical methods; and use of QC samples specified in **Section 8** to assist in appropriately qualifying the data.

9.1.1 LABORATORY REVIEW

The laboratory's analytical report for each SDG will be assembled by collecting and incorporating:

- all the data for each analysis associated with the reported samples
- the analytical narratives
- other report-related information such as
 - copies of chain-of-custody forms
 - communication records
 - nonconformance forms

Before the laboratory submits data, the laboratory's data review process will include a full first-level technical review by the laboratory's analyst during sample analysis and data generation. The review must include a check of all QC data for errors in transcription, calculations, and dilution factors and for compliance with QC requirements. Failure to meet method performance QC criteria may result in the reanalysis of the sample or analytical batch. After the initial review is completed, the data will be collected from summary sheets, workbooks, or computer files and assembled into a data package.

The laboratory's first review will be followed by a second-level technical review of the data package. The second level review may be performed by a peer trained in the procedures being reviewed or by the appropriate analytical group supervisor. The reviewer will check the data packages for completeness and compliancy with the project requirements and will certify that the report meets the DQOs for PARCCS specifications. The report narrative will be generated at this stage of the data review. Any problems discovered during the review and the corrective actions necessary to resolve them will be communicated to the responsible individual, who will discuss the findings with the laboratory QA manager for resolution.

The first and second review will be conducted throughout sample analysis and data generation to validate data integrity during collection and reporting of analytical data. Data review checklists will be used to document the performance and review of the QC and analytical data.

Before the laboratory's final release to the client, the data will undergo a final review by the laboratory's QA officer or their designee. This third level review is to confirm that the report is complete and meets project requirements for performance and documentation. The laboratory's QA officer must review reports involving non-conforming data issues. A summary of all non-conformances will be included in the case narrative. The report will then be released to the client for data validation, and a copy will be archived by the laboratory for a period of seven years.

9.1.2 DATA VALIDATION

The laboratory analytical data will be validated using project-specific data validation procedures to confirm that data meet the applicable data quality objectives. Parsons will perform data validation following the November 2020 USEPA National Functional Guidelines for Organic and Inorganic review (USEPA 2020a and 2020b). The data validation process for a given SDG will be performed on NYSDEC Category B type data packages. This data validation process will provide a level of review resulting in the generation of a DUSR.

A data validation report (or DUSR) will be issued and reviewed by the QAO before finalization. The data validation report will present the results of data validation, including:

- a summary assessment of laboratory data packages
- sample preservation and chain-of-custody procedures
- a summary assessment of PARCCS criteria for each analytical method

The validation criteria are objective and are not sample dependent, except for consideration of sample matrix effects. The criteria specify performance requirements that should be under the control of the field-sampling contractor or analytical laboratory. This QAPP will be the primary reference for evaluating the data.

After data validation, the data will be evaluated for consistency with site conditions and developed conceptual models. Data validation personnel will prepare a project DUSR that summarizes the implications of the use of any data out of criteria. In addition, the DUSR will include the percentage of sample completeness for critical and non-critical samples and a discussion of any issues in representativeness of the data that may develop as a result of validation. The DUSR will address overall data quality and achievement of PARCCS criteria and assess issues associated with the overall data and data quality for all validated data. All DUSRs will be retained in the project files and are available upon request.

9.2 Verification and Validation Methods

9.2.1 LABORATORY

The laboratory will verify and assess analytical data against the stated requirements on the chain-of-custody record, the sample handling procedures (**Section 4**), and the QC parameters. The laboratory data reviewers will also check that transcriptions of raw or final data and calculations were performed correctly and are verified.

Following data verification, analytical data generated by the laboratory will be reduced and managed based on the procedures specified in this QAPP and analytical methodologies. Data reduction includes all processes that change either the values or numbers of data items. The data reduction processes used in the laboratory includes establishment of

calibration curves, calculation of sample concentrations from instrument responses, and computation of QC parameters.

Table 8-4 in **Section 8** lists the formulas used to calculate sample concentrations.

The reduction of instrument responses to sample concentrations takes different forms for different types of methods. For most analyses, the sample concentrations are calculated from the measured instrument responses using a calibration curve. The sample concentrations can be back-calculated from a regression equation fitted to calibration data. For gravimetric and titrimetric analyses, the calculations are performed according to equations given in the method. For chromatographic analyses, the unknown concentrations are determined using either calibration factors (external standard procedure) or relative response factors (internal standard procedure). GC analyses are generally quantitated using the external standard technique; GC/MS analyses are quantitated using the internal standard technique. These calculations are generally performed by the associated computerized data systems.

Validated analytical data will be loaded into a database and reported in tabular format. Database fields will include the field sample identification, laboratory sample identification, blinded sample number, analytical results, detection limits, and validation qualifiers. The usability of the data will be evaluated by the QAO or designee.

9.2.2 ANALYTICAL DATA VALIDATION

The data review process is performed in two phases: the initial phase for contract compliance screening (CCS) and the second phase for data validation.

The initial phase, CCS, includes review of sample data deliverables for completeness. Completeness is evaluated by ensuring that all required data deliverables are received in a legible format with all required information. The CCS process also includes a review of the chain-of-custody forms, case narratives, and RLs. Sample resubmission requests, documentation of nonconformances with respect to data deliverable completeness, and corrective actions often are initiated during the CCS review. The results of the CCS process are incorporated into the data validation process.

The second phase, data validation, involves a project-specific data validation procedure performed on the NYSDEC Category B type analytical results from the fixed-base laboratory or laboratories, with the exception of the bench-scale testing data. The data validation procedure includes:

- a review of summary information to determine adherence to analytical holding times
- results from analysis of field duplicates, method blanks, field blanks, surrogate spikes, MS/MSDs, and LCSs
- sample temperatures during shipping and storage
- initial and continuing calibration forms
- internal standard area count forms
- any other QC forms

Data qualifiers are applied to analytical results during the data validation process based on adherence to method protocols and laboratory-specific QA/QC limits. Calculation checks from the raw data of reported and summarized sample data and QC results will be performed on up to 20 percent of the samples. **Table 9-1** lists the full validation parameters.

TABLE 9-1. LIST OF FULL VALIDATION PARAMETERS

FULL VALIDATION	
ORGANIC ANALYTICAL METHODS	INORGANIC CONSTITUENTS, WET CHEMISTRY PARAMETERS
• Percentage of solids • Sample preservation and holding times • Instrument tuning • Instrument calibrations • Blank results • System monitoring compounds or surrogate recovery compounds (as applicable) • Internal standard recovery results • MS and MSD results • LCS results • Target compound identification • Chromatogram quality • Duplicate results • Compound quantitation and reported RLs • System performance • Results verification	• Percentage of solids • Sample preservation and holding times • Calibrations • Blank results • Interference check samples (inorganics only) • LCSs • Project Required Reporting Limit standard check samples • Duplicates • MSs (pre-digestions and post-digestions for inorganics only) • ICP serial dilutions • Results verification and reported detection limits

The laboratory will send the required analytical data package deliverables and the EDD, following completion of the laboratory's validation process (**Section 9.2**). Data validation will be performed in accordance with the USEPA National Functional Guidelines (USEPA 2020a and 2020b) or the USEPA Region 2 modifications Data Validation SOPs for organic and inorganic data review (USEPA 2015, 2016a-f). Where validation guidelines and the analytical method disagree, this QAPP and data validation professional judgment will prevail. In addition, the data validator will refer to this QAPP and the work plan scoping documents to verify that DQOs were met. If problems are identified during data validation, the QAO and the laboratory QA manager will be alerted, and corrective actions will be requested. The laboratory project manager and data validation chemists will maintain close contact with the QAO to ensure all nonconformance issues are acted upon prior to data manipulation and assessment routines.

Trained and experienced data validation chemists will perform the data validation work. The QAO will review the data validation report before it is finalized. The data validation report will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain-of-custody procedures, and a summary assessment of PARCCS criteria for each analytical method. A detailed assessment of each SDG will follow. Based on the results of data validation, the validated analytical results reported will be assigned a usability flag (**Table 9-2**).

TABLE 9-2. USABILITY FLAGS FOR VALIDATED RESULTS

Flag	Definition
U	The analyte was analyzed but was not detected above the level of the reported sample detection limit.
UJ	Analyte was analyzed but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity and may be biased high.
J-	The result is an estimated quantity and may be biased low.
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

9.3 Reconciliation with User Requirements

Following data validation by qualified personnel, the data will be evaluated by the QAO and the project manager as to consistency with site conditions and developed conceptual models to determine whether field and analytical data meet the requirements for decision making. Specifically, the results of the measurements will be compared to the DQOs (**Section 3**).

The DQOs will be considered complete and satisfied if the data are identified as usable and if no major data gaps are identified. For example, the objective for data collected under the characterization program is to further refine the limits of dredging and/or capping. If the collected data sufficiently characterizes these limits in a manner that is acceptable for remedial action, then the DQO is satisfied. In cases where data may be considered not usable (for example, rejected during data validation), resampling may be required at a specific location. If resampling is not possible, the data will be identified and noted in the project database to make data users aware of its limitations.

10 Assessment and Oversight

10.1 Assessments and Response Actions

Performance and system audits of both field and laboratory activities may be performed. Any such audits will be performed at a frequency to be determined to ensure that sampling and analysis activities are completed in accordance with the procedures specified in the HASP and this QAPP.

Quality assurance audits will be carried out under the direction of the QAO on field activities, including sampling and field measurements. They will be implemented to verify that established procedures are being followed and to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s).

The QAO will plan, schedule, and approve system and performance audits based on procedures customized to the project requirements. If required, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. Quality auditing personnel will not have responsibility for field or laboratory project work.

10.2 Project-Specific Audits

Project-specific audits include system and performance audits of sampling and analysis procedures, and of associated recordkeeping and data management procedures. Project-specific audits will be performed on a discretionary basis at a frequency determined by the project manager.

10.2.1 SYSTEM AUDITS

The QAO may perform system audits. Such audits will encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory QC procedures and associated documentation may be system-audited including the field logbook, field sampling records, laboratory analytical records, sample handling, processing, and packaging in compliance with the established procedures, maintenance of QA procedures, and chain-of-custody procedures. These audits may be carried out during execution of the project to confirm that sampling crews employ consistent procedures. However, if conditions adverse to quality are detected additional audits may occur.

Findings from the audit will be summarized and provided to the project manager and/or designated personnel so that necessary corrective action can be monitored from initiation to closure.

10.2.2 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of PE samples or provide proof that PE samples were submitted by an approved USEPA or NYSDEC performance testing provider within the past 12 months. If necessary, proof that applicable PE samples have been analyzed at the laboratory within the past 12 months will be included in the laboratory procurement package.

10.2.3 FORMAL AUDITS

Formal audits are any system or performance audit that the QAO documents and implements. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklist to verify objectively that QA requirements have been developed, documented, and instituted in accordance with contractual and project criteria. At the discretion of the project manager, the QAO or designated personnel may conduct formal audits on project and subcontractor work during the course of the project.

Auditors who have performed the site audit after gathering and evaluating all data will write audit reports. Items, activities, and documents determined by lead auditors to be in noncompliance must be identified at exit interviews conducted with the involved management. Noncompliance will be logged and documented through audit findings. These findings will be attached to and become part of the integral audit report. These audit-finding forms are directed to management to resolve satisfactorily the noncompliance in a specified and timely manner.

The QAO has overall responsibility to see that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports will be submitted to the project manager after completion of the audit. Serious deficiencies will be reported to the project manager on an expedited basis. Audit checklists, audit reports, audit findings, and acceptable resolutions will be approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

10.3 Laboratory Audits

Internal laboratory audits will be performed routinely to review and evaluate the adequacy and effectiveness of the laboratory's performance and QA program, to ascertain if the QAPP is being completely and uniformly implemented, to identify nonconformances, and to verify that identified deficiencies are corrected. The laboratory QA manager is responsible for such audits and will perform them according to a schedule planned to coincide with appropriate activities on the project schedule and sampling plans. Such scheduled audits may be supplemented by additional audits for one or more of the following reasons:

- When significant changes are made in the QAPP.
- When necessary to verify that corrective action has been taken on a nonconformance reported in a previous audit.
- When requested by the laboratory's project manager or QA manager.

10.3.1 LABORATORY PERFORMANCE AUDITS

Performance audits are independent sample checks made by a supervisor or auditor to arrive at a quantitative measure of the quality of the data produced by one section or the entire measurement process. Performance audits are conducted by introducing control samples, in addition to those used routinely, into the data production process. These control samples include PE samples of known concentrations. The results of performance audits will be evaluated against acceptance criteria. The results will be summarized and maintained by the laboratory QA manager and distributed to the supervisors who must investigate and respond to any results that are outside control limits.

10.3.2 LABORATORY INTERNAL AUDITS

The laboratory QA manager conducts routine internal audits of each laboratory section for completeness, accuracy, and adherence to SOPs. The laboratory audit team will verify that the laboratory's measurement systems are operated within specified acceptable control criteria and that a system is in place to confirm that out-of-control conditions are efficiently identified and corrected.

10.3.3 LABORATORY DATA AUDITS

The laboratory will maintain raw instrument data for sample analyses on magnetic tape media or optical media in a secured fireproof safe. During routine audits, the audit team will verify the processing of the raw data file by reviewing randomly selected electronic data files and comparing the results with the hardcopy report. Tapes will be archived for a period of seven years. Tapes will be also available for audit by the QAO upon request.

10.4 Audit Procedures

Prior to an audit, the designated lead auditor will prepare an audit checklist. During an audit and upon its completion, the auditor will discuss the findings with the individuals audited and discuss and agree on corrective actions to be initiated.

The auditor will prepare and submit an audit report to the designated responsible individual of the audited group, the project manager, and the QAO. Minor administrative findings that can be resolved to the satisfaction of the auditor during an audit need not be cited as items requiring corrective action. Findings that are not resolved during the course of the audit and findings affecting the overall quality of the project will be included in the audit report.

The designated responsible individual of the audited group will prepare and submit to the QAO a reply to the audit. This reply will include, at a minimum, a plan for implementing the corrective action to be taken on nonconformances indicated in the audit report, the date by which such corrective action will be completed, and actions taken to prevent reoccurrence. If the corrective action has been completed, supporting documentation should be attached to the reply. The auditor will ascertain (by re-audit or other means) if appropriate and timely corrective action has been implemented.

Records of audits will be maintained in the project files. Audit files will include, as a minimum, the audit report, the reply to the audit, and any supporting documents. It is the responsibility of the designated responsible individual of the audited group to conform to the established procedures, particularly as to development and implementation of such corrective action.

10.5 Audit Documentation

To confirm that the previously defined scope of the individual audits is accomplished and that the audits follow established procedures, a checklist will be completed during each audit. The checklist will detail the activities to be executed and ensure that the auditing plan is accurate. Audit checklists will be prepared in advance and will be available for review. At a minimum, the following audit information must be provided:

- Date and type of audit
- Name and title of auditor
- Description of group, task, or facility being audited
- Names of lead technical personnel present at audit
- Checklist of audit items according to scope of audit
- Deficiencies or non-conformances

Following each system, performance, and data audit, the QAO or his designee will prepare a report to document the findings of the specific audit. The report will be submitted to the designated individual of the audited group to ensure that objectives of the QA program are met. At a minimum, the audit report must include the following elements:

- Description and date of audit
- Name of auditor
- Copies of completed, signed, and dated audit form and/or checklist
- Summary of findings including any nonconformance or deficiencies
- Date of report and appropriate signatures
- Description of corrective actions

The QAO will maintain a copy of the signed and dated report for each audit. If necessary, a second copy will be placed in project files.

10.6 Corrective Action

Corrective action procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected. Corrective action enables significant conditions adverse to quality to be noted promptly at the site, laboratory, or subcontractor location. Additionally, it allows for the cause of the condition to be identified and corrective action to be taken to rectify the problem and to minimize the effect on the data set. Further, corrective action is intended to minimize the possibility of repetition.

Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, project manager, field team leader, and involved subcontractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action. Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The designated responsible individual of the audited group will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

The following events trigger corrective actions:

- When predetermined acceptance standards are not attained
- When a deviation from SOP is required or observed
- When procedure or data compiled are determined to be deficient
- When equipment or instrumentation is found to be faulty
- When samples and analytical test results are not clearly traceable
- When QA requirements have been violated
- When designated approvals have been circumvented
- As a result of system and performance audits
- As a result of a management assessment
- As a result of laboratory/field comparison studies
- As required by analytical method

All project personnel have the responsibility, as part of normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Specifically, the laboratory must designate the assigned individual to act as the primary laboratory contact responsible for timely identification and resolution of any and all issues including contract and administrative issues. Any phone calls initiated by personnel or designated representatives to the laboratory with respect to corrective actions must be returned in a timely manner on a normal business day if the designate individual (or alternate) is not available at the initiation of the phone call.

Project management and related staff, including field investigation teams, remedial design planning personnel, and laboratory groups will monitor on-going work performance as part of daily responsibilities. Work may be audited at the site, the laboratories, or subcontractor locations. Activities or documents ascertained to be noncompliant with QA requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the QAO, project manager, or designated personnel.

Personnel assigned to QA functions will have the responsibility to issue and control CAR forms (**Figure 10-1**). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered.

Similar to the CAR, the laboratory will record and report nonconformances internally using the laboratory's nonconformance documentation tracking system in the form of an NCM. Each NCM is traceable so that it can be cross-referenced with its resolution to the associated project records. The laboratory QA manager summarizes critical nonconformances, such as reissued reports and client complaints, in a monthly report to the laboratory management staff. Management of the NCM is described in **Section 6.2 Laboratory Records**. Corrective action procedures applicable to QC requirements that do not meet the criteria of this QAPP are described in the following sections. Consistent, frequent contacts between laboratory personnel, the QAO, or designated personnel are required. NCM forms should typically include the following information:

- Problem description and root cause
- Corrective action
- Client notification summary
- QA verification
- Approval history action

FIGURE 10-1. CORRECTIVE ACTION REQUEST FORM

CORRECTIVE ACTION REQUEST					
Number _____					
Date: _____					
TO: _____					
You are hereby requested to take corrective actions indicated below and as otherwise determined by you (a) to resolve the noted conditions and (b) to prevent it from recurring. Your written response is to be returned to the Project quality assurance manager by _____.					
Condition:					
Reference Documents:					
_____ Originator	_____ Date	_____ Approval	_____ Date	_____ Approval	_____ Date
Response					
Cause of Condition:					
Corrective Action					
Resolution:					
(B) Prevention					
(B2) Affected Documents					
Signature _____				Date _____	
CA Follow-up					
Corrective Action verified by: _____				Date _____	

11 Reports to Management

Management personnel receive QA reports appropriate to their level of responsibility. The project manager receives copies of all QA documentation. QC documentation is retained within the department that generated the product or service except where this documentation is a deliverable for a specific contract. QC documentation is also submitted to the project QAO for review and approval. Previous sections detailed the QA activities and the reports, which they generate. Among other QA audit reports that may be generated during the conduct of activities, a final audit report for this project will be prepared by the QAO. The report will include:

- Periodic assessment of measurement data accuracy, precision, and completeness
- Results of performance audits and/or system audits
- Significant QA problems and recommended solutions for future projects
- Status of solutions to any problems previously identified

Additionally, any incidents requiring corrective action will be fully documented.

12 References

- Baird, R. and L. Bridgewater. 2017. *Standard Methods for the Examination of Water and Wastewater*. 23rd edition. Washington, D.C.: American Public Health Association.
- NYSDEC. 1998. *Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*. New York State Department of Environmental Conservation. June. https://www.dec.ny.gov/docs/water_pdf/togs111.pdf.
- NYSDEC. 2010. *DER-10, Technical Guidance for Site Investigation and Remediation*. New York State Department of Environmental Conservation Program Policy, Office of Remediation and Materials Management. Issued May 3, 2010, Errata Sheet last revised April 9, 2019. https://www.dec.ny.gov/docs/remediation_hudson_pdf/der10.pdf
- NYSDEC. 2014. *Screening and Assessment of Contaminated Sediment*. New York State Department of Environmental Conservation Division of Fish, Wildlife and Marine Resources, Bureau of Habitat. June 24. https://www.dec.ny.gov/docs/fish_marine_pdf/screenasssedfin.pdf
- Taylor, J.K. 1987. *Quality Assurance of Chemical Measurements*. Lewis Publishers, Inc., Chelsea, Michigan.
- USEPA. 1983. *Methods for Chemical Analysis of Water and Wastes*. EPA600/4-79/020. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio., Rev. March. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=30000Q10.txt>.
- USEPA. 1986. *NEIC Policies and Procedures*. EPA 330/9-78-001-R. National Enforcement Investigations Center, Denver, Colorado. U. S. Environmental Protection Agency, Office of Enforcement and Compliance Monitoring. May 1978, revised May 1986. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=94003UG3.txt>.
- USEPA. 1987. *Data Quality Objectives for Remedial Response Actions Activities: Development Process*. EPA/540/G-87/003. OSWER Directive 9355.0-7B. U.S. Environmental Protection Agency, Washington, D.C. March. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000A50U.txt>
- USEPA. 1993. *Methods for the Determination of Nonconventional Pesticides in Municipal and Industrial Wastewater, Volumes I and II*. EPA 821 R93-010A and 010B. U.S. Environmental Protection Agency, Office of Water, Engineering and Analysis Division, Washington, D.C. August. Revision 1. Volume 1 <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20009LZ5.txt>. Volume 2 <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20009MLR.txt>.
- USEPA. 1995. *Methods for the Determination of Organic Compounds in Drinking Water, Supplement III (with Errata Sheets)*. EPA-600/R-95/131. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. August. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=30003E77.txt>.
- USEPA. 2001. *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5*. EPA/240/B-01/003. U.S. Environmental Protection Agency Office of the Environmental Information. March. https://www.epa.gov/sites/default/files/2016-06/documents/r5-final_0.pdf.
- USEPA. 2002. *Guidance for Quality Assurance Project Plans EPA QA/G-5*. EPA/240/R-02/009. U.S. Environmental Protection Agency Office of Environmental Information, Washington, D.C. December. <https://www.epa.gov/sites/default/files/2015-06/documents/g5-final.pdf>.
- USEPA. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4*. EPA/240/B-06/001. U.S. Environmental Protection Agency Office of Environmental Information. February. <https://www.epa.gov/sites/default/files/2015-06/documents/g4-final.pdf>.

- USEPA. 2015. *Hazardous Waste Support Section SOP No. HW-37A Revision 0, SOM02.2 Polychlorinated Biphenyl (PCB) Aroclor Data Validation*. U.S. Environmental Protection Agency Region 2. June. https://www.epa.gov/sites/default/files/2020-08/documents/sop-pcb-hw-37a-rev_0-june_2015.pdf.
- USEPA. 2016a. *Hazardous Waste Support Section SOP No. HW-3a Revision 1, ISM02.2 ICP-AES Data Validation*. U.S. Environmental Protection Agency Region 2. September. https://www.epa.gov/sites/default/files/2020-10/documents/sop_hw-3a_icp-aes_rev1.pdf.
- USEPA. 2016b. *Hazardous Waste Support Section SOP NO. HW-3b Revision 1, ISM02.2 ICP-MS Data Validation*. U.S. Environmental Protection Agency Region 2. September. https://www.epa.gov/sites/default/files/2020-10/documents/sop_hw-3b_icp-ms_rev1.pdf.
- USEPA. 2016c. *Hazardous Waste Support Branch SOP No. HW-3c Revision 1, ISM02.2 Mercury and Cyanide Data Validation*. U.S. Environmental Protection Agency Region 2. September. https://www.epa.gov/sites/default/files/2020-10/documents/sop_hw-3c_hg_cn_rev1.pdf.
- USEPA. 2016d. *Hazardous Waste Support Section SOP No. HW-35A Revision 1, Semivolatile Data Validation*. U.S. Environmental Protection Agency Region 2. September. https://www.epa.gov/sites/default/files/2020-08/documents/sop_hw-35a_svoa_rev1_w_crf.pdf.
- USEPA. 2016e. *Hazardous Waste Support Section SOP No. HW-33A Revision 1, SOM02.2 Low/Medium Volatile Data Validation*. U.S. Environmental Protection Agency Region 2. September. https://www.epa.gov/sites/default/files/2020-08/documents/sop_hw-33a_lowmedium_voa_rev1_w_crf.pdf.
- USEPA. 2016f. *Hazardous Waste Support Section SOP No. HW-36A Revision 1, SOM02.2 Pesticide Data Validation*. U.S. Environmental Protection Agency Region 2. October. https://www.epa.gov/sites/default/files/2020-08/documents/sop-pesticide-hw-36a-rev_1-oct_2016.pdf.
- USEPA. 2020a. *National Functional Guidelines for Organic Superfund Methods Data Review (SFAM01.1)*. OLEM 9240.0-51, EPA 540-R-20-005. U.S. Environmental Protection Agency Office of Superfund Remediation and Technology Innovation, Washington, D.C. November. https://www.epa.gov/sites/default/files/2021-03/documents/nfg_for_organic_superfund_methods_data_review_november_2020.pdf.
- USEPA. 2020b. *National Functional Guidelines for Inorganic Superfund Methods Data Review (SFAM01.1)*. OLEM 9240.1-66, EPA 542-R-20-006. U.S. Environmental Protection Agency Office of Superfund Remediation and Technology Innovation, Washington, D.C. November. https://www.epa.gov/sites/default/files/2021-03/documents/nfg_for_inorganic_superfund_methods_data_review_november_2020.pdf.
- USEPA. 2021. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA publication SW-846, Third Edition, including Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI (2017-2019) and VII (2020-2021). U.S. Environmental Protection Agency, Washington, D.C. December. <https://www.epa.gov/hw-sw846/sw-846-compendium>.

ATTACHMENT 1

STANDARD OPERATING PROCEDURES

ATTACHMENT 1

STANDARD OPERATING PROCEDURES

- **Low-Flow Purging and Groundwater Sampling**
 - **Sampling Equipment Decontamination**
 - **Sediment Sampling**
 - **Surface Soil Sampling**
 - **Surface Water Sampling**
 - **Waste Soil Sampling**
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STANDARD OPERATING PROCEDURE LOW-FLOW PURGING AND GROUNDWATER SAMPLING

1.0 PURPOSE OF PROCEDURE

This Standard Operating Procedure (SOP) describes the guidelines for low-flow purging and groundwater sampling as described in the Site Management Plan or as otherwise specified.

2.0 GENERAL REQUIREMENTS AND CONSIDERATIONS

- A. Personnel involved in well development procedures will follow the prescribed procedures in the Health and Safety Plan (HASP).
- B. Well sampling will be documented to verify that proper procedures are followed. Documentation will be in accordance with the requirements specified Quality Assurance Project Plan (QAPP).

3.0 EQUIPMENT AND SUPPLIES

- Electronic tablet, field book and project plans
- Personal protective equipment in accordance with the HASP
- Water level indicator
- In-line multi-parameter water quality meter with flow-through cell (Horiba U-22, or equivalent)
- Plastic or stainless steel beaker (or similar)
- Decontamination supplies
- Low flow (less than 0.1 – 0.5 L/min) pump (peristaltic)
- Coolers and ice
- Sample bottles
- Shipping supplies

4.0 LOW-FLOW PURGING

- A. Immediately prior to pumping each monitoring well, the static water level will be measured with a clean water level meter. Measurements will be recorded to the nearest 0.01 foot.
- B. A peristaltic pump or equivalent with disposable tubing will be set up next to the sampling location on an elevated surface (table or cooler). In order to minimize interference and cross contamination, the dedicated tubing will be of high-density polyethylene (HDPE), polytetrafluoroethylene (PTFE, e.g., Teflon®) or equivalent. These materials are relatively inert for sampling inorganic or organic analytes. Therefore, negative bias towards the proposed groundwater sample analyses for VOCs is not anticipated.
- C. One end of dedicated tubing will be inserted into the well. The other end is attached to a short length of flexible (silicone) dedicated tubing, which will be threaded around the rotor, out of the pump, and connected to a discharge tube. The liquid moves totally within the tubing; thus no part of the pump contacts the liquid.
- D. During the initial low-flow sampling event, the pump will be started at its lowest speed setting and slowly increased until discharge occurs. After start-up, the water level will be

checked, and the pump speed will be adjusted until there is little or no water level drawdown (less than 0.3 feet). During pump start-up, drawdown may exceed the 0.3 foot target and then recover as pump flow adjustments are made. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, purging will continue until indicator parameters stabilize. During subsequent sampling events, the low-flow pumping rate established during the initial event will be used to purge each well. This rate will be adjusted as required to minimize drawdown.

- E. The water level and pumping rate will be monitored and recorded every five to ten minutes during purging. The pumping rate will be adjusted to ensure minimal drawdown. Any pumping rate adjustments will also be recorded. Surging of water during pumping will be avoided. The pump intake will be kept submerged to avoid pump suction loss or air entrainment and to ensure that the sample tubing remains filled with water.
- F. Purging will continue until indicator parameters stabilize.
- H. If the well goes dry before field parameters have stabilized, the well will be allowed to recharge for up to 24 hours and then sampled and the sample conditions (including field parameters) will be noted on the field sampling form. Full documentation of the efforts made to achieve stabilization will be recorded in the field notebook.
- I. All purge water will be transported to the Water Treatment Plant for disposal.

5.0 MONITORING OF INDICATOR PARAMETERS DURING PURGING

- A. All groundwater quality monitoring equipment will be decontaminated in accordance with the Equipment Decontamination SOP.
- B. All groundwater quality monitoring equipment will be calibrated daily, prior to use, per the manufacturer's specifications.
- C. Once an acceptable drawdown pumping rate is established and maintained, the designated field parameters will be monitored at 3-minute intervals using a flow-through cell. The required indicator parameters are pH, conductivity, temperature, and turbidity. The water level will also continue to be monitored and recorded, as well as any changes to the pumping rate.
- D. Purging is considered complete and sampling may begin when the indicator parameters listed above have stabilized. Stabilization has occurred when three consecutive readings, taken at ten-minute intervals, are within the following limits:
 - 1) pH: +/- 0.5 standard pH unit
 - 2) Conductivity: +/- 10%
 - 3) Temperature: +/- 0.5° C
 - 4) Turbidity: +/- 10% or < 10NTU or in a 10 NTU range for 30 min
- E. Water quality parameter will be collected using in-line multi-parameter water quality meter with flow-through cell meter.

- F. If sampling for total and filtered metals, a filtered and unfiltered sample will be collected. Samples may be filtered in the field using a 0.45-micron disposable filter. Alternatively, samples may be collected into the appropriate laboratory container and filtered in the laboratory.

6.0 GROUNDWATER SAMPLING

- A. Groundwater samples will be collected immediately after the indicator parameters have stabilized.
- B. Comments regarding the color and any obvious odors associated with the water will be recorded in the field notebook or electronic device.
- C. Samples will be collected using HDPE or Teflon-lined sample tubing. The sample tubing will be disconnected upstream (on the pump side) of the flow-through-cell prior to sample collection. Sample tubing will remain full during sampling.
- D. Aeration of samples will be minimized.
- E. Groundwater will be pumped slowly into the laboratory-supplied sample containers. VOA vials will be provided pre-preserved by the analytical laboratory. If natural effervescence is present in the samples, no preservative will be used for the VOC samples.
- F. VOA vials will be filled and sealed in accordance with headspace requirements prescribed by the analytical laboratory and the analysis method. If degassing bubbles are evident in vials, fresh samples will be obtained. The pumping velocity will be reduced as needed. In addition, it may be necessary to collect VOC samples without preservation to minimize effervescing effects.
- G. After sample collection, sample bottles will be labeled in accordance with current standards, and the appropriate chain of custody forms will be completed. The sample labels will be such: **Well ID_YYYY-MM-DD**
- H. Samples will be placed in appropriate containers, preserved to 4 deg C, sealed, and transported expeditiously to the analytical laboratory. Between collection and shipment, samples will be kept in a secure storage room or under the sampler's personnel control at all time. Sample packaging will follow laboratory guidelines and shipped via overnight shipping. All samples will be shipped to arrive at the laboratory within parameter specific holding times.
- I. Sample container, preservation, and holding times are detailed in Section 4 of the QAPP. Sample storage, packaging, shipment, sample control, and custody procedures are detailed in Section 4 of the QAPP.

STANDARD OPERATING PROCEDURE SAMPLING EQUIPMENT DECONTAMINATION

1.0 PURPOSE OF PROCEDURE

This Standard Operating Procedure (SOP) describes the guidelines for the decontamination of sampling equipment.

2.0 GENERAL REQUIREMENTS

- A. Procedures for decontamination of field personnel will be specifically addressed in the Health and Safety Plan (HASP).
- B. Decontamination activities will be documented to verify that proper procedures are followed. Documentation will be in accordance with the requirements specified in the Work Plan.

3.0 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

- A. All sampling equipment that may contribute to the contamination of a sample will be thoroughly decontaminated before its initial use, unless specific documentation exists that the sampling equipment has been decontaminated.
- B. Generally, sampling equipment can be cleaned by hand. Delicate equipment, such as the submersible pump, will be cleaned by hand. The following procedure is given as a typical sequence that will be modified based on site conditions.
- C. Other sampling equipment that can be cleaned by hand will be decontaminated as follows:
 - 1) Wash and scrub with detergent (non-ionic)
 - 2) Tap water rinse
 - 3) DI water rinse
 - 4) Isopropanol rinse, and
 - 5) Air dry.
- D. Steel tapes, water probes, transducers, thermometers, and water quality meters will be rinsed in distilled water or cleaned in a detergent solution and rinsed in DI water after each use.
- E. Pumps will be cleaned in water/detergent solution, followed by a tap water rinse, and flushed with DI water after each use.
- F. Use of high-pressure steam or hot water washing may be substituted for hand scrubbing if it effectively removes contaminants and soil and can be done safely without burning or contaminating the personnel. Special racks will be used to hold equipment during high-pressure washing. High-pressure washing will not be conducted on delicate equipment.
- G. More “complicated” samplers require more “complicated” decontamination procedures. The use of piston and other samplers with numerous internal parts should be avoided. If bladder pumps need to be used the decontamination sequence will be the same. The pump will be broken down to individual pieces and the bladder itself replaced.

- H. To the extent possible, sample tubing shall be either dedicated to a particular well/location or disposed after each use. Tubing that cannot be dedicated to a particular well/location will be disposed of and not used for any other purpose.
- I. Sampling and downhole equipment that has come into contact with non-aqueous phase liquids (NAPLs) or high concentration dissolved-phase contaminants (10 ppm range VOCs) will also undergo a rinse with isopropanol to ensure removal of organics. The decontamination steps for high concentration organics are:
 - 1) Wash and scrub with detergent (non-ionic)
 - 2) Tap water rinse
 - 3) Isopropanol rinse
 - 4) DI water rinse, and
 - 5) Air dry.

STANDARD OPERATING PROCEDURE

SEDIMENT SAMPLING

1.0 PURPOSE OF PROCEDURE

This Standard Operating Procedure (SOP) describes the guidelines for the collection of sediment samples.

2.0 GENERAL REQUIREMENTS

- A. Procedures for surface soil sampling will be specifically addressed in the Health and Safety Plan (HASP).
- B. Sediment sampling will be documented to verify that proper procedures are followed. Documentation will be in accordance with the requirements specified in the Quality Assurance Project Plan (QAPP).

3.0 EQUIPMENT AND SUPPLIES

- Field book and project plans
- Personal protective equipment in accordance with the HASP
- Stainless steel hand tools (trowel, spoon, hand auger)
- Stainless steel bowl
- Decon supplies
- Sample bottles
- Coolers and ice, and
- Shipping supplies.

4.0 SAMPLING AND LOGGING PROCEEDURES

4.1 Decontamination of Tools

- A. The sampling tools will be decontaminated (as described in the Sampling Equipment Decontamination SOP) prior to the first and between each sample.

4.2 Sample Collection

- A. Sediment samples may be collected as either a grab sample or as a composited sample. The sample type will be identified in the work plan. Additionally, depending on the parameter being sampled, the use of an En Core® or Terra Core® sample kit may be required. Sample collection details are provided below.
- B. Grab samples will be collected directly from the sediment surface into the appropriate sample container. The sampling location will be identified based on the requirements of the sampling program in the Project Work Plan. Samples will be collected using a stainless-steel trowel or spoon which has been decontaminated in accordance with the Equipment Decontamination SOP.
- C. Composited samples will be collected directly from the sediment surface into a clean, stainless-steel bowl. The sample collection locations will be identified based on the requirements of the sampling program in the Project Work Plan. Samples will be collected using a stainless-steel trowel or spoon which has been decontaminated in accordance with

the Equipment Decontamination SOP. Once the samples have been collected into the bowl, the sediments will be thoroughly mixed then placed into the appropriate sampling containers based on the analytical parameter list.

- D. For VOC analyses, one small Ziploc® bag and two sample containers will be filled with soil for field headspace analysis and off-site laboratory analysis. For all other analyses (SVOCs, Metals, Pesticides, and PCBs), samples will be placed in jars as prepared and provided by the laboratory.
- E. To collect an En Core® sample, insert the En Core® sampler into the soil to be sampled, being sure that the top of the plunger on the sampler is in the locked position (parallel to the handle of the sampler). Make sure that the En Core® sampler is completely filled with the sample (weight of sample should be five grams), level off the bottom of the sampler to remove any excess sample material. Cap coring body and remove the capped sampler by depressing locking lever. Attach the label on the coring body and return full En Core® sampler to the zipper bag. Seal the bag and put on ice.
- F. To collect a Terra Core® sample:
 - Step 1 - Have ready a 40ml glass VOA vial containing the appropriate preservative. With the plunger seated in the handle, push the Terra Core® into freshly exposed soil until the sample chamber is filled. A filled chamber will deliver approximately five or 10 grams of soil.
 - Step 2 - Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.
 - Step 3 - Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body. Place the mouth of the sampler into the 40ml VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down. Quickly place the lid back on the 40ml VOA vial. Note: When capping the 40ml VOA vial, be sure to remove any soil or debris from the top and/or threads of the vial.
- G. The samples submitted for laboratory analysis will be handled according to Section 4 of the QAPP under chain-of-custody procedures.
- H. For field duplicates, and matrix spike/matrix spike duplicate samples, sufficient extra volume must be collected for the laboratory to perform these quality control analyses.
- I. Jars, as prepared and provided by the laboratory will be filled with samples and placed in a cooler on ice for possible laboratory analysis.

5.0 DOCUMENTATION

- A. Documentation of sediment samples in the field logbook will be the responsibility of the supervising geologist/hydrogeologist.
- B. The following minimum information will be recorded during and upon completion of sampling.
 - Project name and number
 - Sample location identification

- Date of soil sample and time completed
- Depth to and length of sampling interval, and
- Name of supervising geologist/hydrogeologist.

STANDARD SURFACE SOIL SAMPLING

OPERATING

PROCEDURE

1.0 PURPOSE OF PROCEDURE

This Standard Operating Procedure (SOP) describes the guidelines for the collection of soils from within approximately five-feet of the ground surface.

2.0 GENERAL REQUIREMENTS

- A. Procedures for surface soil sampling will be specifically addressed in the Health and Safety Plan (HASP).
- B. Surface Soil sampling will be documented to verify that proper procedures are followed. Documentation will be in accordance with the requirements specified in the Quality Assurance Project Plan (QAPP).

3.0 EQUIPMENT AND SUPPLIES

- Field book and project plans
- Personal protective equipment in accordance with the HASP
- Marker stakes, flagging, and paint
- Stainless steel hand tools (trowel, spoon, hand auger)
- Stainless steel bowl
- Soil sample containers
- Decon supplies
- Sample bottles
- Coolers and ice, and
- Shipping supplies.

4.0 SAMPLING AND LOGGING PROCEEDURES

4.1 Decontamination of Tools

- A. The sampling tools will be decontaminated (as described in the Sampling Equipment Decontamination SOP) prior to the first and between each sample.

4.2 Sample Collection

- A. Soil samples may be collected as either a grab sample or as a composited sample. The sample type will be identified in the work plan. Additionally, depending on the parameter being sampled, the use of an En Core® or Terra Core® sample kit may be required. Sample collection details are provided below.
- B. Grab samples will be collected directly from the ground surface into the appropriate sample container. The sampling location will be identified based on the requirements of the sampling program in the Project Work Plan. Samples will be collected using a stainless-steel trowel or spoon which has been decontaminated in accordance with the Equipment Decontamination SOP.
- C. Composited samples will be collected directly from the ground surface into a clean, stainless-steel bowl. The sample collection locations will be identified based on the

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requirements of the sampling program in the Project Work Plan. Samples will be collected using a stainless-steel trowel or spoon which has been decontaminated in accordance with the Equipment Decontamination SOP. Once the samples have been collected into the bowl, the soil will be thoroughly mixed, then placed into the appropriate sampling containers based on the analytical parameter list.

- D. For VOC analyses, one small Ziploc® bag and two sample containers will be filled with soil for field headspace analysis and off-site laboratory analysis. For all other analyses (SVOCs, Metals, Pesticides, and PCBs), samples will be placed in jars as prepared and provided by the laboratory.
- E. To collect an En Core® sample, insert the En Core® sampler into the soil to be sampled, being sure that the top of the plunger on the sampler is in the locked position (parallel to the handle of the sampler). Make sure that the En Core® sampler is completely filled with the sample (weight of sample should be 5 grams), level off the bottom of the sampler to remove any excess sample material. Cap coring body and remove the capped sampler by depressing locking lever. Attach the label on the coring body and return full En Core® sampler to the zipper bag. Seal the bag and put on ice.
- F. To collect a Terra Core® sample:
 - Step 1 - Have ready a 40ml glass VOA vial containing the appropriate preservative. With the plunger seated in the handle, push the Terra Core® into freshly exposed soil until the sample chamber is filled. A filled chamber will deliver approximately five or 10 grams of soil.
 - Step 2 - Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.
 - Step 3 - Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body. Place the mouth of the sampler into the 40ml VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down. Quickly place the lid back on the 40ml VOA vial. Note: When capping the 40ml VOA vial, be sure to remove any soil or debris from the top and/or threads of the vial.
- G. The samples submitted for laboratory analysis will be handled according to Section 4 of the QAPP under chain-of-custody procedures.
- H. For field duplicates, and matrix spike/matrix spike duplicate samples, sufficient extra volume must be collected for the laboratory to perform these quality control analyses.
- I. Jars, as prepared and provided by the laboratory will be filled with soil and placed in a cooler on ice for possible laboratory analysis.

5.0 DOCUMENTATION

- A. Documentation of soil samples in the field logbook will be the responsibility of the supervising geologist/hydrogeologist.
- B. The following minimum information will be recorded during and upon completion of soil sampling.

- Project name and number
- Soil sample location identification
- Date of soil sample and time completed
- Generalized subsurface stratigraphy
- Depth to and length of sampling interval, and
- Name of supervising geologist/hydrogeologist.

STANDARD OPERATING PROCEDURE SURFACE WATER SAMPLING

1.0 PURPOSE OF PROCEDURE

This Standard Operating Procedure (SOP) describes the guidelines for surface water sampling as described in the Work Plan or as otherwise specified.

2.0 GENERAL REQUIREMENTS AND CONSIDERATIONS

- A. Personnel involved in well development procedures will follow the prescribed procedures in the Health and Safety Plan (HASP).
- B. Surface water sampling will be documented to verify that proper procedures are followed. Documentation will be in accordance with the requirements specified in the Quality Assurance Project Plan (QAPP).

3.0 EQUIPMENT AND SUPPLIES

- Field book and project plans
- Personal protective equipment in accordance with the HASP
- Survey stakes, flags
- Peristaltic pump
- Meters, probes and standards for in-situ measurements
- Sample bottles, and
- Shipping supplies.

4.0 DIRECT DIPPING METHOD

- A. The surface water sampling location will be identified in the field based on the mapping information included in the related work plan. The location of the sampling station should be identified and marked for future reference.
- B. At each location, the following water quality parameters may be measured in the field: pH, conductivity, temperature, and turbidity. The requirement for the measurement of these parameters will be identified in the Project Work Plan.
- D. Water quality measurements will be made using a flow through cell meter (Horiba U-52, YSI 6-Series, or equivalent). Calibration of the meter will be completed prior to use following the instrument manufacturer calibration protocols. Measurements should be obtained in-situ when possible; otherwise measurements can be obtained by immersing the instrument probes in a container filled with water from each sampling location. The container used for field measurements will be decontaminated between sampling locations by rinsing the container three times with water obtained at the new sampling location prior to collecting the field measurements.
- E. Samples will be obtained from the proposed sampling locations by direct grab. The sample bottle shall be inverted, and lowered to one-half the water depth, and held at about a 45° angle with the mouth of the bottle facing upstream. If the sample is unreachable, then use a telescoping pole with a clean poly dipper cup (laboratory supplied), and the water will be transferred to the appropriate container.

- F. If the sampling location is unreachable with the pole and cup method, personnel may wade out into the water to collect the sample provided they have assessed the activity and are able to mitigate all hazards associated with this task. In this case, the waders will also be decontaminated between sample locations.
- G. Sampling personnel shall not collect turbid or sediment-containing water, which could bias the sample results. If a laboratory supplied sample container contains a preservative added at the laboratory, then the sample will be collected from the pond using a new, clean glass container to collect the sample and transfer it into the pre-preserved laboratory container.
- H. Sampling containers and appropriate preservatives are based on the analyses to be performed on each sample. Appropriate sample containers will be used for the analyses to be performed on each sample collected during this task.
- J. When sampling for total and filtered metals, a filtered and unfiltered sample will be collected. Filtered samples may be obtained using a 0.45-micron disposable filter.
- K. After collection, samples will be labeled following current conventions, and the appropriate chain-of-custody forms will be completed. Sample labels shall be as follows: **LOCATION ID _YYYY-MM-DD**.
- L. Samples will be placed in appropriate containers (e.g., ice-filled coolers), preserved to a minimum of 4°C, sealed (to maintain the proper COC), and transported expeditiously to the analytical laboratory.
- M. Sample container, preservation, and holding times are detailed in Section 4 of the QAPP. Sample storage, packaging, shipment, sample control and custody procedures are detailed in Section 4 of the QAPP.

4.1 Peristaltic Pump Samplers Method

- A. Another device that can be effectively used to sample surface water is the peristaltic pump system. The use of a metal/PVC conduit to which the tubing is attached, allows for the collection of a surface water sample. Tubing will be changed between sampling locations to prevent cross contamination.
- B. Peristaltic pumps vary in size and capability, with some being designed specifically for the simultaneous collection of multiple water samples.
- C. At each location, the following water quality parameters will be measured in the field: pH, conductivity, temperature, and turbidity. Water quality parameter will be collected using in-line multi-parameter water quality meter with flow-through cell meter. Note that samples should not be collected after passing through the water quality meter but directly after the peristaltic pump.
- D. When sampling for total and filtered metals, a filtered and unfiltered sample will be collected. Filtered samples may be obtained using a 0.45-micron disposable filter.
- E. After sample collection, sample bottles will be labeled, and the appropriate chain-of-custody forms will be completed.

- F. Samples will be placed in appropriate containers (e.g., ice-filled coolers), preserved to a minimum of 4°C, sealed (to maintain the proper COC), and transported expeditiously to the analytical laboratory.
- G. Sample container, preservation, and holding times are detailed in Section 4 of the QAPP. Sample storage, packaging, shipment, sample control, and custody procedures are detailed in Section 4 of the QAPP.

5.0 DOCUMENTATION

- A. All aspects of the surface water sampling will be recorded in a project field book. The following water quality parameters will be measured in the field: pH and temperature, conductivity, and turbidity. In addition, sample location, site conditions, weather, any deviations from this SOP and any other pertinent information will be recorded.

STANDARD OPERATING PROCEDURE WASTE SOIL SAMPLING

1.0 PURPOSE OF PROCEDURE

This Standard Operating Procedure (SOP) describes the guidelines for the collection of samples of soil waste generated during excavations in the North Site Cover. Soils may be staged in stockpiles or roll off containers. This will include those samples collected for waste characterization of soils for disposal.

2.0 GENERAL REQUIREMENTS

- A. Procedures for sampling will be specifically addressed in the Health and Safety Plan (HASP).
- B. Waste soil sampling will be documented to verify that proper procedures are followed. Documentation will be in accordance with the requirements specified in the Quality Assurance Project Plan (QAPP).

3.0 EQUIPMENT AND SUPPLIES

- Field book and project plans
- Personal protective equipment in accordance with the HASP
- Marker stakes, flagging, and paint
- Stainless steel hand tools (trowel, spoon, hand auger)
- Stainless steel bowl
- Soil sample containers
- Decon supplies
- Sample bottles
- Coolers and ice, and
- Shipping supplies.

4.0 SAMPLING AND LOGGING PROCEEDURES

4.1 Decontamination of Tools

- A. The sampling tools will be decontaminated (as described in the Sampling Equipment Decontamination SOP) prior to the first and between each sample.

4.2 Sample Collection

- A. Samples may be collected as either a grab sample or as a composited sample. The sample type will be identified in the work plan. Additionally, depending on the parameter being sampled, the use of an En Core® or Terra Core® sample kit may be required. Sample collection details are provided below.
- B. Grab samples will be collected directly from the accumulated material into the appropriate sample container. The sampling location will be identified based on the requirements of the sampling program in the Project Work Plan. Samples will be collected using a stainless-steel trowel or spoon which has been decontaminated in accordance with the Equipment Decontamination SOP.

- C. Composited samples will be collected directly from the sampling material into a clean, stainless-steel bowl. The sample collection locations will be identified based on the requirements of the sampling program in the Project Work Plan. Samples will be collected using a stainless-steel trowel or spoon which has been decontaminated in accordance with the Equipment Decontamination SOP. Once the samples have been collected into the bowl, the soil will be thoroughly mixed, then placed into the appropriate sampling containers based on the analytical parameter list.
- D. For VOC analyses, one small Ziploc® bag and two sample containers will be filled with soil for field headspace analysis and off-site laboratory analysis. For all other analyses (SVOCs, Metals, Pesticides, and PCBs), samples will be placed in jars as prepared and provided by the laboratory.
- E. To collect an En Core® sample, insert the En Core® sampler into the soil to be sampled, being sure that the top of the plunger on the sampler is in the locked position (parallel to the handle of the sampler). Make sure that the En Core® sampler is completely filled with the sample (weight of sample should be 5 grams), level off the bottom of the sampler to remove any excess sample material. Cap coring body and remove the capped sampler by depressing locking lever. Attach the label on the coring body and return full En Core® sampler to the zipper bag. Seal the bag and put on ice.
- F. To collect a Terra Core® sample:
- Step 1 - Have ready a 40ml glass VOA vial containing the appropriate preservative. With the plunger seated in the handle, push the Terra Core® into freshly exposed soil until the sample chamber is filled. A filled chamber will deliver approximately five or 10 grams of soil.
 - Step 2 - Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.
 - Step 3 - Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body. Place the mouth of the sampler into the 40ml VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down. Quickly place the lid back on the 40ml VOA vial. Note: When capping the 40ml VOA vial, be sure to remove any soil or debris from the top and/or threads of the vial.
- G. The samples submitted for laboratory analysis will be handled according to Section 4 of the QAPP under chain-of-custody procedures.
- H. For field duplicates, and matrix spike/matrix spike duplicate samples, sufficient extra volume must be collected for the laboratory to perform these quality control analyses.
- I. Jars, as prepared and provided by the laboratory will be filled with soil and placed in a cooler on ice for possible laboratory analysis.

5.0 DOCUMENTATION

- A. Documentation of soil samples in the field logbook will be the responsibility of the supervising geologist/hydrogeologist.

B. The following minimum information will be recorded during and upon completion of sampling.

- Project name and number
- Soil sample location identification
- Date of soil sample and time completed
- Generalized subsurface stratigraphy
- Depth to and length of sampling interval, and
- Name of supervising geologist/hydrogeologist.

APPENDIX K SITE MANAGEMENT FORMS

**FMC CORPORATION ORLEANS COUNTY, NEW YORK
FMC DUBLIN ROAD SITE
SITE-WIDE INSPECTION FORM**

FREQUENCY: **ANNUAL**

INSPECTOR(S): _____

DATE: _____

Inspections	Condition	Comments
Visual Inspection of Security Fence	Fence in good repair, not missing barbed wire sections, sections no excess vegetation, trees fallen across fence, locks in place on 3 gates, signs in place and undamaged	
Inspection of Wetland Weir	Water flowing through weir, drainage channel is clear, indicate if water is flowing at the time. Inspect structural integrity of device	
Inspection of Monitoring Wells	wells painted and labelled, accessible, locked, no insect nests, capped, concrete surface in good condition, steel casing in good condition	
Inspection of Containment Cell Sumps	verify that the sumps have been pumped as required, that they are painted and labelled, no excess vegetation, caps are in place. Marker stakes are present	
Recommendations	(Recommended changes to engineering controls)	

**FMC CORPORATION
ORLEANS COUNTY, NEW YORK
FMC DUBLIN ROAD SITE
FENCING INSPECTION**

FREQUENCY: _____

DATE: _____

INSPECTOR(S): _____

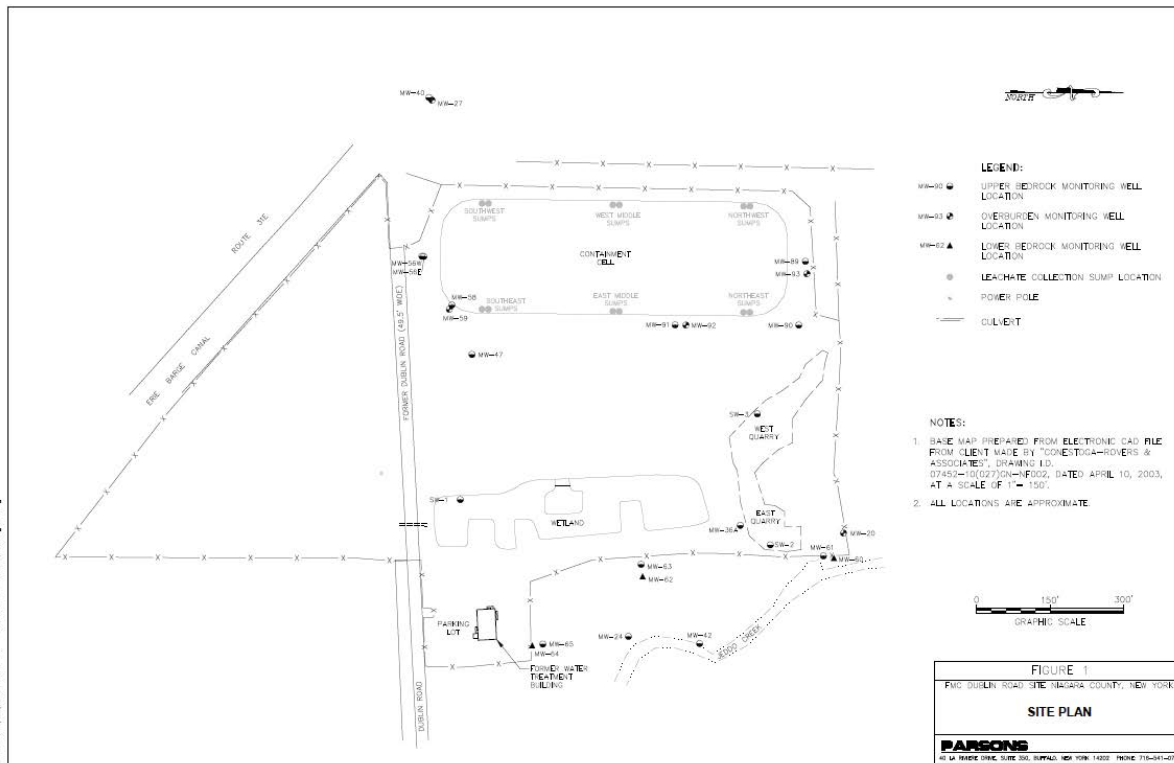
TIME: _____

Inspect for damage to access gate, fence posts, chain link, excessive vegetation growing on fence, barbed wire posts & strands

Description of deficiencies:

Action Required?

yes	no
yes	no
yes	no
yes	no
yes	no
yes	no
yes	no



FMC CORPORATION
ORLEANS COUNTY, NEW YORK
FMC DUBLIN ROAD SITE

CONTAINMENT CELL COVER INSPECTION

FREQUENCY: _____

DATE: _____

INSPECTOR(S): _____

TIME: _____

Inspection Comments

Inspect For

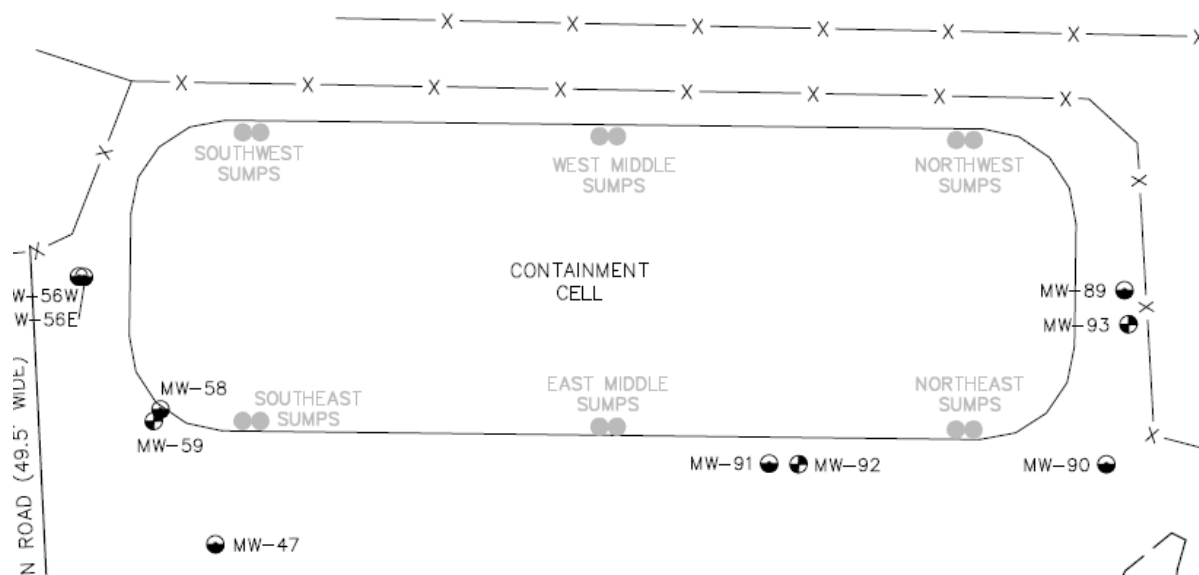
Action Required?

Vegetative Cover

- (i) Erosion
- (ii) Bare areas
- (iii) Puddles/settlement
- (iv) Dead/dying grass
- (v) Weeds/brushes
- (vi) Animal holes/burrows
- (vii) Sediment in ditches
- (viii) Other _____

yes	no
yes	no
yes	no
yes	no
yes	no
yes	no
yes	no
yes	no

Indicate location of all required action on the following diagram of the containment cell.



APPENDIX L REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

APPENDIX L:
REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

REMEDIAL SYSTEM OPTIMIZATION FOR THE DUBLIN ROAD SITE

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2.5.1 System Goals and Objectives

2.5.2 System Description

2.5.3 Operation and Maintenance Program

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3.2 TREATMENT SYSTEM PERFORMANCE

3.3 REGULATORY COMPLIANCE

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3.5 SAFETY RECORD

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4.1.2 Sampling

4.1.3 Conceptual Site Model (Risk Assessment)

4.2 RECOMMENDATIONS TO IMPROVE PERFORMANCE

4.2.1 Maintenance Improvements

4.2.2 Monitoring Improvements

4.2.3 Process Modifications

4.3 RECOMMENDATIONS TO REDUCE COSTS

4.3.1 Supply Management

4.3.2 Process Improvements or Changes

4.3.3 Optimize Monitoring Program

4.3.4 Maintenance and Repairs

4.4 RECOMMENDATIONS FOR IMPLEMENTATION

APPENDIX M REQUEST TO IMPORT/REUSE FILL MATERIAL FORM



**NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**



Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is:

Have Ecological Resources been identified?

Is this soil originating from the site?

How many cubic yards of soil will be imported/reused?

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone?

Does it contain less than 10%, by weight, material that passes a size 100 sieve?

Is this virgin material from a permitted mine or quarry?

Is this material recycled concrete or brick from a DEC registered processing facility?

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

Signature

Date

Print Name

Firm

APPENDIX N RESPONSIBILITIES OF OWNER AND REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan (“SMP”) for the Dublin Road site (the “site”), number 837001, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

Village of Middleport (PO Box 186 Middleport, NY, 14105-0186) and FMC Corporation (2929 Walnut Street Philadelphia, PA, 19104)

(the “owner”).

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party (“RP”) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (“NYSDEC”) is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

FMC Corporation (2929 Walnut Street Philadelphia, PA, 19104).

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner’s Responsibilities:

- 1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.
- 2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a(n) environmental easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP’s request, in order to allow the RP to include the certification in the site’s Periodic Review Report (PRR) certification to the NYSDEC.

- 3) In the event the site is delisted, the owner remains bound by the environmental easement and shall submit, upon request by the NYSDEC, a written certification that the environmental easement is still in place and has been complied with.
- 4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
- 5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 – Notifications.
- 6) If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 – Notifications and coordinate the performance of necessary corrective actions with the RP.
- 7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.

Remedial Party Responsibilities

- 1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.
- 2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

- 3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.
- 4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
- 5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 – Notifications of the SMP.
- 7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.
- 8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX 0 AS-BUILT DRAWINGS

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DAVCO SYSTEMS, INC
000-000 9-9-96

TITLE SHEET

REV 0 DRAWING INDEX & LOCATION MAP
(DELETED FROM PACKAGE)
(DELETED FROM PACKAGE)
(DELETED FROM PACKAGE)
(DELETED FROM PACKAGE)

REV 3 WET LAND RESTORATION AND SITE
REVEGETATION PLAN, SECTIONS, AND DETAIL
REV 1 CONTAINMENT CELL PLAN AND SECTIONS
(DELETED FROM PACKAGE)

REV 2 TYPICAL DETAILS
REV 1 GROUNDWATER EXTRACTION DETAILS AND
TRENCH PROFILE

REV 1 CONTAINMENT CELL PLAN AND SECTIONS
(DELETED FROM PACKAGE)

REV 2 CONTAINMENT CELL SECTIONS
(DELETED FROM PACKAGE)

REV 2 WATER TREATMENT BUILDING FOUNDATION
PLAN AND SECTIONS

REV 2 WATER TREATMENT BUILDING STRUCTURAL
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REV 1 WATER TREATMENT BUILDING FLOOR PLAN AND
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REV 1 BUILDING CONTROL PANELS SCHEMATIC
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REV 1 EXTRACTION WELLS PIPING AND
INSTRUMENTATION DIAGRAM

(DELETED FROM PACKAGE)
REV 1 EXTRACTION WELLHEAD
(DELETED FROM PACKAGE)

REV 1 WATER COLLECTION SUMPS T1 AND T2
(DELETED FROM PACKAGE)

(DELETED FROM PACKAGE)
(DELETED FROM PACKAGE)
(DELETED FROM PACKAGE)

NIAGARA BOUNDARY AND MAPPING SERVICES

4440-96-A 8-22-96

41783-93 8-96

MAP SHOWING AS BUILT TOPOGRAPHIC SURVEY
OF LANDS OWNED BY VILLAGE OF MIDDLEPORT
MAP SHOWING UPDATED TOPOGRAPHIC SURVEY
OF PROPERTY OWNED BY FMC CORPORATION

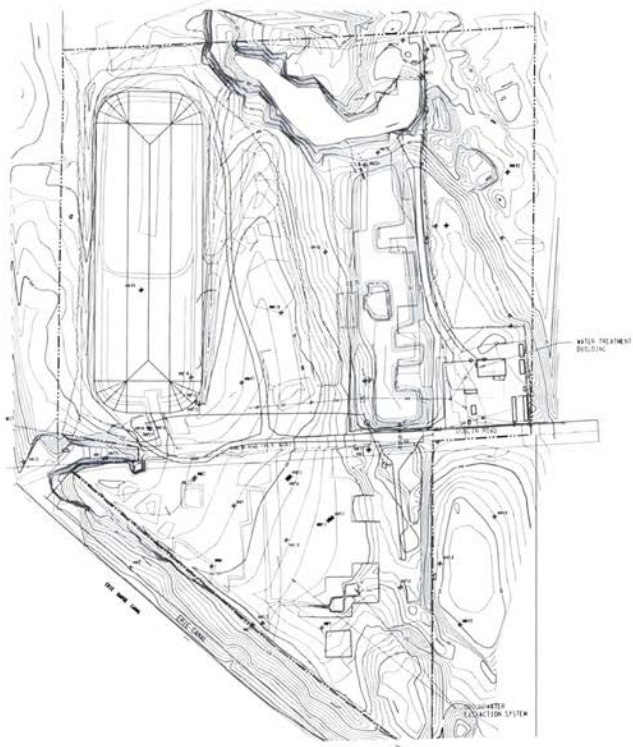
REMCOR

94025-E22 5-4-95
94025-E23 5-4-95

FIGURE 1, CELL EXTENSION PLAN
FIGURE 2, CROSS SECTION A-A AND
OLD NEW LINING SYSTEM JOINING DETAIL

ANDCO ENVIRONMENTAL PROCESSES, INC

3-12594-01 1 OF 3 REV 0 PROCESS & INSTRUMENTATION DIAGRAM
3-12594-01 2 OF 3 REV 1 PROCESS & INSTRUMENTATION DIAGRAM
3-12594-01 3 OF 3 REV 1 PROCESS & INSTRUMENTATION DIAGRAM
3-12594-05 1 OF 9 REV 1 ELECTRICAL SCHEMATICS
3-12594-05 2 OF 9 REV 0 ELECTRICAL SCHEMATICS
3-12594-05 3 OF 9 REV 3 ELECTRICAL SCHEMATICS
3-12594-05 4 OF 9 REV 1 ELECTRICAL SCHEMATICS
3-12594-05 5 OF 9 REV 3 ELECTRICAL SCHEMATICS
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3-12594-05 9 OF 9 REV 2 ELECTRICAL SCHEMATICS
3-12594-06 1 OF 2 REV 0 MAIN CONTROL PANEL FRONT VIEW
3-12594-06 2 OF 2 REV 2 MAIN CONTROL PANEL INSIDE VIEW

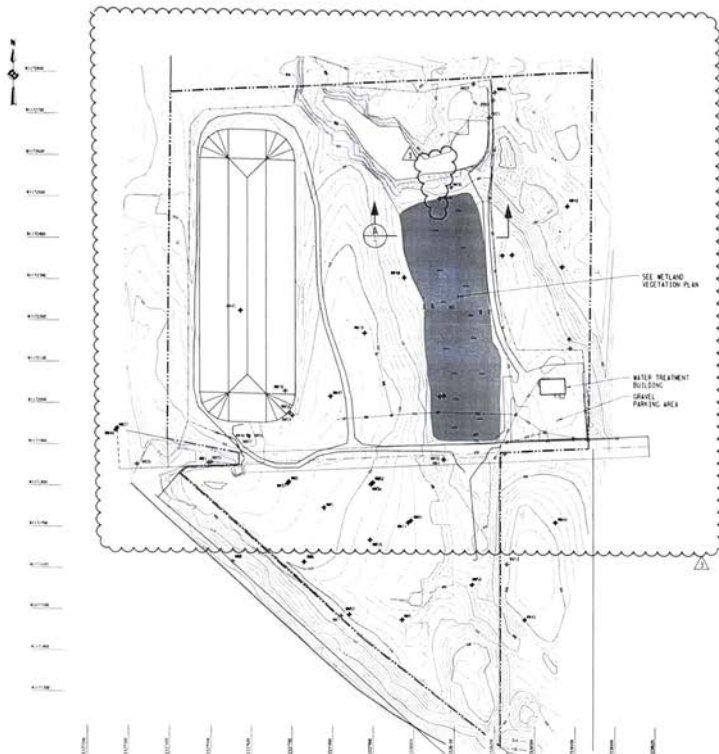


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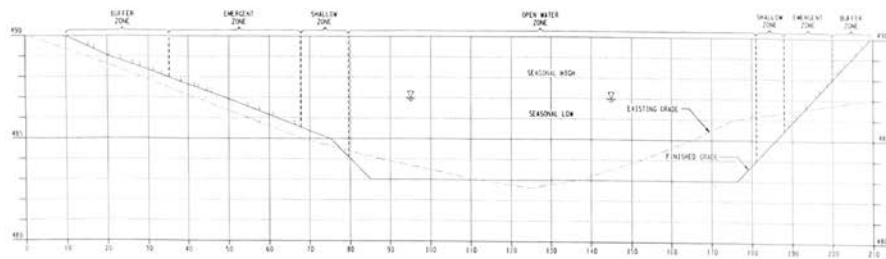
LEGEND

REFERENCE DRAWINGS

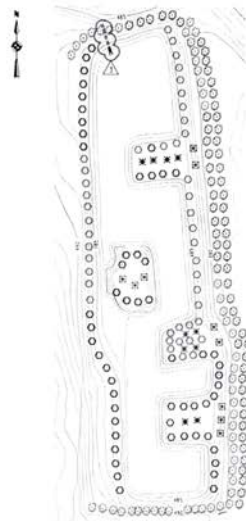
AS BUILT	
LEGEND FOR CONSTRUCTION	
REDFIELD ASSOCIATES PROFESSIONAL CORPORATION INC CIVIL ENGINEER	
FMC CORPORATION	
DUBLIN ROAD SITE REMEDIAL ACTION DRAWING INDEX AND LOCATION MAP	
JOB NO.	DRAWING NO.
19714	19714-X-01



SITE PLAN
1"=100'



SECTION
HORIZ. 1"=10' VERT. 1"=2'



WETLAND VEGETATION PLAN
1"=100'

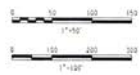
1. INITIAL SEEDING SHALL BE WITH ANNUAL WHEATGRASS OF ENTIRE WETLAND RESTORATION AREA. THEN RESEED WITH WHEATGRASS AND PERENNIAL WHEATGRASS.
2. PROVIDE EMERGENT SPECIES IN WETLAND EMERGENT ZONE ON A GRID OF 3 FT ON CENTER AGGRAVATED BY SPECIES.
3. PROVIDE SHrub SPECIES IN WETLAND EMERGENT ZONE IN TRIANGULAR GROUPS OF SAME SPECIES.
4. PROVIDE BUFFER SPECIES IN WEDGE LIKE ROW WITH AUTUMN OLIVE ON DOWNGRADIENT SLOPE AND JAPANESE BARBERRY ALONG PERENNIAL BUFFER ZONE.
5. PROVIDE TREE SEEDINGS AT EDGE OF OPEN WATER IN SHALLOW ZONE TO SHADE PERENNIAL OPEN WATER.
6. REVEGETATE CONTAMINANT CELL CLUSTER ONE, EXHAUSTED AND BROWN FILL AREA, AND OTHER AREA, CLEARLY ON RESTORATION FOR CONSTRUCTION ACTIVITIES. REVEGETATE IN ACCORDANCE WITH TECHNICAL SPECIFICATION WITH C-07.
7. MONITORING WELLS SHALL BE SAMPLED DURING THE LONG TERM CLEANUP VERIFICATION PROGRAM AND SHALL REMAIN UNDISTURBED DURING REVEGETATION ACTIVITIES. SEE TABLE 1 ON DWG. C-07.

LEGEND

- WETLAND EMERGENT (SEE NOTE 211)
- COMMON PRAIRIEGRASS
- BLUE FLAX
- EASTERN BLUE GRASS
- SECONDARY WETLAND AND SHrub SPECIES (SEE NOTE 211)
- COMMON PRAIRIEGRASS
- SLIPY DOCKWORT
- BUFFER ZONE (SEE NOTE 411)
- AUTUMN OLIVE
- JAPANESE BARBERRY
- BUFFER ZONE 1
- GREEN WHEAT SEEDINGS
- BLACK WHEAT SEEDINGS
- EXISTING FENCE
- EXTRACTION WELL
- MONITORING WELL
- WETLAND AREA

REFERENCE DRAWINGS

SITE LAYOUT OPERATIONS PLAN 19714-C-02



NO.	DATE	DESCRIPTION	BY	CHECKED
1	11/11/90	AS BUILT		
2		REVISED WETLAND AREA AND RESTORATION ZONE	ADD. JED	11/11/90
3		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
4		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
5		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
6		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
7		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
8		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
9		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90
10		RELOCATION OF WETLAND AND RESTORATION ZONE	ADD. JED	11/11/90

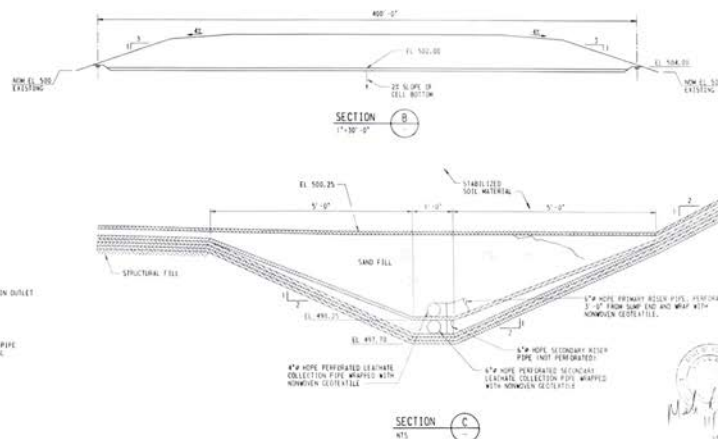
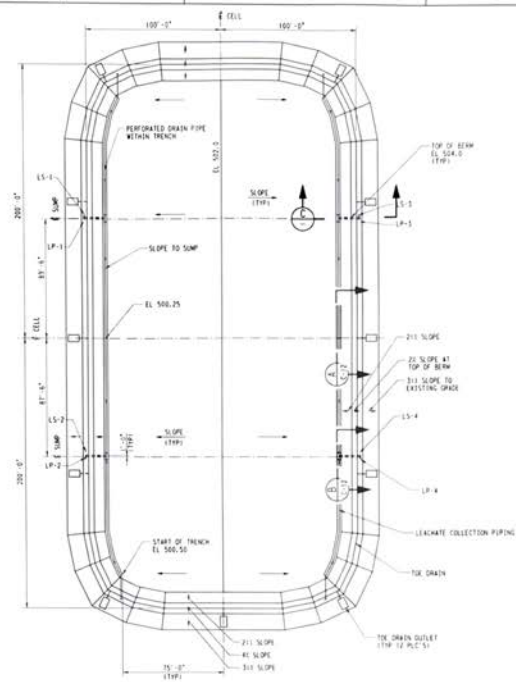
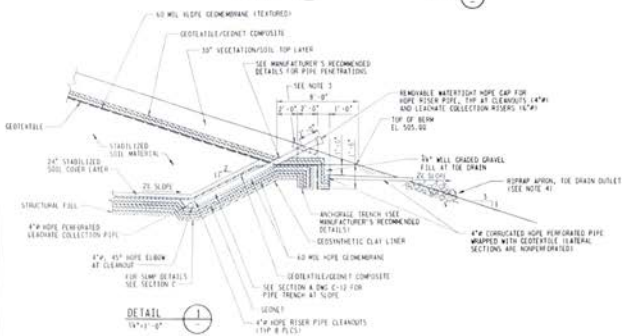
BECHTEL ASSOCIATES PROFESSIONAL CORPORATION - NY
DAR RIDGE, TENNESSEE

FMC CORPORATION

WETLAND RESTORATION AND SITE REVEGETATION
PLANS AND SECTION

JOB NO.	DRAWING NO.	REV.
19714	19714-C-05	3

Handwritten signature and date: 11/11/90



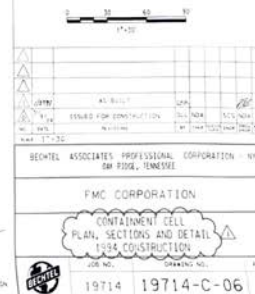
- NOTES**
1. FOR CONTAINMENT CELL BOTTOM LINER AND FINAL COVER MATERIAL AN INSTALLATION REQUIREMENTS SEE TECHNICAL SPECIFICATION CSP-27.
 2. FOR CONTAINMENT CELL SUBGRADE PREPARATION, SEE DRAWINGS 13114-C-102.
 3. CONCRETE PAD SHALL BE 2' x 2' x 4" 12" PAD AT ELEMENTS AND 2' x 2' x 12" PAD AT SELECTION COLLECTION PIPING. CONCRETE COMpressive STRENGTH SHALL BE 3000 PSI.
 4. RUBBER SEAL MAY AVOID FINE STONE FILL (420-2.02).
- SEE OTHER DRAWINGS SHEETS E-1 AND SHEETS 1,2,3 FOR FINAL CONTAINMENT CELL DIMENSIONS.

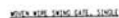
LEGEND

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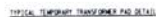
REFERENCE DRAWINGS

CONFINEMENT CELL PLAN AND SECTIONS	19718-C-10
CONFINEMENT CELL SECTIONS	19718-C-12





CULVERT NUMBER	NUMBER OF PIPES	CULVERT INLET (INLET ELEVATION "A" - FET)	CULVERT OUTLET (OUTLET ELEVATION "B" - FET)	CULVERT PIPE NOMINAL SIZE (INCHES)	CULVERT LENGTH (FEET)	REMARKS
CV-1	1	FIELD DETERMINED	FIELD DETERMINED	18	25.0	
CV-2	1	FIELD DETERMINED	FIELD DETERMINED	24	10.0	SEE DETAIL 1 (PAGE 3) FOR INLET STRUCTURE
CV-3	1	FIELD DETERMINED	FIELD DETERMINED	18	10.0	
CV-4	1	FIELD DETERMINED	FIELD DETERMINED	12	25.0	
CV-5	1	FIELD DETERMINED	FIELD DETERMINED	12	20.0	



1914 CBE-2024

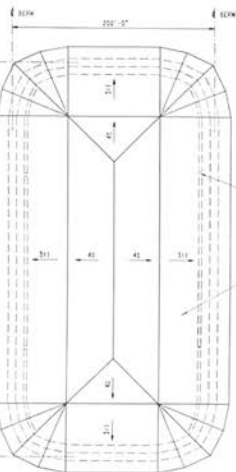
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BECHTEL ASSOCIATES PROFESSIONAL CORPORATION - NY
CAM RIDGE, TENNESSEE

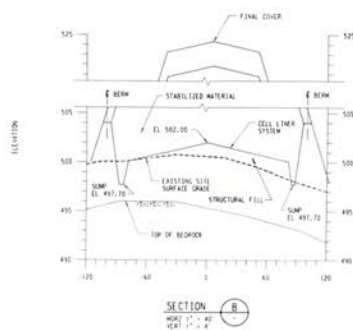
FMC CORPORATION

TYPICAL DETAILS

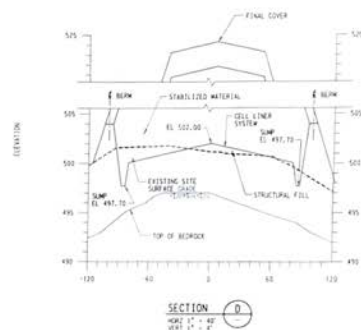
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	19714	19714-C-08	2



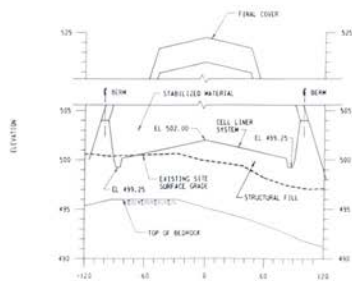
PLAN CONTAINMENT CELL
1" = 40'



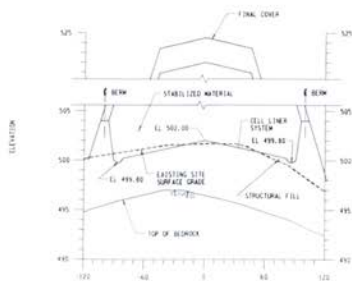
SECTION A-A
HORIZ. 1" = 40'
VERT. 1" = 4'



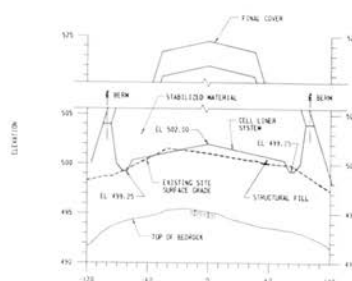
SECTION B-B
HORIZ. 1" = 40'
VERT. 1" = 4'



SECTION C-C
HORIZ. 1" = 40'
VERT. 1" = 4'



SECTION D-D
HORIZ. 1" = 40'
VERT. 1" = 4'



SECTION E-E
HORIZ. 1" = 40'
VERT. 1" = 4'

NOTES

- EXISTING SITE SURFACE GRADE IS ESTABLISHED FROM SURVEY DATA OBTAINED BY ALASKA ROADS AND MAPS SERVICE, DATED APRIL 1953.
- TOP OF BERMS IS ESTABLISHED FROM WATER MARKING DATA OBTAINED BY GLENN AND WILSON, DATED 1970.
- SEE SPECIFICATION 1971A-C-10 FOR CONSTRUCTION OF CONTAINMENT CELL.
- SEE RECORD DRAWINGS 1971A-C-10 AND 1971A-C-11 FOR FINAL CONTAINMENT CELL DIMENSIONS.

LEGEND

REFERENCE DRAWINGS

CONTAINMENT CELL
PLAN, SECTIONS AND DETAILS

1971A-C-10



DATE	4-10-76	BY	WJC
ISSUED FOR CONSTRUCTION	YES	NO	NO
REVISION	BY	DATE	DESCRIPTION
NO.	DATE	NO.	DATE

BEUTEL ASSOCIATES PROFESSIONAL CORPORATION - NY
JAN RIDGE, TENNESSEE

FMC CORPORATION

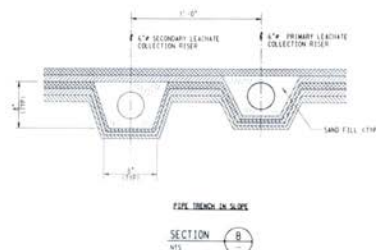
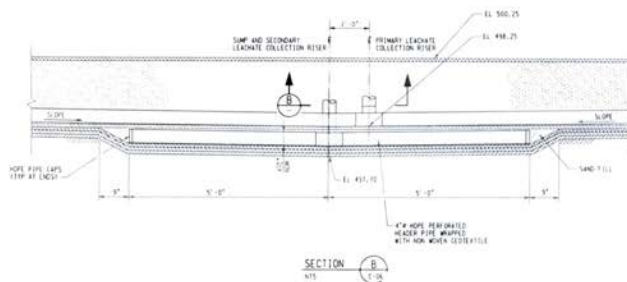
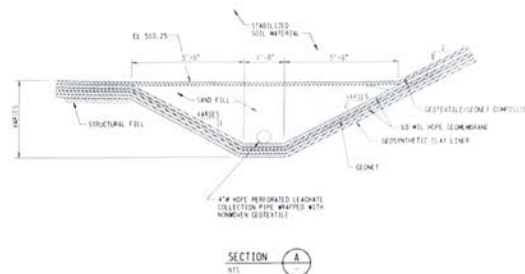
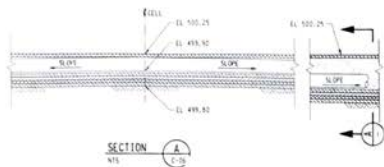
CONTAINMENT CELL
PLAN AND SECTIONS
1984 CONSTRUCTION

1971A-C-10



1971A-C-10

1



1. FOR CONTAINMENT CELL SURFACE PREPARATION, SEE DRAWING 17114-C-10.
2. FOR CONTAINMENT CELL SURFACE PREPARATION, SEE DRAWING 17114-C-11.

LEGEND

REFERENCE DRAWINGS

CONTAINMENT CELL PLAN AND ELEVATION	17114-C-10
CONTAINMENT CELL PLAN AND ELEVATION	17114-C-11

DATE	NO. REV.	DATE	REV.
1/1/74	1	1/1/74	1
1/1/74	2	1/1/74	2
1/1/74	3	1/1/74	3

RENTAL ASSOCIATES PROFESSIONAL CORPORATION - NY
ON 10/1/74, TENNESSEE

FMC CORPORATION

CONTAINMENT CELL
SECTIONS

JOB NO.	DRAWING NO.	REV.
17114	17114-C-12	1

